GDP Modelling with Factor Model: an Impact of Nested Data on Forecasting Accuracy

Bessonovs, Andrejs

University of Latvia

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Andrejs Bessonovs
University of Latvia and
Bank of Latvia
K. Valdemāra 2a, Rīga, LV-1050
E-pasts: Bessonovs@gmail.com

Abstract

Uncertainty associated with an optimal number of macroeconomic variables to be used in factor model is challenging since there is no criteria which states what kind of data should be used, how many variables to employ and does disaggregated data improve factor model's forecasts.

The paper studies an impact of nested macroeconomic data on Latvian GDP forecasting accuracy within factor modelling framework. Nested data means disaggregated data or sub-components of aggregated variables. We employ Stock-Watson factor model in order to estimate factors and to make GDP projections two periods ahead. Root mean square error is employed as the standard tool to measure forecasting accuracy. According to this empirical study we conclude that additional information that contained in disaggregated components of macroeconomic variables could be used to enhance Latvian GDP forecasting accuracy. The efficiency gain improving forecasts is about 0.15-0.20 percentage points of year-on-year quarterly growth for the forecasting period 1 quarter ahead, but for 2 quarter ahead it's about half percentage point.

Keywords: Factor model, forecasting, nested data, RMSE.

JEL: C22, C53, E37

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1. Introduction

Seminal papers of Stock and Watson (1998, 2002a, 2002b), Forni and Reichlin (1998), Forni, Lippi, Hallin and Reichlin (2001a) put forward factor modeling framework as powerful tool to predict macroeconomic variables. Unlike the others univariate and multivariate models, factor models incorporate much macroeconomic data in the analysis. Stock and Watson (2002a) use 215 US macroeconomic variables covering the most economic sectors they may represent an economic activity and potential driving forces of an economy. Forni and Reichlin (1998) use 450 disaggregated series to understand aggregate dynamics.

Factor analysis is easy to implement by adding an additional data without any difficulty. The dataset may include as more information as more disaggregated time series are available for any additional specific sector of an economy. Since the former statement is logical to span the most sectors of the economy and to derive much variability from macroeconomic variables, whereas the latter is more uncertain and rises the question does the additional nested data brings more information to latent factors and hence enable to predict economic activity more accurate. Thus the goal of paper to study the problem of nested data and its contribution to forecasting procedures.

A literature is scarce on the issue of optimality conditions for an amount of series to include in factor models. Usually authors assume to span whole sectors of economy extracting appropriate time series as much as they concerned and judgmentally believe this is exactly right choice for their analyzing problem and relevant economy.

The paper of Boivin and Ng (2006) addresses the issue of the size and the composition of the data and its impact on factor estimates. They possess the question whether it is possible to obtain less useful factor estimates extracting them from larger datasets and argue that it is possible.

The paper of Caggiano et al. (2009) provides a comprehensive investigation on the factor modelling issues regarding number of factors, specification of the dynamics of the factors, combination of the factor-based forecasts and the choice of the dataset extracting the factors. Their empirical results point out that there are benefits of pre-screening of variables before extracting factors. For the raw of European countries pre-screening of the variables before estimating factors and then applying forecasting techniques improve forecasts substantially over the AR model benchmark. Caggiano et al. (2009) argue that the use about one fifth of original variables may yield the best results in terms of forecasts accuracy.

This paper is organizing as the following: in section 2 we describe a nature of data we use, any transformation and complexities capturing it in a model. Then the section 3 provides the model description and assumptions. Section 4 proceeds with obtained results and concludes the paper.

2. Data

We consider large dataset for Latvian economy with few additional time series of neighbor counties of Estonia and Lithuania. The data are collected on the main economic categories comprising business and consumer surveys of EU commission, industrial production, retail sales, consumer price indices, producer price indices, labour market, monetary sector, exchange rates, financial sector, foreign trade, fiscal sector and balance of payments (see Table 2). All the time series are with monthly frequency. Additional time series of Estonia and Lithuania are also included to keep dynamics of neighbor countries in common dataset making domestic factor estimates. These are real and nominal times series of industrial production, CPI components, and confidence indicators of the main groups.

The most blocs of variables may contain data with high disaggregation degree. Consider total industry sector as in Table 1. It contains 3 main sub-components: mining and quarrying, manufacturing and electricity, gas, steam and air conditioning supply. Moreover, manufacturing comprises manufacturing of food products, beverages and textiles etc. In turn, manufacturing of food products may contain even more disaggregated components. Thus total industry represented by nests of some disaggregated parts.

Table 1
Representation of nested data for industrial production

Total Industry (BCD)			
	Mining and quarrying (B)		
	Manufacturing (C)		
		Manufacture of food products	
			Processing and preserving of meat and production of meat products (10.1)
			Processing and preserving of fish, crustaceans and molluscs (10.2)
			…
			Manufacture of other food products (10.8)
		Manufacture of beverages (11)	
		Manufacture of textiles (13)	
		…	
		Repair and installation of machinery and equipment (33)	

Electricity, gas, steam and air conditioning supply (D)

Source: NACE rev.2.0

On the one hand, all those parts might be considered in a factor model all together. On the other hand, we can select any level of disaggregation and apply them further in the analysis. The choice of level of disaggregation depends on researcher. The question is does the incorporation of more data is effective and gives additional information to forecasting procedure in terms of forecasting accuracy.

In the present study we consider two types of databases. The first one (N_1) is the full database comprising all about 250 variables including all the aggregates and its subcomponents of all sub-levels. The second one (N_2) is reduced-form database comprising mainly the first level aggregation. The nature of subcomponents time series is usually differs from those ones of aggregates in the sense of volatility. Going deeper in disaggregate order we may find that those time series are more volatile because more specific sectors are more vulnerable to sector-specific shocks. Thus we leave more aggregated variables in database and exclude sub-components. Therefore judgmentally we reduce the full database N_1 to the database N_2 with the sample about 50 variables. Schematically databases' composition is shown in Table 2.

Table 2
Description of the databases and number of variables representing each sector

Full Database (N_1)	**Number of Variables**	**Reduced Database (N_2)**	**Number of Variables**
Confidence indicators	66	Confidence indicators	24
Industry	40	Industry	4
Retail trade	30	Retail trade	1
CPI	16	CPI	4
PPI	10	PPI	1
Labour market	2	Labour market	2
Monetary sector	12	Monetary sector	7
Exchange rates	4	Exchange rates	2
Financial sector	8	Financial sector	3
Foreign trade	40	Foreign trade	2
Fiscal sector	10	Fiscal sector	2
Balance of Payments	7	Balance of Payments	2
TOTAL	**245**	**TOTAL**	**54**

Therefore we would like to test inclusion of disaggregated and more "noisy" series in forecasting procedure comparing two databases of different content and size.

Time span of variables is January 1996 till December 2010. All the variables are made stationary and normalized prior to factor estimation in order to neutralize differences in scale of variables (see Johnson and Wichern, 2007). The most of monthly series are subject to seasonal adjustment. Therefore all time series are seasonally adjusted by X-12-ARIMA method with specifications set by default, except interest rates and exchange rates, and those times series that already are available in seasonally adjusted form.

Data on Latvian gross domestic product (GDP) is collected on quarterly frequency. We compile real-time database in order to exclude methodology changes and GDP revisions effects on forecasting procedure (for details see Bessonovs, 2010).

Additionally the paper deals with the problem of missing values and ragged edge. Evidently, that all the monthly variables are supplied by statistical offices and respective officials with some delay or within individual schedule of publication as current month passes by. Therefore inevitably at any moment of time we observe ragged edge of data. The second problem arises as data not always is available for the desired period of time, especially at the beginning of the sample. The third, it might happen that few time series experience some breaks within the sample. These obstacles prevent us to implement factor estimation, because factor estimation techniques applied do not allow missing values.

To tackle the problems above we apply expectation-maximization (EM) mechanism introduced in Stock and Watson (2002a) in order to achieve balanced panel of data. The basic idea behind the mechanism is an assumption about expected value of missing values and iterative process of estimation of missing values by means of principal components. So far as a preliminary data transformation is made to let time series become stationary and then we normalize them with zero mean and standard deviation equals one. The expected values of missing observations are set to zero, $E(x_{ik})=0$, where $k=1,\dots T$ is any missing value for variable i. Further factors are estimated using the balanced panel of data. Next, exploiting factor estimates and factors loadings, we recover times series. The missing values of original database are replaced by the new estimates. The iterative process is proceeded until the missing value estimates changes are negligible. The procedure could be described as the following 6 steps:

1. Get $\tilde{X}_t$ dataset comprising original values from X_t and missing values that are set to zero;
2. Estimate initial factors $F_t^{(0)}$ as the first r principal components of dataset $\tilde{X}_t$;

3. Recover $\hat{X}_t$ by means of $\hat{F}^{t(0)}$ and $\hat{\Lambda}^{f(0)}$:
$$\hat{X}_t = \hat{\Lambda}^{f(0)\prime}\hat{F}_t^{(0)}$$
4. Replace $\tilde{X}_t^{(0)}$ missing values by $\hat{X}_t$ estimates;
5. Estimate $F_t^{(1)}$ as the first K principal components of $\tilde{X}_t^{(0)}$
6. Back to step 2 using $F_t^{(1)}$ instead of $F_t^{(0)}$;

By iterating and re-estimating process we obtain stable estimates of missing values.

3. Model

Similarly as in the paper of Stock and Watson (2002a) we employ the factor model. The general form of the model we set in the paper is the following:

$$y_{t+h|t} = \alpha + \beta_i' F_{t,N} + \sum_{j=1}^{p} \gamma_j y_{t-j+1} + e_t \quad (1)$$

Where $y_{t+h|t}$ is scalar forecasting value for h periods ahead, $F_{t,N}$ is a ($r \times 1$) vector of factor estimates using database of N series, y_{t-j+1} is y_t j-th lag variable, α and β_i coefficients.

Let the $X_t = (X_{1t}, \dots, X_{Nt})'$ is the set of N variables at time $t=1,\dots,T$. Then the factors estimates, in turn, admit the following structure:

$$X_{it} = \lambda_i' F_t + u_{it} \quad (2)$$

Where X_{it} is *i-th* variable of database of N series ($i=1,\dots,N$), F_t is a ($r \times 1$) vector of factors, λ_i is ($r \times 1$) a vector of factor loadings for variable i, u_{it} is idiosyncratic error.

Concerning forecasting equation specification, note that for (1) we assume no any dynamics in factors and thus (1) is a static representation of factor model. In addition, to allow some dynamics of forecasting equation (1) we restrict $p=1$, i.e. there is one lag of dependent variable. Further (2) can be easily estimated by principal components and factors are the input for forecasting regression in (1).

As mentioned in section 2 the data frequency for monthly time series differs from GDP data and (1) cannot be estimated. To overcome that shortcoming we use (2) for monthly data, and then apply simple average function for monthly estimated factors to justify frequency basis.

4. Results and conclusions

In this section we compare the forecasting accuracy results between two databases assumed in section 2. By means of root mean square error (RMSE) we measure magnitude of forecasting error as following:

$$RMSE = \sqrt{\frac{1}{T}\sum_{1}^{T}(\hat{y}_{t+h|t} - y_{t+h})^2}$$

where $\hat{y}_{t+h|t}$ is forecasting value at time t for h periods ahead, y_{t+h} is true value. Forecasting values and true values stand for year-on-year growth rates. The number T is set to be about 1/3 of available data sample size. Respectively 2/3 of actual sample is exploited for estimation and 1/3 for out-of-sample forecasting.

Results in Table 3 compare two types of specification. First, it compares results among specified factor models with different number of factors. Second, Table 3 shows results for both types of database specification. In addition, RMSE outcome determined in terms of AR(2) model results. Thus a number below 1 assumes factor model's better performance over AR(2) model. Results suggest that on average full database tends to outperform reduced database.

Table 3
Factor model's RMSE results with respect to AR(2) model by type of database

Out-of-sample forecasting period: 2005Q4-2010Q3				
	DATABASE (N_2)			
Horizon / Model	***SW1****	***SW2***	***SW3***	***SW4***
+1 quarter ahead	0.73	0.74	0.76	0.70
+2 quarters ahead	0.78	0.84	0.85	0.86
	DATABASE (N_1)			
Horizon / Model	***SW1***	***SW2***	***SW3***	***SW4***
+1 quarter ahead	0.72	0.70	0.72	0.75
+2 quarters ahead	0.78	0.77	0.78	0.79

*Number denotes number of factors used in the model.

Table 4 shows outperformance of full database over reduced one. Positive number states by how much full database outperforms another in terms of average percentage points of year-on-year growth rates, respectively negative number states deterioration.

Table 4

Comparison of RMSE of two databases by type of model

forecasting period: 2005Q4-2010Q3				
	Improvement (+) / Deterioration (-)			
	SW1	***SW2***	***SW3***	***SW4***
+1 quarter ahead	0.03	0.16	0.14	-0.18
+2 quarters ahead	-0.05	0.53	0.50	0.48

According to the Table 4 forecasting 1 quarter ahead the full database N_1 may outperform N_2 on about 0.15 percentage points assuming more correct model is chosen. In this case factor model with 2 factors behaves the best. Notably that for 2 quarters ahead improvement is more substantial. The model specified with 2 factors accounts half percentage point of year-on-year growth rate.

We test *ad hoc* robustness check of the results by moving out-of-sample window back. Table 5 describes and compares factor models' improvement results through the different out-of-sample periods.

Table 5

Forecasting improvement of factor models over the different out-of-sample periods

Improvement (+) / Deterioration (-)								
	+ 1 quarter ahead				+ 2 quarters ahead			
Out-of-sample period	***SW1***	***SW2***	***SW3***	***SW4***	***SW1***	***SW2***	***SW3***	***SW4***
2003Q4-2008Q3	-0.18	0.02	-0.03	0.04	-0.31	-0.04	-0.16	-0.05
2004Q1-2008Q4	-0.17	0.04	0.03	0.08	-0.29	-0.07	-0.12	-0.11
2004Q2-2009Q1	-0.18	0.15	0.12	0.04	-0.31	-0.03	0.00	-0.02
2004Q3-2009Q2	-0.22	0.14	0.14	0.05	-0.33	-0.01	0.02	0.02
2004Q4-2009Q3	-0.05	0.27	0.30	-0.10	-0.33	0.03	0.07	0.07
2005Q1-2009Q4	0.07	0.21	0.20	-0.16	-0.10	0.53	0.43	0.37
2005Q2-2010Q1	0.07	0.22	0.22	-0.16	0.01	0.61	0.59	0.49
2005Q3-2010Q2	0.02	0.15	0.12	-0.20	0.00	0.62	0.59	0.48
2005Q4-2010Q3	0.03	0.16	0.14	-0.18	-0.05	0.53	0.50	0.48

Starting with the out-of-sample time period of 2005Q4-2010Q3 we rolling back the fixed period window and counts the outcome difference between database N_1 and N_2 as previously. We find that appropriately specifying the model the constant improvement is observed forecasting 1 quarter ahead. In turn, for two quarters horizon results more ambiguous. In the early years N_1 database wasn't able to outperform N_2 and forecasts accuracy is worse. On the other hand, in the later years improvement appears to be more considerable. We note the fact that improvement of out-of-sample periods coincide with the deep economic crisis period is challenging and might raise the hypothesis that more data still can capture more economic dynamics therefore forecasting accuracy may improve.

According to this empirical study we conclude that additional information that contained in disaggregated components of macroeconomic variables could be used to enhance Latvian GDP forecasting accuracy. The efficiency gain improving forecasts is about 0.15-0.20 percentage points of year-on-year quarterly growth for the forecasting horizon 1 quarter ahead, but for 2 quarters ahead it's about half percentage point. Robustness check shows that improvement is not constant for the different models and forecasting horizons. While one can find stable outperformance pattern of N_1 over N_2 for 1 quarter ahead forecasts, then for 2 quarters ahead there is the evidence that N_1 unable to outperform N_2 for any model in early out-of-sample periods.

Nonetheless results suggest that the use of disaggregated components does not provide the evidence of huge efficiency loss or deterioration of the results due to disaggregated data. Moreover appropriately specifying the model efficiency gain is positive.

Alternative way of research may be pursued toward finding schemes or criteria of weighting data and/or even blocs of data in order to improve forecasting accuracy by using potentially valuable disaggregated information.

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Appendix 1
Data description

Nr.	**Business and consumer surveys**
1	Total Confidence Indicator
	Industry survey
2	Confidence Indicator
3	Production trend observed in recent months
4	Assessment of order-book levels
5	Assessment of export order-book levels
6	Assessment of stocks of finished products
7	Production expectations for the months ahead
8	Selling price expectations for the months ahead
9	Employment expectations for the months ahead
	Services survey
10	Confidence Indicator
11	Business situation development over the past 3 months
12	Evolution of the demand over the past 3 months
13	Expectation of the demand over the next 3 months
14	Evolution of the employment over the past 3 months
15	Expectations of the employment over the next 3 months
16	Expectations of the prices over the next 3 months
	Consumers survey
17	Confidence Indicator
18	Financial situation over last 12 months
19	Financial situation over next 12 months
20	General economic situation over last 12 months
21	General economic situation over next 12 months
22	Price trends over last 12 months
23	Price trends over next 12 months
24	Unemployment expectations over next 12 months
25	Major purchases at present
26	Major purchases over next 12 months
27	Savings at present
28	Savings over next 12 months
29	Statement on financial situation of household
	Retail survey
30	Confidence Indicator
31	Business activity (sales) development over the past 3 months
32	Volume of stock currently hold
33	Orders expectations over the next 3 months
34	Business activity expectations over the next 3 months
35	Employment expectations over the next 3 months
36	Prices expectations over the next 3 months
	Building Survey
37	Confidence Indicator
38	Building activity development over the past 3 months
39	Main factors currently limiting your building activity
40	None (% s.a. - monthly question 2)
41	Insufficient demand (% s.a. - monthly question 2)
42	Weather conditions (% s.a. - monthly question 2)
43	Shortage of labour force (% s.a. - monthly question 2)
44	Shortage of material and/or equipment (% s.a. - monthly question
45	Other factors (% s.a. - monthly question 2)
46	Financial constraints (% s.a. - monthly question 2)
47	Evolution of your current overall order books
48	Employment expectations over the next 3 months
	EU Business and consumer surveys
49	Industry confidence indicator
50	Services confidence indicator
51	Consumers confidence indicator
52	Retail confidence indicator
53	Building confidence indicator
54	Total Confidence Indicator
	EE Business and consumer surveys
55	Industry confidence indicator
56	Services confidence indicator
57	Consumers confidence indicator
58	Retail confidence indicator
59	Building confidence indicator
60	Total Confidence Indicator
	LT Business and consumer surveys
61	Industry confidence indicator
62	Services confidence indicator
63	Consumers confidence indicator
64	Retail confidence indicator
65	Building confidence indicator
66	Total Confidence Indicator
	Industry (index, 2005=100)
67	Mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply
68	Mining and quarrying
69	Manufacturing
70	Manufacture of food products
71	Processing and preserving of meat and production of meat products
72	Processing and preserving of fish, crustaceans and molluscs
73	Processing and preserving of fruit and vegetables
74	Manufacture of dairy products
75	Manufacture of bakery and farinaceous products
76	Manufacture of other food products
77	Manufacture of beverages
78	Manufacture of textiles
79	Manufacture of wearing apparel
80	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and
81	Manufacture of paper and paper products
82	Printing and reproduction of recorded media
83	Manufacture of chemicals and chemical products
84	Manufacture of basic pharmaceutical products and pharmaceutical preparations
85	Manufacture of rubber and plastic products
86	Manufacture of other non-metallic mineral products
87	Manufacture of basic metals
88	Manufacture of fabricated metal products, except machinery and equipment
89	Manufacture of computer, electronic and optical products
90	Manufacture of electrical equipment
91	Manufacture of machinery and equipment n.e.c.
92	Manufacture of motor vehicles, trailers and semi-trailers
93	Manufacture of other transport equipment
94	Manufacture of furniture
95	Other manufacturing
96	Repair and installation of machinery and equipment
97	Electricity, gas, steam and air conditioning supply
	EU Industry (index, 2005=100)
98	Mining and quarrying
99	Manufacturing
100	Electricity, gas, steam and air conditioning supply
	EE Industry (index, 2005=100)
101	Mining and quarrying
102	Manufacturing
103	Electricity, gas, steam and air conditioning supply
	LT Industry (index, 2005=100)
104	Mining and quarrying
105	Manufacturing
106	Electricity, gas, steam and air conditioning supply
	Retail Trade (2005=100)
107	RETAIL TRADE, TOTAL, INCLUDING AUTOMOTIVE FUEL
108	Retail trade, total, except of automotive fuel
109	Retail sale of automotive fuel in specialised stores
110	Retail sale of food, beverages or tobacco, total ;
111	..retail sale in non-specialised stores with food, beverages or tobacco predominating
112	..retail sale of food, beverages and tobacco in specialised stores
113	Retail trade of nonfood products, including automotive fuel
114	Retail trade of nonfood products, except automotive fuel
115	Other retail sale in non-specialised stores
116	Retail sale of computers, peripheral units, software telecommunications equipment in specialised stores
117	Retail sale of textiles, clothing, footwear and leather goods in specialised stores
118	..retail sale of textiles in specialised stores
119	..retail sale of clothing, footwear and leather goods in specialised stores
120	Retail sale of audio and video equipment in specialised stores
121	Retail sale of hardware, paints and glass in specialised stores
122	Retail sale of carpets, rugs, wall and floor coverings in specialised stores
123	Retail sale of electrical household appliances in specialised stores
124	Retail sale of furniture, lighting equipment and other household articles in specialised stores
125	Retail sale of music and video recordings in specialised stores
126	Retail sale of books, newspapers and stationery in specialised stores
127	Retail sale of sporting equipment, games and toys in specialised stores
128	Dispensing chemist in specialised stores, retail sale of medical, orthopaedic goods, cosmetic and toilet articles
129	..dispensing chemist in specialised stores and retail sale of medical and orthopaedic goods in specialised stores
130	..retail sale of cosmetic and toilet articles in specialised stores

Appendix 1
Data description

131 Retail sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores
132 Retail sale of watches and jewellery and other retail sale of new goods in specialised stores
133 Retail sale of second-hand goods in stores
134 Retail sale via stalls and markets
135 Retail sale via mail order houses or via Internet
136 Other retail sale not in stores, stalls or markets

CPI (2005=100)

137 All-items HICP
138 Food and non-alcoholic beverages
139 Alcoholic beverages, tobacco and narcotics
140 Clothing and footwear
141 Housing, water, electricity, gas and other fuels
142 Furnishings, household equipment and routine maintenance of the
143 Health
144 Transport
145 Communications
146 Recreation and culture
147 Education
148 Restaurants and hotels
149 Miscellaneous goods and services
150 EU HICP (2005=100)
151 EE HICP (2005=100)
152 LT HICP (2005=100)

Producer prices index (2005=100)

153 Mining and quarrying
154 Mining and quarrying; manufacturing; electricity, gas, steam and
155 Manufacturing
156 Electricity, gas, steam and air conditioning supply
157 MIG - Capital goods
158 MIG - Consumer goods
159 MIG - Durable consumer goods
160 MIG - Intermediate goods
161 MIG - Non-durable consumer goods
162 MIG - Energy

Unemployment

163 Unemployment Rate (percent)
164 Job Vacancies

Monetary Statistics (millions of lats)

165 Money Stock M1
166 Money Stock M2
167 Money Stock M3
168 Currency in circulation
169 Interest rates, lats,deposits, long-term (%)
170 Interest rates, lats, deposits, short-term (%)
171 Interest rates,, lats, loans, long-term (%)
172 Interest rates, lats, loans, short-term (%)
173 Euribor 3m (%)
174 Euribor 6m (%)
175 Rigibor 3m (%)
176 Rigibor 6m (%)

Exchange rates

177 EUR/USD
178 NEER - total
179 NEER - developed
180 NEER - developing

Banking Statistics (millions of lats)

Deposits

181 Overnight deposits
182 Maturity of 1-6 months
183 Maturity of 6-12 months
184 Total deposits

Loans

185 Short-term
186 Maturity of 1-5 years
187 Maturity of over 5 years
188 Total loans

Foreign Trade (thousands of lats)

189 **Exports, total**
190 Live animals and animal products
191 Vegetable products
192 Fats and oils
193 Prepared foodstuffs including alcoholic and non-alcoholic beverages and tobacco products
194 Mineral products
195 Products of the chemical and allied industries
196 Plastics and articles thereof; rubber and articles thereof
197 Raw hides, leather, furskins and articles thereof
198 Wood and articles of wood
199 Pulp of wood; paper and paperboard
200 Textiles and textile articles
201 Footwear, headgear, umbrellas and other articles
202 Articles of stone, plaster, cement, glassware and ceramic products
203 Precious, semiprecious stone, precious metals, metals clad with precious metal
204 Base metals and articles of base metals
205 Machinery and mechanical appliances; electrical equipment
206 Transport vehicles
207 Optical instruments and apparatus inc. medical; clocks and watches; musical instruments
208 Miscellaneous manufactured articles
209 **Imports, total**
210 Live animals and animal products
211 Vegetable products
212 Fats and oils
213 Prepared foodstuffs including alcoholic and non-alcoholic beverages and tobacco products
214 Mineral products
215 Products of the chemical and allied industries
216 Plastics and articles thereof; rubber and articles
217 Raw hides, leather, furskins and articles
218 Wood and articles of wood
219 Pulp of wood; paper and paperboard
220 Textiles and textile articles
221 Footwear, headgear, umbrellas and other articles
222 Articles of stone, plaster, cement, glassware and ceramic products
223 Precious, semiprecious stone, precious metals, metals clad with precious metal
224 Base metals and articles of base metals
225 Machinery and mechanical appliances; electrical equipment
226 Transport vehicles
227 Optical instruments and apparatus inc. medical; clocks and watches; musical instruments
228 Miscellaneous manufactured articles

Fiscal Sector (thousands of lats)

229 Tax Revenues
230 Personal income Tax
231 Enterprise Income Tax
232 Social contributions
233 Real Estate Tax
234 Value added tax
235 Excise Tax
236 General government expenditure
237 Central government expenditure
238 General government budget saldo

Balance of Payments (thousands of lats)

239 Services Export
240 Services Import
241 Saldo: Income
242 Saldo: Transfers
243 Saldo: Direct Investment
244 Saldo: Portfolio Investment
245 Saldo: Other Investment