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## **INFORUM model development in Latvia: problems and solutions**

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Nowadays the significance of development and use of economic models doesn't decrease. The importance of economic modelling maintains its positions and plays a relevant role in the analysis of behaviour of national economy. Various types of economic models, including multisectoral macroeconomic models, have been developed for the analysis of different economic processes and needs. The multisectoral macroeconomic models differ from country to country but they also have a lot of similarities.

Model builders of any type of economic models face a wide variety of problems in different fields. These problems impede or even completely stop the process of multisectoral macroeconomic model development. Hence without solving or discarding these problems it is impossible to implement the models that are under construction.

At present, in Latvia, there has not been developed such a multisectoral macroeconomic model that could be actually used on a regular basis for the analysis and prognosis of economic processes, and for modelling and estimating the results of the economic policy as well as various economic shocks. The exceptions are the classic input-output analysis static models that are based on input-output tables and direct and full technical coefficients tables. These models are used by the Latvian Ministry of Economics.

This situation in many ways is related to the fact that the development and application process of multisectoral macroeconomic models demands an enormous amount of information, particularly trained personnel, solid and long-standing experience in the field of economic mathematical modelling, dealing with many complicated and complex methodological problems, as well as time and information technology resources.

The underestimation of modelling of economic processes by the economists is one of the obstacles precluding the development of macroeconomic mathematical modelling in Latvia. Even most prominent economists launch their hypotheses about further development of the national economy and interindustry interdependence mainly on

the basis of their personal knowledge and experience, applying the simplest forecasting methods to substantiate their hypotheses.

The development process of the multisectoral macroeconomic models is heavily influenced by the low level and fragmentary government funding allocated for modelling purposes. In fact, only the enthusiasm of the modellers and the understanding of usefulness and wide variety of applications keep economic modelling traditions alive, which has mainly stimulated the recent development of multisectoral macroeconomic modelling in Latvia.

To date, in Latvia, the most notable developments are connected with the development of INFORUM type models. This was also reported at the 12<sup>th</sup> INFORUM conference in 2004 (Ascea, Italy). The results are published in the conference materials (see Grassini (2004), G.Pinke, R.Pocs, L.Neiders (2004)). In 2005, the problems concerning the multisectoral macroeconomic model development process in Latvia were ascertained and solutions were proposed, the existing version of the model was upgraded (with great assistance of Prof. M.Grassini), and specific issues concerning implementation of calculations were researched.

When analysing problems of multisectoral macroeconomic model development, according to the authors, they could be grouped by two features:

- 1) the phase of the model building process, in which specific problems arise;
- 2) the field, where the particular problem arises.

Figure 1 illustrates grouping of major model development problems in Latvia.

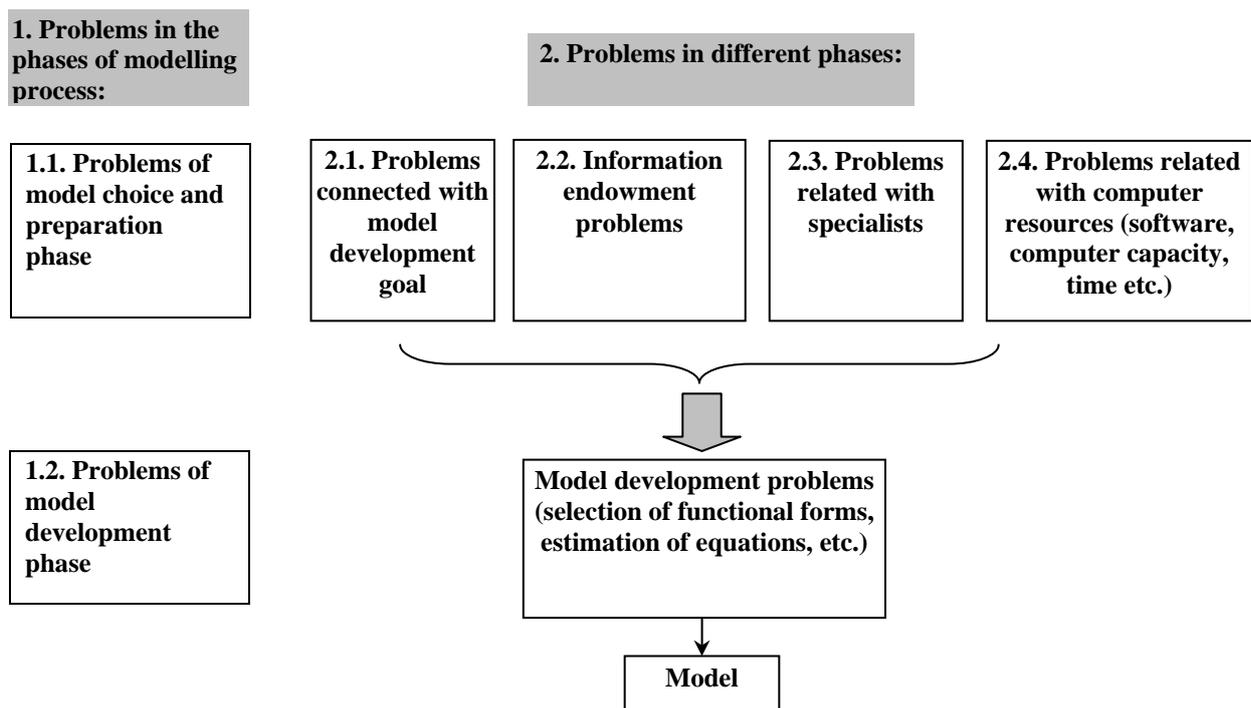


Figure 1. **Grouping of model building problems**

As for the problems connected with the choice of the model and preparation phase, the most essential problems are connected with the model development goal. The most crucial one is the problem related to the substantiation of the goal. The model development goal must be achievable in real life and within time limits. Frequently too many tasks are addressed for a certain model, hence it is complicated to implement this model. For this reason, it is necessary to correct or change model tasks. In practice, traditionally a model has a certain goal and at the same time there are quite strict time limits within which it must be developed. And this fact limits the possibilities to change model characteristics and reshape the model completely.

Time after time model builders try to develop too large models that could be used to solve many tasks and meet a wide variety of goals. Such a situation usually arises, when model builders strive to build a universal, general economic model and address very different and contradictory needs of modelling of economic processes. If the statement of the goal is not changed, these fundamental problems force the modellers to pause or even stop the model development process. During the model building process it is almost impossible to find an effective and fast solution to solve these fundamental problems.

Nevertheless, at present, the most significant problems are the problems concerning information endowment. These problems are the most essential ones to be encountered when developing the Latvian multisectoral macroeconomic model. In Latvia, for the INFORUM model developers various problems arise due to data endowment as well as data consistency with the model development goals.

The information database of the multisectoral macroeconomic model consists of data taken from the statistical bulletin of input-output statistics, national accounts statistics etc. Depending on the model type and model development goal, necessary time series are being included in the model database.

Figure 2 represents major information endowment problems faced by model builders in Latvia concerning the availability, amount, quality and credibility of data. The estimation of major problem groups is subjective and can differ from estimates by other specialists.

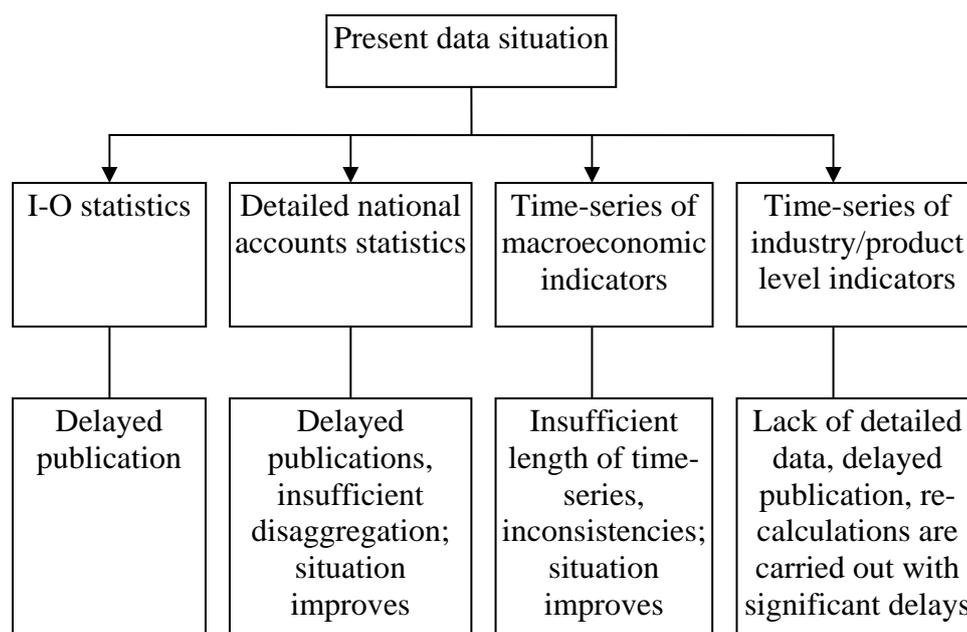


Figure 2. **Present data situation estimation and major groups of problems.**

Speaking about input-output tables, the major problem is connected with the delayed preparation and publication of input-output statistics in Latvia. This problem can be called as the most significant problem for multisectoral macroeconomic modelling in Latvia that impedes the development process. To modellers' regret, the latest published bulletin of input-output statistics in Latvia is only for 1998. This bulletin was published in 2003. There is a significant lag in preparation and publishing of input-output tables in Latvia. The modellers, macroeconomists and other specialists interested in fresher input-output data constantly keep this matter alive, but so far they have not succeeded in changing this situation.

According to the information obtained from the leading specialist of input-output statistics in the CSB, the input-output tables (and the corresponding tables) of 2000, 2002, 2003, and 2004 are still under construction. However, the predictions, when and how these tables will be finalized and published, cannot be relied on.

There are several reasons why the table of 1998 cannot be directly applied without corrections and modifications. The major reasons are the following:

- In 1998, the structure of the national economy has undergone significant and fundamental changes. For instance, in 1998, the share of service industries in the economy accounted for 68.4 %, but 73.9 % in 2005 (see Table 1). The share of wholesale and retail sale increased from 15.3% to 20.4%. The share of financial intermediation increased from 3.2% to 5.5%. The share of industry (mining, manufacturing, and energy) decreased from 21.1% to 15.7%. New industries (sub-industries) were developed in the field of information technologies, services, banking, transport, communications etc. In 1998, these sub-industries were underdeveloped or even did not exist at all.
- The technologies and techniques used by the industries have been upgraded or even replaced by more modern and more productive ones. New-generation technologies have penetrated almost all fields. The technological shift is notable and must be taken into account to illustrate the present situation. Hence the technological coefficients of 1998 are not capable to show the present cost structure of a certain industry. The changes in the economy have been too significant to ignore them.
- The improvements of statistical methodology used by the CSB and the following re-calculations. The GDP value of 1998, according to the input-output table, is not the same as the re-calculated value of GDP in the latest bulletin of macroeconomic indicators.
- The investment flow from the EU aimed at stimulating and converging the economy with the level of EU, has been notable during recent years (2004, 2005, and this year), but it was not the case in 1998.
- The year of 1998 was not a typical year in the development process of Latvia's economy. The economy was significantly influenced and affected by the economic processes in Russia (the Russian financial crisis). This year can be characterized as a year marked with tension and stress in all industries, delayed deliveries and payments etc.

*Table 1*

**Gross value added by kind of activity**  
(current prices; %)

	1998	1999	2000	2001	2002	2003	2004	2005
<b>TOTAL</b>	100	100	100	100	100	100	100	100
<b>Agriculture, hunting and forestry (A)</b>	3.8	3.7	4.3	4.3	4.4	4	4.3	4
<b>Fishing (B)</b>	0.3	0.3	0.4	0.3	0.2	0.1	0.1	0.1
<b>Mining and quarrying (C)</b>	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3*
<b>Manufacturing (D)</b>	16.3	13.9	13.7	13.9	13.7	13.3	13.2	12.8
<b>Electricity, gas and water supply (E)</b>	4.8	4.1	3.6	3.4	3.3	3.2	3	2.6
<b>Construction (F)</b>	6.3	6.5	6.1	5.6	5.5	5.6	5.8	6.3
<b>Services (G-O)</b>	68.4	71.4	71.8	72.3	72.7	73.5	73.3	73.9

*continued*

<b>wholesale, retail trade; repair of motor vehicles, motorcycles, personal, household goods (G)</b>	15.3	16.1	16.8	17.4	17.8	17.9	18.9	20.4
<b>hotels and restaurants (H)</b>	1.1	1.2	1.1	1.2	1.2	1.4	1.6	1.7
<b>transport, storage and communications (I)</b>	15.1	14	14	15.3	15.2	15.3	15.3	15.6
<b>financial intermediation (J)</b>	3.2	4.5	4.9	4.4	5	4.9	5.1	5.5
<b>real estate, renting and business activities (K)</b>	11.8	13.3	14	14	13.9	13.7	13.3	12.6
<b>public administration and defence; compulsory social security (L)</b>	8.5	8.9	8.2	7.8	7.9	7.8	7.1	6.4
<b>education (M)</b>	5.6	5.5	5.3	5.1	4.9	5.6	5.2	5
<b>health care and social work (N)</b>	4	3.8	3.4	3.2	3	3	2.9	2.8
<b>other community, social and personal service activities (O)</b>	3.8	4.1	4.1	3.9	3.8	3.9	3.9	3.9

\* with yellow – industries that experienced the most significant changes

At the same time even the input-output table of 1998 gives an overview of the interdependences in the economy, the flows between industries, and the cost structure of individual industries. The input-output table of 1998 provides a huge amount of information on how the national economy and individual industries operate. The problem for modellers is to decide and detect the nonconformity with the present situation. Everyone admits that the economy has experienced significant changes in 1998, but it is a very complicated task to detect the exact and numerical changes in the data at a high disaggregation level. Subjective interpretations and judgments are inevitable.

For model development needs a tailored version of the input-output table for 2000 has been prepared based on the information obtained from the CSB.

When analysing the national accounts statistics of Latvia, a few years ago modellers faced quite similar problems as in the case of input-output statistics, but the delay was not so significant. A few years lag encumbers the model development process. However the situation concerning the national accounts statistics is improving and it is not as desperate as in the case of the input-output tables. The latest bulletin of national accounts statistics is for 2004.

Macroeconomic indicators form an important share of the model's database. The length of time-series is a significant issue in the model development process. The problems concerning the length and creditability of time-series are the most topical in Latvia. The insufficient length of time series is also a noteworthy problem for model builders and from time to time it incommodes the model development process. This situation is connected with the fact, that statistics prior to the mid 1990s cannot be used for modelling purposes. The levels of indicators of the preceding periods cannot be compared with the levels for most of the economic indicators after the mid 1990s. The major reason is the changes in the statistical methodology and the fact that re-

calculation has not been made for all the periods. As a result the time-series are quite short.

The data situation concerning industry-level indicators and the length of time-series is even worse. And the statistics of indicators in high level of disaggregation constitute another important problem for modellers. It is possible to point out two types of problems: lags and insufficient length of time-series. The preparation and publication process is very time, labour, and money intensive, and hence a significant lag has been observed.

The bulletin of macroeconomic indicators is devoted to the major 15 industries (according to the NACE classification) with a special stress on the agriculture sector, which is subdivided into 2 sub-industries – A01 and A02. The indicators with a higher level of disaggregation have not been prepared and officially published.

A separate problem that can be analysed is the problem connected with the changes in the statistical methodology used by the CSB and periodic re-calculation of the levels of indicators. As the statistical methodology has been upgraded several times during the past years, the values of indicators have been re-calculated. Re-calculation is made by the statistical office. The major reason for this is the continuous and legitimate need to upgrade the statistical methodology used by the CSB. The problem usually arises because of very unexpected and unplanned re-calculations and there is no plan or schedule made available for modellers for them to know when and which indicator will be estimated and re-calculated. The new values of total values of indicators force to once again estimate the questions and relations between the indicators. Traditionally total values of indicators are re-calculated but re-calculations at the industry level take time or even do not take place at all.

As re-calculation demands time, specialists and money, the values of many indicators have been re-calculated only for the period starting from 2000. It means that the values of the same indicator for the years prior to 2000 cannot be compared with the respective values after 2000.

The problems connected with the specialists and experts, also form a very topical and painful issue in Latvia. This concerns specialists not only in the field of multisectoral modelling, but also in related fields. Latvian specialists in comparison with their colleagues have a very short experience in the field of large-scale multisectoral macroeconomic modelling under the market economy conditions. Hence exchange of information is extremely crucial for further development.

As the input-output data form the basis for multisectoral modelling it is a task of fundamental importance to obtain and use the latest tables of officially published data as well as to have their updates as soon as possible. However, modellers in Latvia must perform in the present situation.

The solutions used to deal with the problems concerning data endowment:

- Detailed analysis and study of previous officially published input-output tables ( the tables for 1997 and 1998).
- Analysis of semi-finished input-output tables for 2000, 2002, 2003, and 2004 to disclose the structural changes and shifts in the economy.

- Attempt to finalize an updated version of input-output tables (one of the semi-finished tables) to replace the table of 1998 in the INFORUM model.
- Use of more recent input-output tables (rather than 2000). This task cannot be realized without assistance and participation of the CSB. Modellers are used to understand the input-output and national accounts statistics, but they are not used to build the tables by themselves, especially in the cases when modellers do not represent the statistical office.

The process of finalizing of the input-output table of 2000 is closely connected with the planned use of this table – to replace the present table in the Latvian INFORUM model.

The drawbacks of finalizing of the table of 2000 by ourselves than by the specialists of CSB:

- Larger possibility to make erroneous assumptions and misinterpret the behaviour of the economy (numerically).
- Numerical results are affected by personal modelling experience and knowledge.
- In order to finalize the table it is necessary to have a role-model (because the amount of available data is limited), and the table of 1998 was used as a role model. The choice of this role-model also affects the results.

The process of finalizing of the input-output table of 2000 has not been finished and still continues.

### ***Summary***

At present, in Latvia, there is no multisectoral macroeconomic model that could be used, on a regular basis, for the needs of economic modelling. Major problems concerning data endowment in Latvia are related with the following issues: lags in the publishing process of input-output tables, insufficient length of time-series of macroeconomic indicators, and unavailability of time-series of industry-level indicators. Data endowment problems can be solved only with the assistance of specialists of the Statistical Bureau and other institutions (such as the Ministry of Economics). The process of such a collaboration has been started.

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