Base-scenario forecasts by Latvian INFORUM model: results and problems

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Latvia's economies experiences extremely high annual growth rates in comparison with the EU member states. It determines a huge necessity for modelling tools that are capable to capture and reflect both macro and sectoral changes.

The activities to update and improve the Latvian multisectoral macroeconomic model have not stopped and the process is still on. At current stage, the model is developed to be applicable to various and diverse modelling needs. However, a special attention is paid to manufacturing industry and its further importance in the economy. Year-by-year the service industry squeezes out the manufacturing sector.

What can the model give – what do we want from it?: a challenge to reach a trade-off.

Description

Latvian multisectoral macroeconomic model is based on the INFORUM philosophy, based on the input-output accounting principles and identities, integrated bottom-up approach, and INFORUM software is applied to. The model is under construction, and there are significant achievements, improvement, upgrade in comparison with the models stage and condition in last year.

As the model development process encounters with a number of problems regarding data endowment and availability, structural changes in the economy, future perspectives and experts' estimation etc. many issues are still very painful and seek for an appropriate solution.

Sectoral disaggregation is based on the NACE classification (two signs level) with some exceptions. Mining and quarrying sector (C group) is presented by two branches – coal and peat mining (C10) and aggregated other mining and quarrying industry (C11-C14). This aggregation has been carried out to omit the industries that have zero values (according to the geographical location, natural resources endowment and existing manufacturing these branches are not presented in the economy, however, some branches consume the imported products of these branches).

Additional disaggregation is not performed, at the moment. However, several initiatives\ideas concerning the energy sector, financial intermediation, real estate and some other industries are being considered as potential model elements. Especially, the disaggregation of energy sector and its logical integration in the model is a topical and needed issue as a considerably large share of the electricity consumed domestically has been imported. Construction sector also experiences a very fast and diverse growth, therefore, a detailed and disaggregated analysis of this sector would bring worth information.

Analysis of trends

Latvian economy experiences rocketing growth rates, and some industries develop even faster. In 2006, the fastest growing industries (regarding the NACE classification's groups) were real estate (K) (17.4%), wholesale and retail trade (G) (17.4%), financial intermediation (J) (15.4%), and construction (F) (13.6%). However, the products producing industry - manufacturing grew only by 6.2%, and it was one of the lowest growth rates (see Table 1).

Table 1

Gross domestic product by kind of activity (growth rate)[1]

	2001	2002	2003	2004	2005	2006
TOTAL	**1.080**	**1.065**	**1.072**	**1.087**	**1.106**	**1.119**
Agriculture, hunting and forestry (A)	1.082	1.056	1.000	1.032	1.095	1.000
Fishing (B)	0.854	0.874	0.559	1.091	1.056	0.908
Mining and quarrying (C)	1.679	1.213	1.287	1.115	1.310	1.094
Manufacturing (D)	1.102	1.089	1.060	1.067	1.059	1.062
Electricity, gas and water supply (E)	1.058	1.043	1.044	1.050	1.018	1.040
Construction (F)	1.061	1.108	1.137	1.133	1.155	1.136
Wholesale, retail trade; repair of motor vehicles, motorcycles, personal, household goods (G)	1.106	1.127	1.100	1.124	1.174	1.174
Hotels and restaurants (H)	1.137	0.998	1.255	1.164	1.146	1.143
Transport, storage and communications (I)	1.095	1.034	1.089	1.101	1.137	1.093
Financial intermediation (J)	1.073	1.051	1.033	1.083	1.114	1.154
Real estate, renting and business activities (K)	1.139	1.057	1.067	0.345	3.515	1.176
Public administration and defence; compulsory social security (L)	1.027	1.035	1.025	1.044	1.042	1.052
Education (M)	1.012	1.013	1.064	1.025	1.041	1.034
Health and social work (N)	0.999	1.013	1.033	1.022	1.021	1.039
Other community, social and personal service activities (O)	1.035	1.046	1.049	1.080	1.091	1.144

In 2006, fishing and agriculture, including forestry, didn't share the value added increase tendency as the rest of the economy. Despite the increase in subsidies

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[1] Data source: CSB data base

and new market opportunities, agriculture loses its positions year-by-year.

Since 2000, the structure of the national economy also has changed. Table 2 illustrates the structure of value added from 2000 to 2006. The share of the service industries (G-O) had continued to increase and, in 2006, it was 74.8%. During this time period, the share of wholesale and retail trade increased faster –by 4.1 percent point and, in 2006, it was 20.9%.

Table 2

Structure of value added by kind of activity (%)[2]

	2000	2001	2002	2003	2004	2005	2006
TOTAL	100	100	100	100	100	100	100
Agriculture, hunting and forestry (A)	4.3	4.3	4.4	4.0	4.3	3.8	3.6
Fishing (B)	0.4	0.3	0.2	0.1	0.1	0.1	0.1
Mining and quarrying (C)	0.1	0.2	0.2	0.3	0.3	0.3	0.3
Manufacturing (D)	13.7	13.9	13.7	13.3	13.2	12.6	11.8
Electricity, gas and water supply (E)	3.6	3.4	3.3	3.2	3.0	2.5	2.5
Construction (F)	6.1	5.6	5.5	5.6	5.8	6.1	6.8
Wholesale, retail trade; repair of motor vehicles, motorcycles, personal, household goods (G)	16.8	17.4	17.8	17.9	18.9	20.1	20.9
Hotels and restaurants (H)	1.1	1.2	1.2	1.4	1.6	1.7	1.8
Transport, storage and communications (I)	14.0	15.3	15.2	15.3	14.8	13.9	13.0
Financial intermediation (J)	4.9	4.4	5.0	4.9	5.1	6.0	6.2
Real estate, renting and business activities (K)	14.0	14.0	13.9	13.7	13.8	14.2	14.8
Public administration and defence; compulsory social security (L)	8.2	7.8	7.9	7.8	7.1	6.9	6.6
Education (M)	5.3	5.1	4.9	5.6	5.2	4.8	4.4
Health and social work (N)	3.4	3.2	3.0	3.0	2.9	3.0	3.1
Other community, social and personal service activities (O)	4.1	3.9	3.8	3.9	3.9	3.9	4.0

Manufacturing sector had lost a part of its share in the economy even despite its annual positive and considerably high growth rates. Manufacturing growth rates are considerably high in comparison with the average EU rates, but they are lower the average growth rate of the total nation economy of Latvia. During the past years, the share of manufacturing had decreased by 1.9 percent point and, in 2006, it was below 12 percent.

Employment trends represent the growing need for labour force, and, since 2000, the number of employed persons has increased on average by 2.4% every year. The sharpest increase was observable in 2006 – by 5.0% (see Table 3).

Table 3

Employed persons by kind of activity (thsd)[3]

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[2] Data source: CSB data base
[3] Data source: CSB data base

	2000	2001	2002	2003	2004	2005	2006
TOTAL	**941**	**962**	**989**	**1 007**	**1 018**	**1 036**	**1 088**
Agriculture, hunting and forestry (A)	134	143	147	135	132	122	118
Fishing (B)	2	2	6	3	2	3	2
mining and quarrying (C)	2	2	3	2	2	2	4
manufacturing (D)	170	166	167	174	163	154	170
electricity, gas and water supply (E)	21	19	22	22	25	23	22
Construction (F)	56	68	60	74	87	91	104
Wholesale, retail trade; repair of motor vehicles, motorcycles, personal, household goods (G)	145	151	148	153	151	158	170
Hotels and restaurants (H)	22	22	24	25	26	28	29
Transport, storage and telecommunication (I)	79	78	86	95	96	95	101
Financial intermediation (J)	12	14	13	16	18	20	25
Real estate, renting and business activities (K)	45	41	39	42	40	49	61
Public administration and defence; compulsory social security (L)	71	68	68	67	73	82	88
Education (M)	87	88	88	79	83	91	88
Health and social work (N)	48	50	60	59	54	58	51
Other community, social and personal service (O)	44	49	53	57	60	58	49

Unemployment rate and number of unemployed persons are the indicators that illustrate the changes demand for labour force. Due to the high economic growth the demand for labour force has significantly increased and since 2002 the unemployment rate has shrunk almost double (see Fig.1.) – from 12.0% in 2002 to 6.8% in 2006.
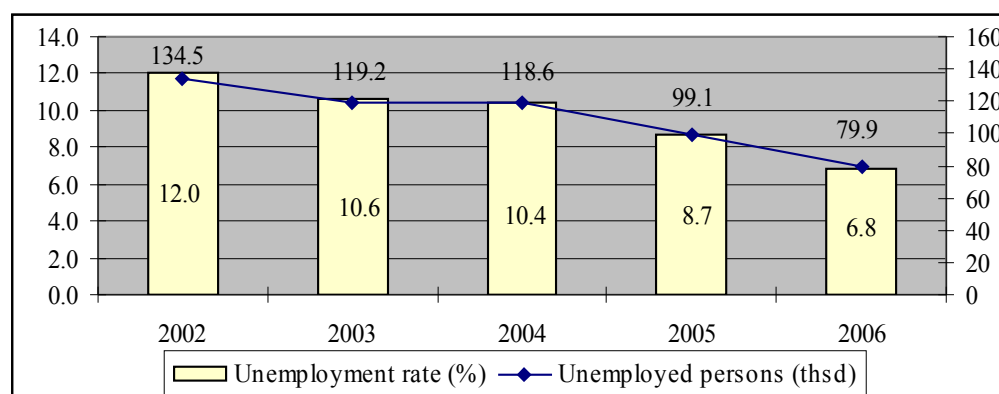

Figure 1. **Unemployment indicators**

Exports and imports of goods and services have grown by high rates, however the ration of experts on GDP has grown a bit – from 41.6% on GDP in 2000 to 44.2% on GDP in 2006, but the ration of imports on GDP has grown dramatically – from 48.7% to 64.4%. As a result, the foreign trade deficit also has increased dramatically. Current account as per cent of GDP has increased from -4.8% in 2000 to -21.1% in 2006. However, in 2005, it was considerably lower (-12.6%) and it even a bit decreased by 0.3 percent points in comparison with the level in 2004.

Forecasts

The forecasts generated by the model illustrated the potential development pace of the Latvian economy in long-run. Taking into account the structural and sectoral changes and shifts in the economy, the model is developed and used more like an indicative instrument that disclosed the potential future levels and problems. At the current stage, the model results must be comprehended reservedly and sceptically. As the model encounters many branches, some of them perform illogically and they demand close investigation and examination, especially the branches that have developed very sharply during the past years and the trends and experts believe this growth will continue.

Base modelling scenarios has been developed. It represents the potential sectoral and total developed till 2020. The base-scenario illustrates the economical development within the present and provisional trends and shifts. It is neither optimistic nor pessimistic.

Table 4 illustrates average annual growth rated by branches. Most of the branches perform according to pre-simulation assumptions, however there some branches that perform in a quite weird or questionable manner. It requires detailed analysis to dispart scenario assumption mistakes or slips from fundamental and model-size errors or problems.

Table 4

Output growth rates forecasts by branch

	Code	Shortened description	2007-2010	2011-2015	2016-2020	2007-2020
1	A 01	AgriProd	1.046	1.036	1.030	1.037
2	A 02	ForestProd	1.111	1.083	1.068	1.085
3	B 05	Fish	1.053	1.038	1.029	1.039
4	C 10	CoalPeat	1.109	1.106	1.099	1.105
5	C 11- C 14	OthMining	1.109	1.106	1.099	1.105
6	D 15	FoodBever	1.053	1.044	1.034	1.043
7	D 16	Tobacco	1.134	1.089	1.066	1.093
8	D 17	Textiles	1.109	1.078	1.060	1.080
9	D 18	Clothing	1.093	1.068	1.054	1.070
10	D 19	Leather	1.148	1.100	1.074	1.104
11	D 20	Wood	1.080	1.060	1.047	1.061
12	D 21	PulpPaper	1.096	1.070	1.055	1.072
13	D 22	PrintRecor	1.091	1.071	1.057	1.072
14	D 23	Coke	1.058	1.048	1.045	1.050
15	D 24	Chemicals	1.062	1.055	1.048	1.054
16	D 25	RubPlast	1.064	1.062	1.062	1.063
17	D 26	OthNMetPro	1.071	1.064	1.059	1.064
18	D 27	BasicMet	1.081	1.068	1.054	1.067
19	D 28	MetalProd	1.070	1.067	1.064	1.067

continued

	Code	Shortened description	2007-2010	2011-2015	2016-2020	2007-2020
20	D 29	MachEquipm	1.090	1.077	1.070	1.078
21	D 30	MachOffice	1.086	1.077	1.072	1.078
22	D 31	MachElectr	1.079	1.065	1.056	1.066
23	D 32	CommEquipm	1.097	1.080	1.071	1.082

24	D 33	MedOptInst	1.083	1.066	1.056	1.067
25	D 34	Vehicles	1.279	1.174	1.129	1.187
26	D 35	OthTransp	1.099	1.073	1.060	1.076
27	D 36	FurnitOhte	1.087	1.068	1.061	1.071
28	D 37	SecRawMate	1.065	1.056	1.047	1.055
29	E 40	ElEnergyGa	1.048	1.048	1.047	1.048
30	E 41	Water	1.090	1.097	1.094	1.094
31	F 45	Construct	1.069	1.067	1.065	1.067
32	G 50	VehRepairS	1.064	1.051	1.042	1.051
33	G 51	WholesaleT	1.041	1.037	1.034	1.037
34	G 52	RetailTrS	1.023	1.023	1.022	1.023
35	H 55	HotelRstnt	1.059	1.047	1.038	1.047
36	I 60	LandTransp	1.052	1.044	1.037	1.044
37	I 61	WatTranspS	1.252	1.118	1.073	1.138
38	I 62	AirTranspS	1.082	1.061	1.048	1.062
39	I 63	SuppTransp	1.031	1.029	1.026	1.029
40	I 64	PostTlcmS	1.054	1.046	1.040	1.046
41	J 65	FinIntermS	1.047	1.043	1.040	1.043
42	J 66	InsuranceS	1.063	1.054	1.047	1.054
43	J 67	AuxFinIntS	1.052	1.041	1.032	1.041
44	K 70	RealEstate	1.033	1.034	1.036	1.035
45	K 71	MachRentS	1.074	1.071	1.067	1.070
46	K 72	ComputerS	1.067	1.062	1.059	1.062
47	K 73	ResearchS	1.063	1.052	1.045	1.052
48	K 74	OthBusinS	1.056	1.049	1.044	1.049
49	L 75	PublAdminS	1.029	1.029	1.029	1.029
50	M 80	EducationS	1.036	1.034	1.032	1.034
51	N 85	SocialS	1.042	1.038	1.035	1.038
52	O 90	RefuseDisp	1.055	1.067	1.073	1.066
53	O 91	MemberOr	1.089	1.068	1.056	1.070
54	O 92	RecrCultur	1.030	1.026	1.023	1.026
55	O 93	OtherServ	1.051	1.044	1.038	1.044
		Total	**1.057**	**1.051**	**1.047**	**1.051**

Exports of goods forecasted on the bases of export indexes for Latvia computed by Grassini and Parve (presented at 14th INFORUM conference in Traunkirchen, Austria, and included in the conference materials). However, some modifications and extensions have been carried out because the model time horizon is longer. These activities are mainly carried out using the analysis of trends and experts evaluations.

However, imports of goods and services are forecasted using the equations – imports shares equations that are integrate in the model. At the current stage, according to the models the imports behave to optimistic from the overseas point of view and very pessimistic from the domestic producers positions. Regarding the forecasts the foreign trade deficit will continue to grow and it seems too dramatic and destructive for the domestic production. It requires also additional analysis and studies to estimate whether it is possible and how to improve the model.

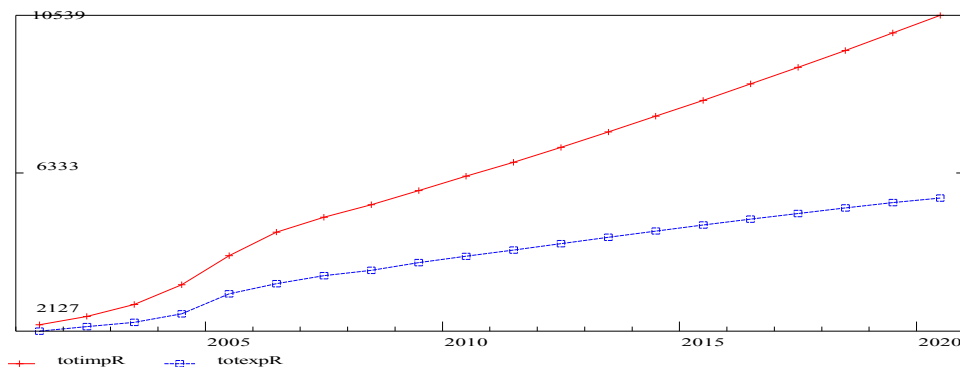Figure 2 illustrates the imports and exports of goods and services in constant prices till 2020.

Fig.2. Imports and exports forecast, mln lats

The model included also the employment modelling possibilities. At the present, employment is forecasted using the relation between output and productivity. However, productivity by branch are exogenous. This block also requires both detailed and diverse analysis of results and theoretical improvements. As a result, employment (in persons) mainly depends on output by branch.

According to model's forecast the average annual growth rate of total employment is 1.2%, and in 2020 the total employment are forecasted to be 1 305 thsd persons. Analysing the structure of employed persons, the share of service sector stops increasing and it will stabilize.

Problems and solutions

There are several problems concerning the model's forecasts at the current stage. Firstly, the problems regarding the model's incompleteness, in other words, the results are weird or bizarre because of the structure, elements, coefficient values, etc. Mainly, it is observable in forecast of small and specific branches that perform differently from year to year and in base years they had unusual stage\conditions and performance.

Secondly, how effectively and fast catch the above mentioned problems (bizarre behaviour without modellers' intentions) is one of the most painful problems and issues. Detection of these problems is the first step and it may shorter time period, but it is far more complicated task to find an appropriate solution.

Thirdly, the model requires new input-output information. Some actions have been taken to elaborate a input-output table for 2005 for analytic needs and with lower level of disaggregation.

At a first look it seems that the model in some extent behaves more optimistic than expected. However, comparing the model's results to other Latvian economy model results, it is not so – other models present even more optimistic values. For instance, comparing the real GDP level in 2020 of the model with the Latvian labour demand forecasting system's modeling results, and the result is that the level of GDP in the rival model is approximately by 15% higher.

Comparing the employment forecasts, the results are opposite; the Latvian multisectoral macroeconomic model generates larger numbers than the Latvian labour demand forecasting system's model. It requires additional study to find out the cause of the difference and whether any changes should be made to the model.

Summary

Latvian multisectoral macroeconomic model is under construction and the development process has not stopped. This paper presents only the initial results and achievements in Latvian multisectoral macroeconomic models building process. A lot should be done. Base-scenario reflects the further development in accordance to existing and detected trends and predicted/estimated trends and shifts. Forecasts illustrated the further development by branch till 2020.

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