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SiBILA 2.0

METHODOLOGICAL FRAMEWORK AND TECHNICAL DOCUMENTATION

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List of abbreviations

BNB	Bulgarian National Bank
CM	Council of Ministers
ERDF	European Regional Development Fund
ESF	European Social Fund
EU	European Union
EURIBOR	Euro Interbank Offered Rate
Eurostat	Statistical Office of the European Communities
GDP	Gross Domestic Product
GS	Government Securities
ICT	Information and Communication Technology
IFI	International Financial Institutions
IMF	International Monetary Fund
LOTHAR	System for preparation of financial forecasts for the absorption of EU SCFs and monitoring of their implementation
MA	Managing Authority
NATO	North Atlantic Treaty Organisation
NSI	National Statistical Institute
NSRF	National Strategic Reference Framework
OECD	Organisation for Economic Co-operation and Development
OP	Operational Programmes
OPAC	Operational Programme "Administrative Capacity"
OPDCBE	Operational Programme "Development of the Competitiveness of the Bulgarian Economy"
OPE	Operational Programme "Environment"
OPHRD	Operational Programme "Human Resources Development"
OPRD	Operational Programme "Regional Development"
OPT	Operational Programme "Transport"
OPTA	Operational Programme "Technical Assistance"
R&D	Research and Development
SCF	Structural Funds and Cohesion Fund
UMIS	Unified Management Information System
VAT	Value Added Tax

Part 1: Methodological Framework

1. Highlights of the methodology of SIBILA 1.0 and justification of the present update

The Structural Funds, which include the European Regional Development Fund (ERDF) and the European Social Fund (ESF), together with the Cohesion Fund (CF), have an important role in promoting economic and social cohesion by reducing regional disparities between member states and the regions. Operating with a budget of €347 billion in the period 2007-13, Cohesion Policy is the largest single source of financial support at EU level for investment in growth and jobs. For the programming period 2014-20, the European Commission[1] has launched Europe 2020: a strategy for smart, sustainable and inclusive growth[2], building on the Lisbon objectives. The Common Strategic Framework (CSF) for the programming period 2014-20 brings together the Community Strategic Guidelines in the areas of cohesion, rural development, and maritime and fisheries, and directly links the objectives of Europe 2020 with the priorities of the five funds for implementation of Cohesion Policy – European Regional Development Fund (ERDF), European Social Fund (ESF), Cohesion Fund (CF), European Agricultural Fund for Rural Development (EAFRD), and European Maritime and Fisheries Fund (EMFF), commonly referred to as European Structural and Investment Funds (ESIF).

The Structural Funds and the Cohesion Fund are a major factor supporting the Bulgarian economy and contributing to reducing the disparities between Bulgarian regions and regions in developed member states. During the first eight years of Bulgaria's EU membership (2007-14), the contribution of these funds towards overcoming the major challenges to the country's socio-economic development was apparent. Their impact was further enhanced after the beginning of the economic crisis and the ensuing major restrictions on public and private investment.

SIBILA is a tool for monitoring the net effects of the structural funds at different aggregate levels, from the cumulative effect of the total support all the way down to the individual impact of each operational programme, priority or sub-priority. This makes it possible to identify the impact of a chosen set of structural instruments on a wide range of macroeconomic indicators, including the effects observed at different levels of spending.

The originally developed model (SIBILA 1.0) is aligned with best European practice, including QUEST II, HERMIN, E3ME, and ECOMOD. SIBILA 1.0 is a macroeconomic tool for studying the effects of the EU funds on the Bulgarian economy in the short and medium term. Its main purpose is to enable an assessment of SCF effects on key macroeconomic indicators. The model covers the four major sectors of the economy (real, monetary, fiscal and external), and enables simultaneous treatment of the two sides of economic dynamics - supply and demand - with a possibility to report effects under both.

- Demand-side effects are reported under three categories – government consumption, government investment, and private investment. The modelling of demand-side effects follows the logic of data usage and the classification under relevant macroeconomic aggregates adopted by the design team. As the model links imports to components of domestic demand, SCF resources translate into an increase in imports.

[1] COM(2010) 2020 final

[2] Approved at the Spring Summit of 25-6 March 2010, finalised by the European Council on 17 June 2010.

- The modelling of supply-side effects in the real sector follows the same logic. The constructed production function contains three explicitly defined production factors (labour, physical capital and human capital), whose dynamics are defined within the model, as well as a Hicks-neutral technical change, identified with the so-called total factor productivity. In this way, supply-side effects are calculated directly on the basis of spending of European funding on:
  - Physical capital – by means of gross investment in the economy;
  - Labour – by means of recruitment of additional human resources and their involvement in the production process;
  - Human capital – by means of provision of vocational training to the labour force;
  - Raising the technology level in the economy – by means of expenditure on infrastructure, R&D, information and communication technology etc.

In the construction process, the team that developed the original version of SIBILA has adhered closely to specific trends or schools of economic theory. The main goal was for the model to realistically mirror the structure of the Bulgarian economy, and at the same time to yield results that are consistent with the historical developments of the monitored indicators.[3] SIBILA 1.0 consists of 170 equations, describing relationships between 202 macroeconomic variables. Some of the equations are econometrically estimated, while others are calibrated on the basis of existing economic knowledge or stable historical dependencies; still others represent macroeconomic identities.

- The original version of the model follows the EU guidelines for the programming period 2007-13. It has been used for provision of full and reliable information on the impact of interventions implemented to date in various reports on the spending of EU funding, including the 2012 Strategic Report. As regards Cohesion Policy in the ongoing programming period 2014-20 however, a need to update and further develop the model arises, in particular with regard to the need to assess impacts until 2023 (in accordance with the N+3 rule), for the following reasons:
- Since the development of the original version, as a result of the business dynamics during the economic crisis and the post-crisis period of moderate economic recovery, there have been significant changes in financial and economic processes in Bulgaria, the EU, and in international markets, which have affected and continue to affect the relationships between economic variables.
- The assumptions on which SIBILA 1.0 is based were formulated in early 2011, and they need to be updated, subsequently verified, and potentially modified to prevent the statistical risk of the model yielding not sufficiently precise future assessments of the effects of European funding in the new programming period during the present and the next few years. In addition, SIBILA contains a number of exogenous variables describing external economic developments that need to be estimated as accurately as possible. It is crucial that the model provide reliable forecasts and/or projections by

[3] It follows that the model is neither Keynesian, nor is it neo-classical, neo-Keynesian etc. The chosen econometric modelling technique tackles both the short- and the long-term effects of the interaction between the variables, and as such can be claimed to exhibit both Keynesian and neo-classical characteristics. Insofar as the production function used in the modelling of aggregate supply possesses neo-classical properties and includes factors generating endogenous growth, the model can also be described as leaning on endogenous growth theory and empirics.

the year 2023, by which time the spending of ESIF resources for the programming period 2014-20 is expected to have been completed.

- Moreover, in the period 2014-20 the CSF will cover the financial resources that will be available to Bulgaria under the Integrated Maritime Policy and the Common Fisheries Policy, as well as part of the resources under the Common Agricultural Policy. It is therefore necessary to further develop the assessment capacity of the model by incorporating the funding to be awarded under the EAFRD and the EMFF. This will provide a more complete picture of the net benefits of the country's EU membership as all five key CSF funds will have been included.

In view of the above, the development of a second updated and upgraded version of the model (SIBILA 2.0) will be a key prerequisite for: improving the assessments and estimates of the impact of ESIF implementation; expanding the opportunities for assessing and analysing ESIF impact; improving the programming process and the formulation of specific measures under individual operational programmes by identifying the most effective ESI-funded policies; overall improvement of the policy implementation process based on comprehensive impact assessments, as well as on ex-ante and ex-post impact assessments.

A highlight of SIBILA 2.0 is that its outputs must not be compared with those of the original SIBILA 1.0 version. The reasons why any such comparisons would fail are:

- First of all, practical – the original version has thus far exhausted its potential, hence the development of the updated model;
- But more importantly, methodological:
  - SIBILA 1 covers only the operational programmes of the first programming period under an assumption of a 100% spending rate, whereas SIBILA 2 operates on an actual utilisation rate of c. 80% for the said operational programmes, as well as part of the funding available under the Common Agricultural Policy and the funding under the Common Fisheries Policy (unlike SIBILA 1). The updated model further covers the funds for the second programming period under an assumption of 100% spending.
  - SIBILA 1 operates in constant prices of 2005, and SIBILA 2 – in constant prices of 2010.
  - SIBILA 1 is based on assumptions for economic development dating from early 2011 and on a sectoral structure of the economy of 2005. SIBILA 2, on the other hand, builds on current information about economic development based on revised NSI and BNB data and official forecasts of international institutions, as well as on a sectoral structure of the economy of 2011.
  - All economic dependencies in SIBILA 2 are freshly calibrated and specified to ensure a more adequate reflection of changes in the socio-economic environment, markets, and recent data that were not available at the time of SIBILA 1, including a more accurate reflection of subsidised employment under the European funds (in SIBILA 2).
  - SIBILA 2 makes use of a new type of simulation logic of impact assessment – the rate of spending in the first programming period is already known, so its baseline scenario is grounded on actual utilisation of EU funding (which is also fully consistent with historical data, unlike SIBILA 1, which was developed at a time of very limited spending history).

2. General methodological notes on SIBILA 2.0

SIBILA 2.0 is a complete update of the 1.0 version created in 2011. The main modelling principles remain principally the same. The present documentation includes a brief description to provide a fuller picture, but it also aims to ensure that any parallel usage of the technical documentation of the original version be kept to a minimum.

The purpose of the model is to present a synthesis of the structure of the Bulgarian economy and the main relationships between variables at macro level. Thus, SIBILA 2.0 can:

- Accurately reproduce (simulate) the development of the economy in a historical perspective using whatever historical statistical information is available for a defined set of exogenous variables and/or previously known data concerning past periods for endogenous variables;
- Simulate the development of the economy for future periods based on pre-established assumptions about the future development of exogenous variables until the end of the simulation period.

An integral feature of the model that is of key significance in our context is its ability to integrate information on EU funding into the economic structure. This should be approached by paying very close attention to its intended use, i.e. it is essential to correctly identify the purpose of funding so as to reflect as accurately as possible its impact on relevant components of aggregate supply and demand. Accordingly, modelling follows a pattern that approximates and binds the allocation of European funding as closely as possible to the relevant macroeconomic aggregate.

The model includes two types of equations – behavioural dependencies and identities. While no further explanation is needed for the latter type (it follows from definitions laid out in the System of National Accounts, IMF's Balance of Payments Manual, monetary statistics standards etc.), the former requires some clarification. First, these are equations in which the dynamics of the endogenous variable calculated is determined by the dynamics of one or more other variables (which can be both exogenous and endogenous). Second, the equations can belong to either of the following sub-types – econometrically estimated or manually calibrated, where econometric estimation consists in linear regression analysis of defined statistical data samples, thus establishing equation parameters, while manual calibration is grounded in sufficiently stable historical relationships, theoretical assumptions, well-known empirical results etc.

As for the specification of econometrically estimated equations, wherever possible, the so-called error correction representation is applied.[4]

Each of the equations in the model (behavioural dependencies and identities) corresponds to a single endogenous variable. Accordingly, all equations are appended with the help of EViews programming language tools to a model object, which in itself represents a system of equations that needs to be solved.

[4] Part 2 Technical Documentation includes a description of the generation of each variable contained in the model, including variables obtainable via estimation of econometric equations with the presence of an error correction mechanism.

3. Structure and main features of SIBILA 2.0

SIBILA 2.0 consists of a total of 298 equations, 22 of which are econometrically estimated. Overall, 331 variables are used for modelling, 33 of which are exogenous (two of these also belong to the category of the so-called add factors). Compared with the previous version, which contains a total of 170 equations, the net number of equations is increased by 128. This is mainly due to expanding the sectoral disaggregation of the economic structure from four to ten sectors. It is also the reason for the increase in the number of variables by 121 (their respective number in SIBILA 1.0 is 210).

SIBILA 2.0 preserves the block structure of the previous version. Its building blocks can generally be classified under the following categories:

1. Sectoral blocks - refers to the modelling of individual sectors of the national economy. The current version includes four such blocks: real, budgetary, monetary and external;
2. Price block – refers to the modelling of price dynamics in the total economy and in individual macroeconomic aggregates. This includes the modelling of CPI, as well as of the deflators for individual demand components;
3. Specialised blocks – refers to the modelling of specific macroeconomic categories related to production technology. These include human capital, technology capital, infrastructure capital, production function modelling, interest rates, sectoral disaggregation and labour market;
4. Auxiliary blocks – whose function is to automate modelling, including import and export of data to and from the econometric software, computation of other variables used in the modelling, formulation of alternative scenarios etc.

This brief description of the different block types shows that the model allows for simultaneous treatment of the supply and the demand side of the economy. Accordingly, both supply- and demand-side effects can be monitored.

4. Input data

4.1 Spending of EU funding

SIBILA requires spending of EU funding to be broken down by economic category on both the supply side and the demand side. The impact on the economy is assessed primarily on the basis of annual disbursement data for the period 2007-23. The updated version operates with information about actual expenditure in the first programming period 2007-13 and estimated disbursement in the second period 2014-20.

The economic categories used are fully compliant with the model framework and include:

- Categories of aggregate supply (production factors):
  - Capital (K): corresponds to procedures relating to acquisition of machinery, equipment, buildings etc.
  - Labour (L): corresponds to procedures relating to inclusion in the labour force of people who, for different reasons, have been and continue to be economically inactive, as well as to creation of new jobs.

- Technology (A): corresponds to procedures relating to R&D, ICT, as well as to improving the quality of environments and productivity in the public and private sectors.
- Human capital (H): corresponds to procedures relating to training of employed and unemployed people, as well as to improving the quality of and access to education.
- Infrastructure (I): corresponds to procedures relating to construction of new and the rehabilitation of existing infrastructure (roads, waste management systems, energy efficiency, cultural monuments etc.)

- Categories of aggregate demand (cost items):
  - Public investment (PUI): corresponds to resources already classified under the Infrastructure category (I). It further includes resources classified under Capital (K) that are to be acquired by and for the benefit of the public administration.
  - Private investment (PRI): corresponds primarily to resources classified under Capital (K).
  - Public consumption (PUC): classified on the basis of the Unified Chart of Accounts for public expenditure.

4.1.1 Breakdown of spending of EU funding in the programming period 2007-13 by production factor and cost item

For the first programming period information on actual disbursement by year and project, available from the public module of the Unified Management Information System (UMIS) of the structural instruments of the European Union[5], is used. For all 11,785 UMIS-registered projects, data are collected under the following categories:

- Number;
- Title;
- Beneficiary;
- Beneficiary's registered address;
- Operational programme under which the project is implemented;
- Status;
- Start date of implementation;
- End date of implementation;
- Administrative region and province of implementation;
- Approved budget;
- Total budget;
- Total disbursed amount;

[5] he management information system for monitoring the structural instruments of the European Union is used by all administrative structures involved in the management, monitoring and control of the European Structural Funds. The system has two modules, with restricted and general access respectively. The publicly accessible module http://umispublic.government.bg/ ensures publicity and transparency for the absorption of resources from the European Structural Funds and Cohesion Fund in Bulgaria and has been used to feed data onto the model regarding the utilisation of European funding.

- Grant;
- Beneficiary’s contribution;
- Disbursement (total) by year (2007 to 15 August 2015);
- Disbursement (EU) by year (2007 to 15 August 2015)

First, on the basis of this detailed information, a calculation of disbursement (total and EU-funded), broken down by year, is made for the whole programming period at procedure level for each of the seven operational programmes.

Second, all open schemes under the operational programmes are analysed and related to one of the imbedded production factors, including to a part of total factor productivity (TFP) endogenised through the definition of technology capital and infrastructure capital. Production factors are divided into the following categories::

Technology capital	Innovation, R&D
	Technology development
	Social capital, social infrastructure (excluding buildings and similar)
	Institutional environment (including experience exchange and total factor productivity in the public sector)
Human capital	Training of young people
	Improving skills of employed people
	Training of unemployed
	Other training
Labour	Youth employment
	Employment of socially excluded people
	Other employment
Infrastructure capital	Road infrastructure
	Green infrastructure
	Energy infrastructure, including infrastructure related to energy efficiency and adaptation to climate change, as well as to risk prevention and management
	Urban, cultural, sports and other infrastructure types
	Industrial buildings and others

Finally, the obtained breakdowns of disbursement by procedure, year and production factor are aggregated at priority axis and operational programme level.

As regards the Operational Programme “Fisheries Sector Development” and the Rural Development Programme, data on their annual financial performance is obtained indirectly from the official annual reports on their implementation. The level of detail of the Rural Development Programme and the Operational Programme “Rural Development” data corresponds to individual measures and years in order to guarantee higher precision of classification of funds to one production factor or another. For the purposes of simulations, however, they are aggregated at the priority axes level which also matches the terms-of-reference requirements.

The resulting database makes it possible to assess the effect of the spending of Union support on long-term growth with the help of the production function constructed under the model. The funding, however, also has a short-term effect on aggregate demand in the economy. The latter is impacted indirectly through the public and private expenditure incurred on project implementation. The cost-item breakdown of disbursement under European programmes is obtained with the help of the following correspondence table between production factors and expenditure.

Production factors		**Cost items** (categories of aggregate demand)		
		Public investment	Private investment	Public consumption
Technology capital	Innovation, R&D		☑	
	Technology development		☑	
	Social capital, social infrastructure (excluding building and similar)			☑
	Institutional environment (including experience exchange and total factor productivity in the public sector)			☑
Human capital	Training of young people			☑
	Improving skills of employed people		☑	
	Training of unemployed			☑
	Other training			☑
Labour	Youth employment			☑
	Employment of socially excluded people			☑
	Other employment			☑
Infrastructure capital	Road infrastructure	☑		
	Green infrastructure	☑		
	Energy infrastructure, including infrastructure related to energy efficiency and adaptation to climate change, as well as to risk prevention and management	☑	☑	
	Urban, cultural, sports and other infrastructure types	☑		
	Industrial buildings and others		☑	

4.1.2 Breakdown of spending of EU funding in the programming period 2014-20 by production factor and cost item

Unlike the previous programming period, for which data on the implementation of programmes are available, as far as the current period 2014-20 is concerned, the only information practically available at the time of the update of the model were the commitments set out in the Partnership Agreement (PA) and the programme documents of the operational programmes. Hence the following assumptions:

- National contribution is set to 15% of the total funding available under the operational programmes (with the exception of the Operational Programme “Small and Medium-sized Enterprises” where no national co-financing is envisaged);
- It is assumed that disbursement will be implemented as follows: 50% of the funding committed for a given year will be disbursed (i.e. will actually enter the economy) two years after the year of commitment, and the remaining 50% - three years after the year of

commitment. Thus, by 2023 disbursement for all commitments under the Partnership Agreement will have been achieved.

The following tables from the Partnership Agreement and the programme documents are used as sources of input data:

- Table of the indicative allocation of Union support by thematic objective at national level for each of the ESI Funds (PA);
- Table of the indicative allocation by year and programme under the ERDF, the ESF and the YEI, and the Cohesion Fund, except that under the European territorial cooperation goal, and the programmes of the EAFRD and the EMFF (PA);
- Table 18a. Financial Plan (from the programme documents);
- Table 18c: Breakdown of the financial plan by priority axis, fund, category of region and thematic objective (from the programme documents).

Similarly to the previous programming period, a breakdown by operational programme, priority axis, production factor and year is included, which is based on the above breakdown algorithms of funding by production factor and cost item (categories of aggregate demand).[6] Moreover, information for the period 2014-20 is also broken down by thematic objective. Then, on the basis of the conversion table of production factors into cost items, the size of the public and private expenditure expected to be incurred by the end of 2023, the end spending year for Union support in the current programming period (in accordance with the N+3 rule), is estimated. Thus, a five-dimensional matrix of the spending of EU resources is obtained, which is then used for simulation under the following categories:

- Priority axis;
- Production factor;
- Year;
- Thematic objective;
- Cost item (categories of aggregate demand).

4.2 Macroeconomic data

4.2.1 Data sources

SIBILA 2.0 operates entirely on yearly data. Its construction is based exclusively on official statistical information. Any use of data originating from private international or national organisations is purposefully omitted so as to avoid risks associated with corporate interest, deficient capacity etc., especially as regards current database maintenance and forecast generation.

The data fed onto the indicators in the model reflect the latest changes introduced by the institutions responsible for their generation. Data sources can be divided into two categories:

- National institutions: National Statistical Institute, Bulgarian National Bank, Ministry of Finance;
- International and supranational institutions: International Monetary Fund and Eurostat.

[6] A detailed breakdown is included in Part 2: Technical Documentation.

The main sources of information are national accounts. The statistical series update of 2014, in accordance with the European System of Accounts 2010, is taken into consideration in the construction of the model database. At the same time, a number of faults, relating primarily to the period before 2000, are also considered. As a result, data referring to the period 1995-9 are intentionally omitted in the modelling, in order to prevent distortion of the estimated behavioural relations.

Account is further taken of the update of the Balance of Payments data initiated by the BNB in 2015 in accordance with the Sixth Edition of the IMF Balance of Payments Manual. It should be noted, however, that annual data are revised only for the period 2007-14, whereas for previous years they are prepared in accordance with the Fifth Edition of the Manual. The situation is quite similar as regards the statistics on the international investment position, where data revisions apply only to the period after 2010. On the one hand, this can be suggestive of data inconsistencies between individual periods, i.e. of a number of structural breaks in the statistical series, and on the other – of a lack of compliance with national accounts data until 2009. All of the above makes any in-depth modelling of the economic dynamics rather challenging.

As for forecasting exogenous variables, the main source used is IMF's World Economic Outlook of April 2015. The latter, however, operates with a horizon only until 2020. Because of this, for the period 2021-3 certain assumptions are made that generally follow common observations, while in other cases the assumption is that there will be no change in the indicator compared with the previous period (so-called naïve forecasting).[7] This is justified insofar as the said three years represent a far too distant horizon for which no sufficiently reliable forecasts are practically available. Some further information about specific indicators requiring forecast data for the solution of the model is provided below.

The designation of variables generally follows the one in the previous version, the main changes being:

- Variables at constant prices of 2010 are marked with the extension _2010, instead of the previously used _2005, to denote the transition to the new database;
- Deflators for variables are marked with the extension _P2010, instead of the previously used _CPI05.

Individual indicator groups are organised into separate Microsoft Excel files for easier handling. The files are in XLSX format, which simplifies the code for importing statistical data series. The only exception is the file containing the input/output supply and use tables and their respective aggregates, which is in XLS format. This is because EViews 7 does not support direct import to matrix objects from XLS files. Each file contains a worksheet with a glossary of variables.[8]

Data files also contain formula-based internal calculations. It is therefore unadvisable to delete any of their parts, even if not directly used by the model.

4.2.2 Key endogenous variables

Although it is possible to monitor the dynamics of all variables used in the model, a certain group are of particular interest in terms of macroeconomic policy. Therefore, they deserve special attention, especially in regard to studying the effects of the implementation of EU funds in the Bulgarian economy. With this in mind, a dedicated feature of the model is specifically designed to export

[7] The naïve forecasting method is most commonly used for economic and financial data when, due to their specific nature, it is impossible to generate any meaningful forecast by any other method. For further information about the efficiency of naïve forecasting see for example Chase (2013, p. 84).

[8] Details on the content of macroeconomic indicator files are included in Part 2 Technical Documentation.

output relevant to such variables into a standard xlsx electronic table, thus allowing users to view the results in a spreadsheet format without having to use the modelling software.

With the help of the method of final consumption at constant prices, the key indicators list is generally reduced to GDP and its components, including indicators relevant to the public administration sector (pubic investment and consumption), labour market indicators (labour demand and supply, unemployment and wages), consumer price index, budget indicators (budget balance, fiscal reserves, public debt), and external sector indicators (current account balance).

Since SIBILA 2.0 (as well as its predecessor) is a simulation rather than a forecasting model, the absolute values of indicators are not as relevant here as are the relative differences in their performance in different development scenarios. In our specific context, it is important to study the relative differences in the values of relevant macroeconomic indicators, expressed as percentages, in the presence and in the absence of a given intervention consisting in spending European resources (including national co-financing).

5. Technical specification of the model

5.1 Dummy variables

Dummy variables (also known as indicator variables) are important in modelling as they generally indicate the presence of atypical observations in the behaviour of variables. They take the value 1 in periods of atypical observations, and the value 0 in all other periods. In our case, dummy variables are used for the period of Bulgaria's EU membership (dum_eu: value 1 for 2007 and subsequent years, and value 0 for all other years), for the crisis period (dum1: value 1 for 2009 and 2010, and value 0 for all other years), for the period of strongest economic boom (dum2: value 1 for 2007 and 2008, and value 0 for all other years), as well as for individual years (variables are marked as dumXX, where XX represents the last two digits of the respective year: value 1 for period XX, and value 0 for all other periods).

5.2 Preliminary definitions of variables

A preliminary definition is necessary for some variables mostly because they are used in calculations before the corresponding block has been reached, as well as due to the need for variables to have a starting value (hence the separate definitions section at the beginning of the software code). They are as follows:

- EU-financed public consumption at current prices is defined as the total of EU funding for public consumption and the corresponding national co-financing: p3_s13_eu = (puc_p_eu + puc_p_bg)/1000000 (division by 1,000,000 is required due to the form of input data and applies to all of the next three variables).
- EU-financed public investment at current prices is defined as the total of EU funding for public investment and the corresponding national co-financing: p5_s13_eu = (pui_p_eu + pui_p_bg)/1000000.
- EU support to the budget is defined as the total of EU funding for public consumption and investment: d92_eu = (puc_p_eu + pui_p_eu)/1000000.
- EU-financed private investment at current prices is defined as the total of EU funding for private investment and the corresponding national co-financing: p5_x_s13_eu = (pri_p_eu + pri_p_bg)/1000000.
- The model operates with number of persons undergoing EU-financed training. As this number is unavailable from the information provided to the design team, based on a

sample of training projects, the unit cost of training per person is set to BGN 1,111: trcost = 1111.

- Accordingly, the number of persons undergoing such training is: numvoc_eu = (h_p_eu + h_p_bg)/trcost/1000, where the two indicators in parentheses represent EU funding and national co-financing respectively.
- Direct taxes are defined as the total of the personal income tax, corporate income tax, and social security and health insurance contributions: d5_d61 = d51a + d51b + d61.
- Indirect taxes are defines as the total of the value-added tax (VAT), customs duties and import tax, excise duties and the insurance premiums tax: d21 = d211 + d212 + d214a + d214g.
- Gross national disposable income at current prices is defined as the total of GDP at current prices, net factor income from abroad, and net transfers from abroad: dispy = b1gq + bop300nt + bop379nt
- Gross national disposable income at constant prices of 2010 is obtained by deflating gross national disposable income by the consumer price index: dispy_2010 = dispy/cp00_avx*100.
- Private investment at current prices is defined as the difference between gross investment at current prices and public investment at current prices: p5_x_s13 = p5 - p5_s13. The constant-price indicator is obtained through deflation by the gross investment deflator: p5_x_s13_2010 = p5_x_s13 / p5_p2010*100
- Public consumption and public investment at constant prices, as well as real wage are also obtained through deflation: p3_s13_2010 = p3_s13 / p3_s13_p2010 * 100; p5_s13_2010 = p5_s13 / p5_p2010 * 100; wage_total_2010 = wage_total/cp00_avx*100.

5.3 Real sector

5.3.1 Aggregate supply

Aggregate supply in SIBILA 2.0 is modelled with a Cobb-Douglas production function. The latter includes three "traditional" production factors: physical capital, human capital and labour. In accordance with the empirical findings of Mankiw, Romer and Weil (1992), their production elasticities are set to 1/3 each. Technology level, which constitutes a fourth production factor, is endogenised, for which purpose two additional types of capital are defined: technology and infrastructure. For these, a production elasticity of 0.05 each is calibrated. In this way, the total of all defined elasticities becomes 1.1, which conditions increasing returns to scale, i.e. if the quantity of production factors is increased times two, production will increase times 2.2. The drivers of such increasing returns are precisely infrastructure capital and technology capital.[9] The elasticities defined here are lower than in SIBILA 1.0; however, first, they can be claimed to be more realistic, and, second, they can yield considerably more accurate output from the simulation of observed historical developments in real production.

► *Technology capital*

Technology capital represents the accumulated stock of investment in R&D and information and communication technology. However, while data on investment in R&D are available for the entire

[9] The assumption for increasing returns to scale fits well with the low starting position of the Bulgarian economy in terms of real production and income, and capital base compared with the values observed in developed economies. Beyond the programme horizon, during which time further progress towards actual convergence is expected to be achieved, the assumption might be less realistic.

period 1995-2013, data on investment in ICT are only available for 2006-10. Therefore, by way of supplementing the missing data and generating forecasts, observed shares of GDP indicators are used. In this way, the share for the period 2000-5 is set to equal that for 2006, and for the period after 2011 - that for 2010 (extrapolation of R&D expenditure begins in 2014, when the share equals the one for 2013).

Expenditure on technology is defined as the total of the expenditures on R&D, information technology and communication technology:

techexp = gerd + itexpen + commexp

Then, the obtained indicator is converted into constant-price terms using the gross investment deflator.

The initial stock value of technology capital is obtained by dividing the value of technology expenditure at constant prices of 2000 by the technology capital depreciation rate. In our case, the latter is set to 50% per year, which, on the one hand, is a reflection of the rapid global technological progress, hence the rapid depreciation of technology, and, on the other, is compliant with the legally specified rate of depreciation on assets falling into the category.

Subsequent values of technology capital are obtained in accordance with the perpetual inventory approach:

techkt_2010 = techexp_2010(-1) + (1-techdeprate) * techkt_2010(-1)

where -1 in parentheses indicates a value from the previous period.

▸ *Infrastructure capital*

Where technology capital refers to the accumulated stock of investment in R&D and ICT, Infrastructure capital reflects the accumulated stock of investment in infrastructure. Since data on investment in infrastructure are not available from national statistics, a relevant Eurostat indicator is used - investment in other buildings and structures (n1112). In addition to the current price value, Eurostat also provides data on the deflator and the 2005 price-term value, making it possible to calculate the indicator at 2010 prices. The values obtained are then used to construct the series of infrastructure capital:

infrkt_2010 = n1112_2010(-1) + infrkt_2010(-1)*(1-infrdeprate)

where the initial stock value is determined for 1999 in accordance with the above approach. The rate of depreciation on infrastructure is estimated at 4%, resulting in an average asset life of 25 years.[10]

▸ *Physical capital*

Physical capital refers to the accumulated stock of gross investment in the economy. Using an analogous approach to the one described in the technology and infrastructure capital sections above, the initial stock value is obtained by dividing gross investment for 1998 at 2010 prices by the annual depreciation rate, which is set to 5%.[11]

kt_2010 = p5_2010(-1) + (1-deprate) * kt_2010(-1)

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[10] The assumption is compliant with the legally established accounting rate of depreciation on category-one long-term assets (solid buildings, including buildings classified as investment property, facilities, transceivers, energy carriers and communication lines). In the calibration procedures of the model, this value also yields the most realistic simulation of historic developments.

[11] This value has been used on multiple occasions in international empirical studies (for reference see e.g. Ganev (2005)). The resulting figure is to a large extent confirmed by national accounts data on fixed capital consumption.

▸ *Labour*

Labour is identified with employment in the economy, which is defined in the labour market block (see description below).

▸ *Human capital*

As regards human capital, the adopted approach is to identify the indicator with the educational attainment of the population. In our case, the latter is measured by the average number of years in education. Statistical data for this indicator are generally unavailable, except for the possibility to calculate it on the basis of census data. While only one such observation (based on data from Census 2001) was available during the development of the previous version of the model, at the present moment the observations are already two. Version 1.0 makes use of Kyriacou's (1991) econometrically estimated cross-country dependency, which here is further manually calibrated (with a pseudo fixed effect resulting in an intercept shift). In the course of the present update, it was discovered that the error in calculation, measured by the difference between the projected data and the actual census data, is about 0.5 years (i.e. the projected average number of years in education for 2011 differ from the actual number by about half a year), hence the intercept shift from 2 to 1.5:

edu_att = 1.5 + 4.439*primedu_rt(-15) + 2.665*secedu_rt(-5) + 8.092*higheredu_rt(-5)

where primed_rt, secedu_rt and higheredu_rt are the respective ratios of enrolment in primary and basic, secondary and secondary specialised, and tertiary education. The ratios are calculated on the basis of data on the number of enrolled students and the number of the population in the corresponding age group:

primedu_rt = primedu/(pop_5_9 + pop_10_14)

secedu_rt = secedu/pop_15_19

higheredu_rt = higheredu/pop_20_24

It is assumed that vocational training also leads to improving the educational attainment, so, in the present version, the years spent in vocational training are added to the years in formal education. As regards the number of people undergoing such training, statistics are scarce, with only three observations (1999, 2005 and 2010). The situation is even worse where the total number of hours in vocational training is concerned, as the observations are only two (2005 and 2010). The missing data is once again supplemented through interpolation and extrapolation. After that, the number of hours is converted into years on the assumption that there are 9 months of training in a year, 22 days of training in a month, and 8 hours of training in a day. An analogous approach is then applied to EU-funded training, and, in this way, the following dependency is reached:

hkt = act_15_64 * edu_att + voc + voc_eu

namely that human capital is equal to the sum of the total number of years in education for the labour force and the total number of years for all persons undergoing vocational training financed by own resources of enterprises or through European funding.

▸ *Total factor productivity – Solow residual*

In spite of the many production factors used in the definition of the production function, there remains a small unexplained part of the dynamics of real aggregate production. It can be defined with the help of the production function equation:

b1gq_2010 = tfp * emp_15_64^lshare * kt_2010^kshare * hkt^hkshare * infrkt_2010^infrelast * techkt_2010^techelast

its logarithmic transformation, and a calculation as a Solow residual:

log(tfp) = log(b1gq_2010) - kshare * log(kt_2010) - lshare * log(emp_15_64) - hkshare*log(hkt) - infrelast * log(infrkt_2010) - techelast * log(techkt_2010)

This indicator cannot be forecast, and is therefore assumed to remain unchanged, i.e. production growth arising from this residual is ignored in simulation.

5.3.2 Interest rates

With the help of the production function defined above, it is possible to calculate the real interest rate (by which is here meant the implicit cost of capital). Assuming price to be equal to marginal cost of capital yields the following:

rintrate = tfp * kshare * kt_2010^(kshare-1) * emp_15_64^lshare * hkt^hkshare * infrkt_2010^infrelast * techkt_2010^techelast - deprate

The nominal interest rate, in accordance with the Fisher relation, is defined as the total of the real interest rate and the inflation rate:

intrate = rintrate + dlog(cp00_avx)

5.3.3 Prices

Price indicators have a special function in the model – on the one hand, they help to analyse the impact of European funding on general price level dynamics, and, on the other - to convert nominal variables into real variables and vice versa. The latter makes use of the price deflators corresponding to quantitative macroeconomic variables, while the general price level is measured through the consumer price index.[12]

The consumer price index is modelled by econometrically estimating the following dependency:[13]

eq_cp00_avx.ls dlog(cp00_avx) = c(2) * dlog(pfoodw) + c(3) * dlog(p3_2010(-1)) + c(4) * dlog(cp00_avx(-1))

The underlying logic is as follows: the inflation rate[14] is explained by the inflation of international food prices, the real consumption growth rate in the previous period, and the inflation lag in the previous period. The function of the latter regressor is to measure inflation inertia.

Since of all macroeconomic aggregates the consumer price index is the one most closely associated with private consumption, it is logical to anticipate that in addition to a short-term relationship between the private consumption deflator and the consumer price index, there will also be a much more stable (long-term) one. This is shown in the following equation, which is subject to econometric estimation:

dlog(p3_s14_s15_p2010) = c(1) + c(2)*(log(p3_s14_s15_p2010(-1)) – c(4)*log(cp00_avx(-1))) + c(3)*dlog(cp00_avx)

The public consumption deflator is modelled as follows:

dlog(p3_s13_p2010) = c(1) + c(3)*(log(p3_s13_p2010(-1)) - log(cp00_avx(-1))) + c(5)*dlog(te) + c(6)*dum08

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12 It is self-evident that the GDP deflator can be interpreted in precisely the same way; however, in effect analysis, it is significantly less important.

13 c(1), c(2), c(3) etc. signify the respective coefficients (parameters) in the regression equation having to be estimated.

14 he first difference of the natural logarithm, which in EViews is calculated with the dlog command, determines the relative (percentile) change of the indicator in two adjacent periods.

This equation also reveals a long-term relationship with the consumer price index, but here, government decisions on spending as part of the fiscal policy become an impact factor as well. As in late 2008 there was a shock increase in public spending, this atypical element of dynamics is modelled by means of a dummy variable.

A long-term dependency on the consumer price index is similarly present in the investment deflator equation. In addition to it, the inflation of international prices of industrial goods in the previous period is also introduced as an explaining variable:

dlog(p5_p2010) = c(2)*dlog(cp00_avx) + c(3)*(log(p5_p2010(-1)) - log(cp00_avx(-1))) + c(4)*dlog(pindu(-1))

The exports deflator is determined by the dynamics of the international market price of energy commodities and metals, which is represented by the following equation:

dlog(p6_p2010) = c(1) + c(2)*dlog(pnrg) + c(3)*(log(p6_p2010(-1)) – c(4)*log(pnrg(-1)) – c(5)*log(pmeta(-1)))

The development of international market prices also determines the dynamics of the imports deflator:

dlog(p7_p2010) = c(1) + c(2)*dlog(pnrg) + c(3)*(log(p7_p2010(-1)) – c(4)*log(pnrg(-1)) – c(5)*log(pindu(-1)))

The two identities below determine the aggregate consumption deflator and the GDP deflator:

p3_p2010 = (p3_s13_2010 / p3_s13_2010(-1) * p3_s13(-1) * p3_s13_p2010 + p3_s14_s15_2010 / p3_s14_s15_2010(-1) * p3_s14_s15(-1) * p3_s14_s15_p2010) / (p3_s13_2010 / p3_s13_2010(-1) * p3_s13(-1) + p3_s14_s15_2010 / p3_s14_s15_2010(-1) * p3_s14_s15(-1))

b1gq_p2010 = (p3_2010 / p3_2010(-1) * p3(-1) * p3_p2010 + p5_2010 / p5_2010(-1) * p5(-1) * p5_p2010 + p6_2010 / p6_2010(-1) * p6(-1) * p6_p2010 - p7_2010 / p7_2010(-1) * p7(-1) * p7_p2010) / (b1gq_2010 / b1gq_2010(-1) * b1gq(-1))

5.3.4 Aggregate demand: variables at constant prices

The dynamics of private consumption are determined exclusively by real GDP dynamics:[15]

dlog(p3_s14_s15_2010) = c(2)*dlog(b1gq_2010)

The growth rate of private investment financed through sources other than the EU is determined by the growth rate of the global economy in the long term, and by local economic growth (acceleration element) in the short term:

dlog(p5_x_s13_x_eu_2010) = c(1) + c(2)*(log(p5_x_s13_x_eu_2010(-1)) - ngdp_rpch(-1)) + c(4)*ngdp_rpch(-1) +c(5)*dlog(b1gq_2010)

Percentile changes in export volumes are set as a function of the real growth rate of the global economy, but a long-term dependency on investment in R&D and ICT is also included:

dlog(p6_2010) = c(2) * ngdp_rpch/100 + c(4)*(log(p6_2010(-1)) - log(techexp_2010(-1)))

[15] An analogy with a standard Keynesian consumption function is certainly possible; however, it should be noted that here the equation does not imply a long-term relationship.

At the same time, changes in import volumes are determined by the dynamics of real consumption, investment and exports:

dlog(p7_2010) = c(1)*dlog(p3_2010(-1)) + c(2)*dlog(p5_2010) + c(3)*dlog(p6_2010)

The underlying logic of the equation is that import volumes are split between the above three categories.

The identity:

p5_2010 = p5_x_s13_2010 + p5_s13_2010

determines the equality between gross investment at constant prices and the total of private and public investment, also at constant prices. Real consumption is obtained by deflating nominal consumption:

p3_2010 = p3/p3_p2010*100

▸ *Aggregate demand: variables at current prices*

Nominal private consumption is obtained through multiplication of real private consumption by the corresponding deflator:

p3_s14_s15 = p3_s14_s15_2010 * p3_s14_s15_p2010 / 100

Aggregate nominal consumption is the total of private and public nominal consumption:

p3 = p3_s13 + p3_s14_s15

The aggregate nominal investment identity follows the same logic:

p5 = p5_x_s13 + p5_s13

Nominal exports and nominal imports are similarly obtained through multiplying the corresponding amounts by the deflators:

p6 = p6_2010 * p6_p2010 / 100

p7 = p7_2010 * p7_p2010 / 100

Finally, nominal GDP equals the total of consumption, investment, imports and exports taken with a minus sign:

b1gq = p3_s13 + p3_s14_s15 + p5 + p6 - p7

5.3.5 Sectoral decomposition of effects

Compared with the previous version, SIBILA 2.0 operates with an A10 level of sectoral decomposition. This makes the level of aggregation sufficiently informative and, at the same time, sufficiently concise, thus ensuring a good quality analysis. Yet, it is important to note that processing the software code used in the present version makes it possible to obtain disaggregation at any level with minimum input of time and effort, namely for the full NSI range of sectors in accordance with the supply and use tables. To this end, however, relevant matrices with the desired type and level of aggregation need to be prepared for import into EViews.

Since the decomposition logic remains essentially unchanged from the previous version, the description below is a summary of the SIBILA 1.0 documentation. All new changes are explicitly marked as such in the text.

The sectoral decomposition of effects is performed via an imbedded small computable general equilibrium model and includes the following operations:

- Modelling the effects on demand;
- Decomposition of demand by product group;
- Modelling supply via an input/output matrix.

Individual sectoral decomposition coefficients and cross-sector relationships are calibrated on the basis of the 2011 supply and use tables, which at present are the only two tables constructed in accordance with the European System of Accounts 2010. As the tables are in current prices of 2011, so is the sectoral decomposition. Switching from the 2005 supply and resource tables to the ones for 2011 makes it possible to examine an economy that is much closer in structure to the post-crisis period than the one of 2005, which basically marked the beginning of the boom period in the country.

Decomposition of effects by product group applies to the following components of aggregate demand: final consumption of households and NPISH; government consumption; investment; exports of goods and services.

The direct effects of EU funding on demand are as follows:

- EU-funded government consumption – impact on service consumption;
- EU-funded government investment – impact on demand for construction goods/services;
- EU-funded private investment – impact on demand for industrial goods. Insofar as most of the latter are not locally produced, imports of industrial goods in the economy are also affected.

In supply modelling, explicit differentiation is made between sectors and goods/services by introducing the concept of economic activities. For each sector, a unit of economic activities leads to production of a given quantity of all types of goods/services, while at the same time posing a need for production factors within the terms of goods/services for intermediate consumption and labour force. This makes it possible for one sector to produce several types of goods/services, as well as for specific goods/services to be produced across several sectors. Accordingly, for given amounts of economic activities within individual sectors, both total production of all goods/services and intermediate consumption of all contributing goods/services can be calculated. Hence, the difference between production and intermediate consumption defines final demand for goods and services in the economy.

Given these conditionalities, the supply of goods and services in each sector can be expressed by the following matrix form:

$$\boldsymbol{P1} = \boldsymbol{A}\,\boldsymbol{Act}$$

where $\boldsymbol{Act}' = (Act_1, Act_2, \ldots, Act_n)$ is the vector of quantities of economic activity within each sector, $\boldsymbol{P1}' = (P1_1, P1_2, \ldots, P1_n)$ is the vector of output quantities of all goods, and $\boldsymbol{A} = \{a_{ij}\}_{n\times n}$ is the matrix of the corresponding coefficients from the supply-use tables. In this case, $n = 10$ matches the number of sectors.

At the same time, economic activities in individual sectors pose a need for production factors within the terms of goods/services for intermediate consumption and labour force. The form of the analogous matrix expression is as follows:

$$\boldsymbol{P2} = \boldsymbol{B}\,\boldsymbol{Act}$$

where $\boldsymbol{P2}' = (P2_1, P2_2, \ldots, P2_n)$ is the vector of quantities of intermediate consumption of each product, and $\boldsymbol{B} = \{b_{ij}\}_{n\times n}$ are the corresponding coefficients from the supply-use tables.

For given quantities of economic activities within individual sectors, both total output of all types of goods/services and interim consumption of all contributing goods/services can be calculated. Hence, the difference between production and intermediate consumption defines final demand for goods and services in the economy.

$$\boldsymbol{FD} = (\boldsymbol{A} - \boldsymbol{B})\boldsymbol{Act}$$

As the model is linear, if the quantities of goods/services of final demand are known, it is possible to perform a unique calculation of the exact economic activities within each sector needed to meet this final demand.

$$\boldsymbol{Act} = (\boldsymbol{A} - \boldsymbol{B})^{-1}\boldsymbol{FD}$$

Imports are also present in the supply category. They are first modelled for the total economy, after which, in accordance with the supply-use tables, they are decomposed by type of goods/service.

The sectoral model is closed when the quantity of goods/services supplied equals that of the goods/services demanded. This, however, is not trivial since supply is calculated at producer prices, and demand – at market prices. The difference between the two is attributed to trade margins and transport costs, as well as to net taxes on products.

When modelling trade margins and transport costs, the following facts need to be considered:

- Their total for all goods/services is zero. Insofar as they are essentially services, margins and transport costs incurred for other types of goods/services are subtracted from the supply of services.
- Margins and transport costs do not apply to construction goods/services.

In our model, margins and transport costs for agricultural and industrial goods are modelled as a fixed percentage of total supply. Accordingly, their total is subtracted from the supply of services.

Net taxes on products are modelled as a fixed percentage of supplied goods/services with included trade margins and transport costs.

5.3.6 Labour market

Unlike the previous version, SIBILA 2.0 introduces substantial changes to labour market modelling, specifically in regard to labour demand. While in version 1.0 labour demand (employment) was obtained from the sectoral decomposition of effects, the current version models labour demand as a function of real production (simultaneous presence of a long-term and a short-term dependency), in addition to which the first lag of the GDP growth rate is present in the equation as an explanatory variable (i.e. a moment of inertia is admitted):

dlog(emp_15_64) = c(2)*(log(emp_15_64(-1)) – c(3)*log(b1gq_2010(-1))) + c(4)*dlog(b1gq_2010) + c(5)*dlog(b1gq_2010(-1))

The resulting employment is assigned to economic sectors in accordance with the 2011 structure.

Labour supply is identified with the labour force. It is assumed that its dynamics are defined by the employment dynamics, i.e. higher employment opportunities imply that a higher number of people are willing to look for jobs and vice versa:

dlog(act_15_64) = c(2)*dlog(emp_15_64)

The number of the unemployed is defined as the difference between the labour force and the number of the employed. Accordingly, the unemployment rate is the number of the unemployed relative to the size of the labour force:

une_15_64 = act_15_64 - emp_15_64

une_rt_15_64 = une_15_64/act_15_64*100

The average annual wage is determined by the following equation, which is subject to econometric estimation:

dlog(wage_total) = c(1) + c(2)*une_rt_15_64/100 + c(3)*dlog(cp00_avx) + c(4)*dum2

Here, the determinants are the unemployment rate and the inflation rate, and the dummy variable reflects the impact of the economic boom of 2007-8.

In these simulations, the minimum wage is set to equal 40% of the country average wage.

5.4 Fiscal sector

5.4.1 Revenue side

On the revenue side, the following fiscal variables are calculated in the model: grants other than EU grants, indirect taxes, other taxes on production, direct taxes. Except for indirect taxes, whose ratio relates to aggregate consumption, the ratio to nominal GDP is calculated for all other variables. All ratios for 2015-23 are then set to equal the ratio for 2014. Accordingly, in simulations, variables are calculated by the following formulas:

d21 = shr_d21 * p3

d29 = shr_d29 * b1gq

d5_d61 = shr_d5_d61 * b1gq

d4 = shr_d4 * b1gq

d92_x_eu = shr_d92_x_eu * b1gq

The identities:

d92 = d92_x_eu + d92_eu

tr = d21+ d29 + d5_d61 + d4 + d92

define respectively total grants in the state budget and total revenue.

5.4.2 Expenditure

On the expenditure side, social transfers in kind and other current transfers are defined first, by subtracting government consumption and interest expenditure from current government expenditure:

d3_d62_d63_d7 = currexp - p3_s13 - d41pay

It is assumed that for the period 2015-23 the ratio of these transfers to GDP will retain its 2014 level, which is then applied to the simulation of the variable:

d3_d62_d63_d7 = shr_d3_d62_d63_d7 * b1gq

After that, government capital expenditure financed through sources other than the EU is defined:

p5_s13_x_eu = p5_s13 - p5_s13_eu

Expenditure is then converted into constant prices and deflated by the gross investment deflator:

p5_s13_x_eu_2010 = p5_s13_x_eu / p5_p2010 * 100

Public expenditure financed through sources other than the EU is defined in the same way, and is subsequently converted into constant prices:

p3_s13_x_eu = p3_s13 - p3_s13_eu

p3_s13_x_eu_2010 = p3_s13_x_eu/p3_s13_p2010 * 100

In order to eliminate the effects of any government policy changes in real public consumption and real public investment on the results of the simulation (generally, these two variables are exclusively the result of political action, and are therefore not subject to forecasting), it is assumed that from 2015 onwards they will retain their 2014 levels:

p5_s13_x_eu_2010 = @elem(p5_s13_x_eu_2010, "2014")

p3_s13_x_eu_2010 = @elem(p3_s13_x_eu_2010, "2014")

This does not mean that nominal government expenditure will also remain constant, as, in fact, it changes in line with the dynamics of the corresponding deflators:

p5_s13_x_eu = p5_s13_x_eu_2010 * p5_p2010 / 100

p3_s13_x_eu = p3_s13_x_eu_2010 * p3_s13_p2010 / 100

Interest expenditure is estimated econometrically as a function of the dynamics of public debt and interest rates, which is approximated with the dynamics of the 12-month Euribor rate:

dlog(d41pay) = c(2)*(log(d41pay(-1)) - log(gd(-1))) + c(4)*log(gd(-1)) + c(5)*euribor_12/100 + c(6)*dum13

The EU budget contribution is modelled as a dependent on the size of the gross national disposable income:[16]

eubudget = c(1)*dispy(-1)

The identities below define respectively nominal public investment, nominal public consumption, current expenditure, and total state budget expenditure:

p5_s13 = p5_s13_x_eu + p5_s13_eu

p3_s13 = p3_s13_x_eu + p3_s13_eu

currexp = p3_s13 + d3_d62_d63_d7 + d41pay

te = currexp + p5_s13 + eubudget

5.4.3 Financing

The main assumption here is that the government will not permit the fiscal reserve to drop below the BGN 4.5 billion level. In other words, it is assumed that should expenditure signal a decline below this mark, debt will automatically be issued to achieve the minimum reserve.

To this end, first the budget balance is calculated:

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[16] GNDI is an estimated variable dependent on gross national income, which is actually used to determine the size of the contribution.

$$b9\_s13 = tr - te$$

Then, a check is made to find whether the fiscal reserve plus budget balance (which has a negative sign in the event of deficit) is above the minimum required level:

$$fiscrule = fiscres(-1) + b9\_s13 > !min\_fisc\_res\_level$$

fiscrule is a logical variable – it takes the value 1 when the above condition is satisfied, and the value 0 when it is broken. Thus, the fiscal reserve for each period is:

$$fiscres = fiscrule * (fiscres(-1) + b9\_s13) + (1 - fiscrule) * !min\_fisc\_res\_level$$

Accordingly, the level of public debt is defined as follows:

$$gd = gd(-1) - b9\_s13 + fiscres - fiscres(-1)$$

5.5 External sector

Considering the above-mentioned issues surrounding the balance of payments and the international investment position, and in view of the fact that a large number of variables in the external sector are dependent on outside conditions, requiring huge amounts of data to be collected, the present version operates with a simplified model of the external sector, so as to, on the one hand, ensure that only the most relevant information is provided, and, on the other, yield more realistic simulation output.

The key factor that needs to be monitored here is the current account balance. For this reason, it is defined differently from the previous version. Namely, it equals gross national disposable income less the total of aggregate consumption and aggregate investment:

$$bop993nt = dispy - p3 - p5$$

In turn, gross national disposable income is modelled via the dynamics of real GDP and the dynamics of its deflator:

$$dlog(dispy) = c(2)*dlog(b1gq\_2010) + c(5)*dlog(b1gq\_p2010) + c(3)*dum07$$

5.6 Monetary sector

As a result of the changes to the external environment, certain modifications are also required in connection with the monetary sector. Two groups of indicators are subject to modelling here – monetary aggregates and the balance of the Issue Department of the BNB.

The monetary aggregates considered include outside money, overnight deposits and quasi money. Of these, outside money is modelled as a function of economic growth and inflation:

$$dlog(cash) = c(1) + c(4)*dlog(b1gq\_2010) + c(5)*dlog(cp00\_avx) + c(6)*dum12$$

Overnight deposits are modelled via the dynamics of money in circulation:

$$dlog(overn1) = c(1)*dlog(cash) + c(2)*dum08$$

Quasi money dynamics are defined by economic growth and a long-term relationship with real GDP, as well as the dummy for 2014, which reflects the situation with Corporate Commercial Bank:

$$dlog(quasi) = c(1) + c(3)*(log(quasi(-1)) - 4.05*log(b1gq\_2010(-1))) + c(6)*dlog(b1gq\_2010) + c(7)*dum14$$

The total of overnight deposits and outside money is identically equal to monetary aggregate M1:

$$m1 = cash + overn1$$

In turn, the total of M1 and quasi money equals aggregate M2:

m2 = m1 + quasi

The balance of the Issue Department is considered in terms of liabilities. The latter include notes and coins in circulation, liabilities to the government, liabilities to banks, deposit with the Banking Department, and liabilities to other depositors.

The amount of notes and coins in circulation is modelled through the relationship (short- and long-term) between the variable and the amount of outside money (in accordance with the monetary survey):

dlog(notescoins) = c(1) + c(2) * dlog(cash) + c(3) * (log(notescoins(-1)) - log(cash(-1))) + c(4) * log(cash(-1))

Liabilities to the government are modelled as a function of fiscal reserve:

d(liabgov) = c(1)*d(fiscres)

Liabilities to banks are calculated by applying the minimum reserve ratio to the total of all deposits within aggregate M2:

liabbanks = 0.12*(overn1 + quasi)

The deposit with the Banking Department in the model is determined in terms of a long-term relationship with quasi money in the banking system:

dlog(bankdept) = c(1) +c(2)*(log(bankdept(-1)) - log(quasi(-1))) + c(4)*dum13

Finally, currency board assets are equal to the amount of liabilities in the balance of the Issue Department (it is assumed that liabilities to other depositors are equivalent to 2% of GDP for the period):

sibila_v2.append cbassets = notescoins + liabbanks + liabgov + bankdept + 0.02 * b1gq

6. Estimation and software implementation of the model

6.1 Calibration of equation coefficients

6.1.1 Econometric estimation

The econometric estimation of regression equation parameters in the model is an integral part of the implementation of its software code. The equations are written in EViews scripting language, and the procedure specified as the standard estimation approach of the model software is the Method of Least Squares. The format is as follows:

equation <name of equation>.ls <specification of equation>

Running this command results in an estimation of the numerical values of the equation based on the data variables involved and the specified statistical sample (year-to-year period). As noted above, in certain cases, when an equation allows for inclusion of an error correction element, it is initially estimated manually, after which the long-term dependency coefficients are also manually calculated. The numerical estimates of these coefficients, instead of their names, are used in commands to save one or more degrees of freedom (depending on the number of long-term coefficients) in the automatic implementation of the full software code, including in the econometric estimation of the remaining (short-term) parameters.

The choice of period (sample) over which econometric estimations are carried out is based on the design team's preliminary work with the equations.

As a next step, the estimated equation is merged to the system of equations formalised in the model object (here called „sibila_v2") for subsequent solution and performance of simulations under the different scenarios:

sibila_v2.merge <name of equation>

6.1.2 Manual calibration of coefficients in the remaining behavioural equations

Както и в предходната версия, освен иконометрично оценените параметри на поведенческите As in the previous version, in addition to econometrically estimated parameters of behavioural dependencies, some equations also require manual calibration. The underlying reason(s) may be one or more of the following:

- An econometric estimation is impossible because it is impossible to identify factors defining a clear dependency;
- The available information is insufficient to compute stable estimates for regression parameters;
- Using ready-made parameter numerical values deriving from observations of historical proportions, shares etc. significantly simplifies simulations and the interpretation of results, and makes it possible to solve the model on the basis of the available information, which otherwise may not be guaranteed.

The software code presented below is duly annotated, making it easy to identify the places where such manual calibration is performed..

6.2 Solving the model

Solving the equations system of the model in order to perform simulations under the different scenarios is also performed through the embedded capacities of the software package EViews 7. It is the final step after importing the information database (statistical data series), calibrating the equations, and merging them, together with the identities, to the system of equations. Accordingly, solving the model is the final step in the creation of any alternative scenario.

The software operates with three system solving tools based on the corresponding numerical method after which each is named – Broyden, Newton and Gauss-Seidel.[17] In the present version, the tool used in the software code is Broyden, as per the command:

sibila_v2.sovle(o=b)

Should a user wish to apply either of the other two tools, the segment (o=b) in the command will need to be changed to (o=n) for Newton, or to (o=g) for Gauss-Seidel. Solving the model under different scenarios has been tested with all three methods.

[17] For additional information about the methods see EViews 7 User's Guide II, pp. 759-762. Further information is presented in Judd (1998), ch. 5.

7. Simulation scenarios

7.1 Scenario 1: Baseline scenario

Solving the model in accordance with the above procedure and the prescribed system of equations yields the baseline scenario. The assumption behind it is that the total European funding will be available and will exert an impact on the national economy. This is based on historical developments on the basis of which the model equations are estimated and calibrated – the years before 2014. The variables obtained as a result of simulations under this scenario are marked with the extension _0 in the EViews workfile.

7.2 Scenario 2: No EU funds

This scenario is based on an assumption that for a certain period of time no EU finding will enter the Bulgarian economy. There are two options for this time period – the first and the second programming periods.

When the second period is analysed, availability of the total EU funding (based on actual utilisation) is assumed to be a fact for the first programming period.

The variables obtained as a result of simulations under this scenario are marked with the extension _NO in the EViews workfile.

7.3 Scenario 3: Impact of selected EU funds

Under this scenario, the model user can select one or more programmes or priority axes, respectively thematic objectives. The model user guide contains a detailed description of the steps required to identify the desired impact.

The variables obtained as a result of simulations under this scenario are marked with the extension _SEL in the EViews workfile.

8. Model validation and sensitivity analysis

The purpose of the validation is to study the extent to which the results of the simulation scenarios correspond to actual historical developments and to the normal behaviour of economic variables. Such validation is carried out at every stage of the development of the model – equation, block, complete system of dependencies. Thus, subject to limitations associated with availability and quality of statistical information, the model can be claimed to have a high degree of realism and to adequately reflect the specifics of the Bulgarian economy.

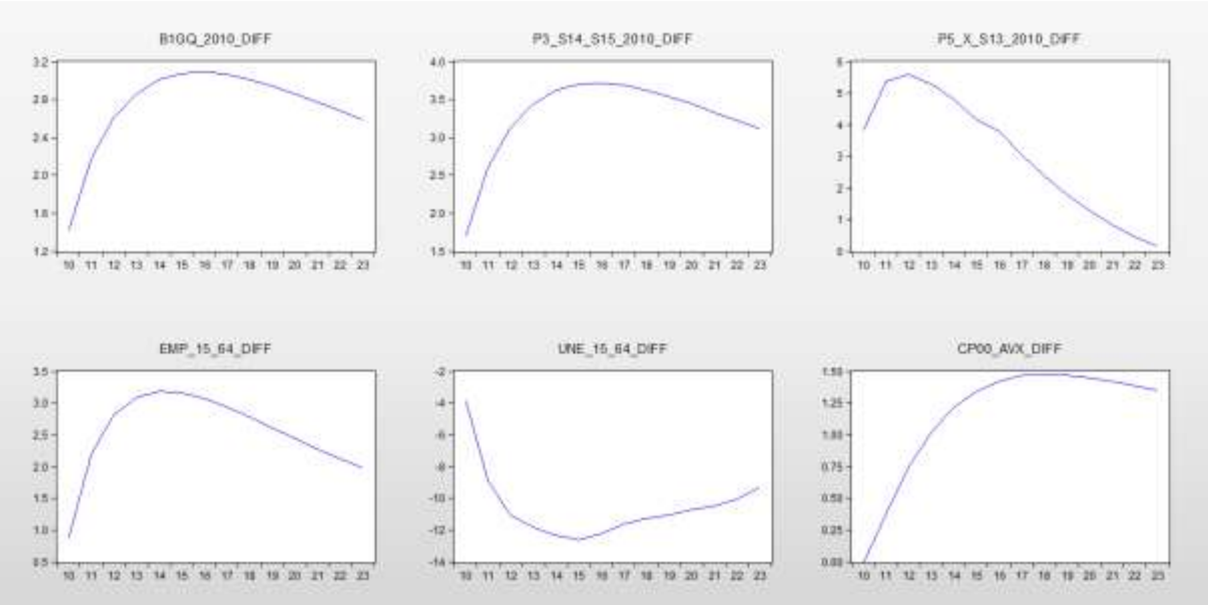
SIBILA 2.0 is a model of an economic system. Process flows in any such system are characterised by a degree of uncertainty, which in turn affects economic data. The purpose of the sensitivity analysis is to monitor the potential changes to model outputs resulting from changes in the values of key external (exogenous) variables.

Several types of shock are defined for the sensitivity analysis, and the behaviour of key endogenous variables is examined in the longer term (in our specific case – until 2023):

- A 1% increase in total factor productivity (the residual unexplained part of the technological level, identified with the so-called Solow residual);
- A 10% real-term increase in both government consumption and government investment;
- A 1% increase in international food prices;
- A slowdown in the growth rate of world GDP by 1 pp for each programme horizon year.

The results of the performed sensitivity analysis are presented graphically in the figures below, where each group chronologically depicts the effects of the four shocks mentioned above:

Figur 1: Effects (%) of a 1% increase in total factor productivity



Figur 2: Effects (%) of a 10% real-term increase in government consumption and government investment

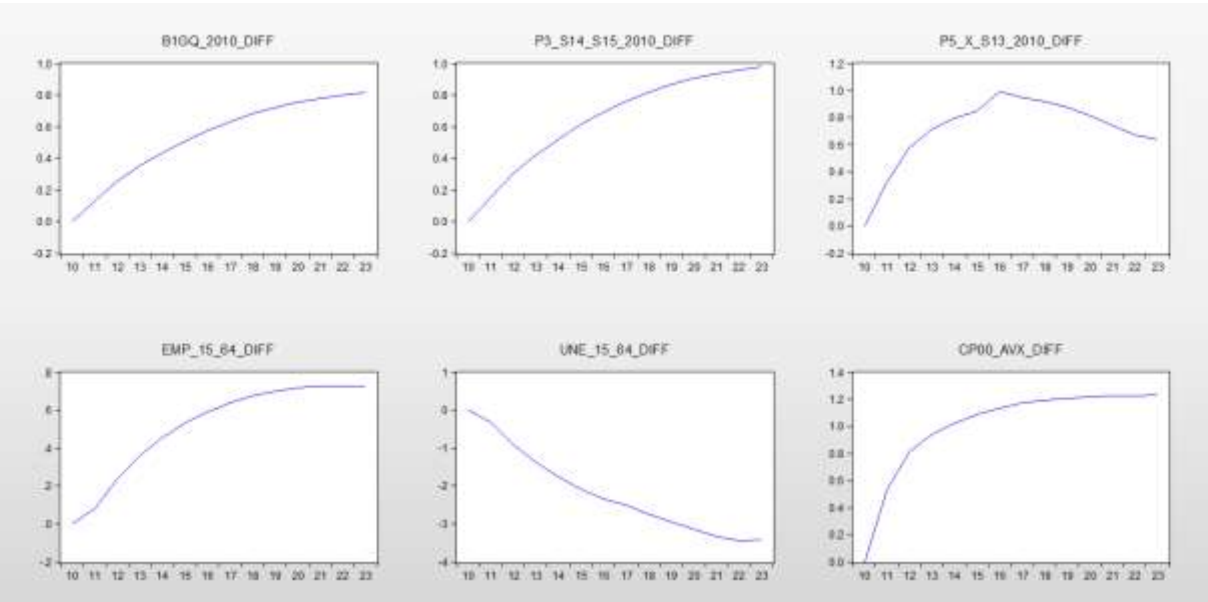


Figure 3: Effects (%) of a 10% increase in international food prices

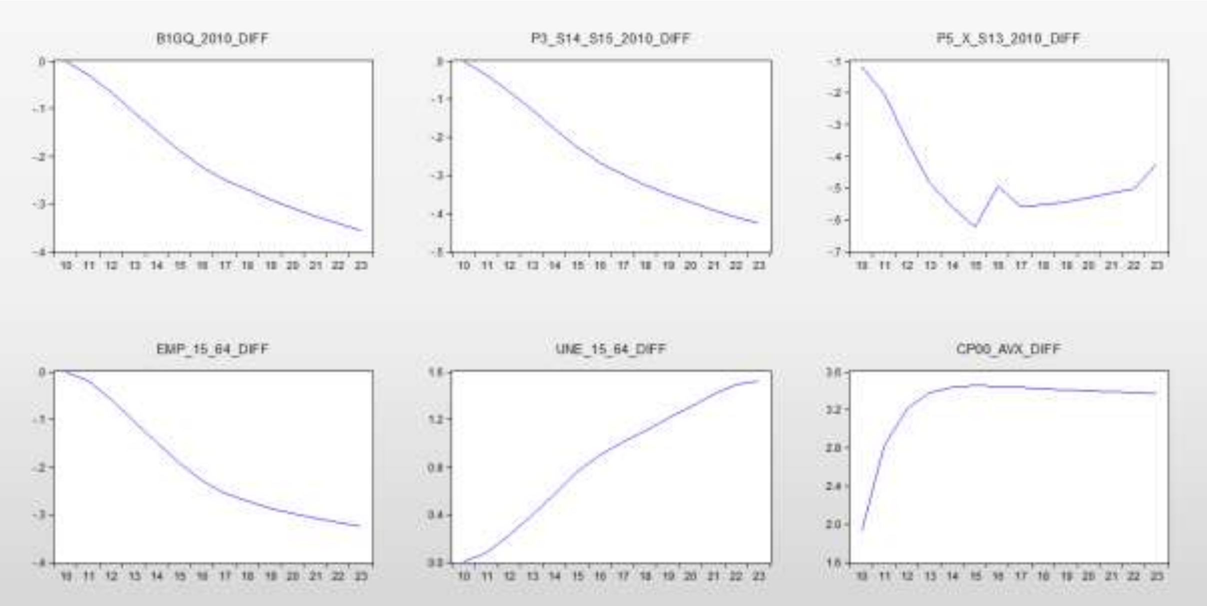
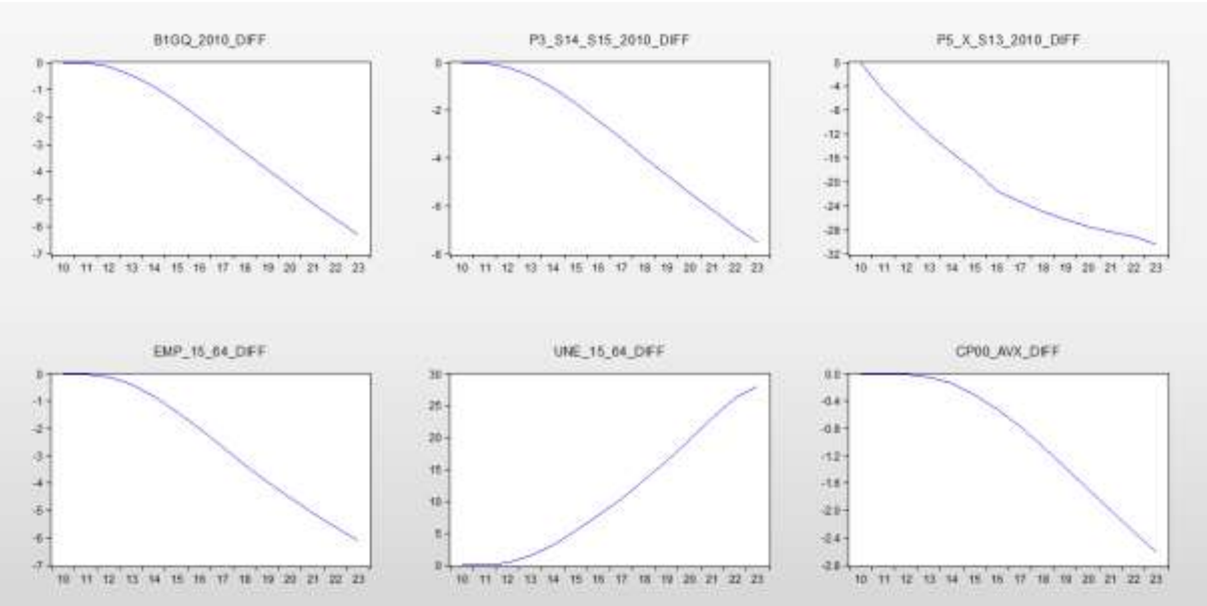


Figure 4: Effects of a slowdown in the growth rate of world GDP by 1 pp for each programme horizon year



The results of the simulation shocks confirm the anticipated tendencies for the behaviour of the selected variables, and, as far as size is concerned, they are generally compliant with economic logic. Along these lines, it can be concluded that the model offers an objective reflection of the impact of the exogenous variables contained in the system. •

Part 2: Technical Documentation

1. Expenditure classification of European funding by economic category as set out in SIBILA 2.0 [18]

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
Programming period 2007-2013						
Operational Programme "Administrative Capacity"	1	Good governance			A-Institut	26%
	2	Human resources management			A-Institut	35%
	3	Quality administrative service delivery and e-governance development			A-Institut	36%
	4	Technical assistance			A-Institut	4%
Operational Programme "Environment"	1	Improvement and development of water and wastewater infrastructure in settlements with over 2,000 PE and in settlements below 2,000 PE within urban agglomeration areas			I-Environ	73%
	2	Improvement and development of waste treatment infrastructure			I-Environ	18%
	3	Preservation and restoration of biodiversity			I-Environ	6%
	4	Technical assistance			A-Institut	3%
Operational Programme "Development of the Competitiveness of the Bulgarian Economy"	1	Development of a knowledge-based economy and innovation activities			A-R&D	16%
	22	Increasing efficiency of enterprises and promoting supportive business environment	2.1 Improvement of technologies and management in enterprises		I-Prod	29%
			2.2 Creation of business support infrastructure		A-Tech	0%
			2.3 Introduction of energy-saving technologies and renewable energy sources		I-Energy	15%
			2.4 Promotion of business networking and clustering		A-Tech	1%
	3	Financial resources for developing enterprises			A-Tech	34%
	4	Strengthening the international market positions of the Bulgarian economy			A-R&D	3%
	5	Technical assistance			A-Institut	2%
Operational Programme "Human Resources Development"	1	Promotion of economic activity and development of inclusive labour market	1.1 Integration of vulnerable groups on the labour market	1.1.01 Increase of youth employment through their permanent inclusion on the Bulgarian labour market	H-Youth	0%
	1			1.1.02 Providing conditions for active working life for people over 50 and long-term unemployed persons	H-Unempl	0%
	1			1.1.03 Development	H-Unempl	13%
	1			1.1.04 Qualification services and promotion of employment	H-Unempl	0%
	1			1.1.05 Back to work	H-General	1%
	1			1.1.06 Creation of youth employment through provision of opportunities for	L-Youth	2%

[18] The data on the EU-financed paid funds for the 2007-2013 programming period are calculated on the basis of information from the publicly accessible section of the Unified Management Information System for the EU Structural Instruments in Bulgaria available as of 15.08.2015, and the expected paid funds by the end of 2015 as of 01.09.2015. The data on the EU-financed expenditures for the 2014-2020 programming period are based on the Partnership Agreement as of July 2014 and the programming documents of the corresponding operational programmes adopted by the EC.

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
				internships		
	1			1.1.07 Take your life in your hands	H-General	0%
	1			1.1.08 Training and adaptation	H-General	0%
	1			1.1.09 Qualification services and promotion of employment	H-General	0%
	1			1.1.10 Qualification and motivation for competitive inclusion in the labour market	H-General	0%
	1			1.1.11 Support for employment	L-General	8%
	1			1.1.12 First job	L-Youth	1%
	1			1.1.13 New workplace	L-Youth	0%
	1			1.1.14 INTEGRA	L-Excluded	0%
	1		1.2 Employment through development of entrepreneurship		L-General	1%
	2	Raising the productivity and adaptability of the employed persons			H-Empl	14%
	3	Improving the quality of education and training in correspondence with the labour market needs for building a knowledge-based economy			H-Youth	18%
	44	Improving the access to education and training	4.1 Access to education and training for disadvantaged groups		H-Youth	2%
			4.2 Children and youth in education and society		H-Youth	12%
			4.3 Development of the life-long learning system		H-General	3%
	5	Social inclusion and promotion of social economy			A-Soc	17%
	6	Improving the effectiveness of labour market institutions and of social and healthcare services			A-Institut	3%
	7	Transnational and interregional cooperation			A-Institut	1%
	8	Technical assistance			A-Institut	3%
Operational Programme “Regional Development”	1	Sustainable and integrated urban development	1.1 Social infrastructure	1.1.01 Support for provision of adequate and cost-effective educational, social and cultural infrastructure contributing to development of sustainable urban areas	I-Soc	8%
	1			1.1.02 Support for provision of adequate and cost-effective state educational infrastructure contributing to development of sustainable urban areas	I-Soc	0%
	1			1.1.03 Support for provision of adequate and cost-effective state social infrastructure contributing to development of sustainable urban areas	I-Soc	0%
	1			1.1.04 Support for provision of adequate and cost-effective labour office infrastructure contributing to development of sustainable urban areas	I-Soc	0%
	1			1.1.05 Support for provision of adequate and cost-effective state cultural infrastructure contributing to development of sustainable urban areas	I-Soc	2%
	1			1.1.06 Support for renovation and modernisation of state healthcare facilities in urban agglomerations	I-Soc	0%
	1			1.1.07 Support for provision of adequate and cost-effective infrastructure of universities in urban agglomerations	I-Soc	1%
	1			1.1.08 Support for reconstruction, renovation and equipment of state medical and healthcare facilities in urban agglomerations	I-Soc	3%

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
	1			1.1.09 Support for implementation of energy-efficiency measures in municipal educational infrastructure of urban agglomerations	I-Soc	4%
	1			1.1.10 Support for design and promotion of innovative cultural events	I-Soc	1%
	1			1.1.11 Support for deinstitutionalisation of social institutions delivering services to children at risk	I-Soc	3%
	1			1.1.12 Support for reconstruction renovation and equipment of municipal medical facilities in urban agglomerations	I-Soc	3%
	1			1.1.13 Support of modern social housing for vulnerable, minority and socially disadvantaged groups, as well as other disadvantaged population groups	I-Soc	0%
	1		1.2 Housing	1.2.01 Support for energy efficiency in multi-family residential buildings	I-Energy	0%
	1			1.2.02 Support to provide modern social housing for vulnerable, minority and indigent groups of the population and other disadvantaged groups	I-Soc	0%
	1			1.2.03 Support for establishment of a financial engineering instrument – Housing Renovation Fund	I-Energy	0%
	1		1.4 Improvement of physical environment and risk prevention	1.4.01 Support for reduction and prevention of risks and damages caused by fire in urban agglomeration areas	I-Energy	3%
	1			1.4.02 Support for improvement of the urban environment	I-Soc	4%
	1			1.4.03 Support for construction and consolidation of small-scale infrastructure for landslide prevention in urban agglomerations	I-Energy	0%
	1			1.4.04 Support for small-scale infrastructure for landslide prevention in urban agglomerations	I-Energy	0%
	1			1.4.05 Support for integrated and sustainable development through improvement of urban environment	I-Soc	3%
	1			1.4.06 Support for small-scale interventions to prevent floods in urban agglomerations	I-Energy	1%
	1			1.4.07 Support for integrated urban regeneration and development plans	A-Institut	1%
	1			1.4.08 Joint European Support for Sustainable Investment in City Areas (JESSICA)	I-Soc	2%
	1			1.4.09 Green and accessible urban environment	I-Soc	6%
	1		1.5 Sustainable urban transport systems		I-Road	11%
	22	Regional and local accessibility	2.1 Regional and local road infrastructure		I-Road	23%
			2.2 ICT network		I-Soc	1%
			2.3 Access to sustainable and efficient energy resources		I-Energy	0%
	3	Sustainable tourism development			I-Soc	9%
	4	Local development and co-operation	4.1 Small-scale local investments	4.1.01 Support for provision of adequate and cost-effective educational infrastructure contributing to sustainable urban development	I-Soc	2%
	4			4.1.02 Support for construction and	I-Energy	0%

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
				consolidation of small-scale infrastructure for landslide prevention		
	4			4.1.03 Support for implementation of energy efficiency measures in the municipal educational infrastructure of 178 small municipalities	I-Energy	2%
	4			4.1.04 Support for small-scale interventions to prevent floods in 178 small municipalities	I-Energy	2%
	4			4.1.05 Support for reconstruction, rehabilitation and equipment of municipal medical facilities outside urban agglomeration areas	I-Soc	1%
	4		4.2 Inter-regional cooperation		A-Institut	0%
	5	Technical assistance			A-Institut	3%
Operational Programme "Technical Assistance"	1	Support to the implementation of the activities performed by the structures at central level: Central Coordination Unit, Certifying Authority, Audit Authority, NSRF Monitoring Committee and OPTA Monitoring Committee			A-Institut	68%
	2	Further development and support to the functioning of the Unified Management Information System			A-Institut	9%
	3	Promotion of the European Cohesion Policy and its objectives in Bulgaria and ensuring the provision of general and statistical information			A-Institut	24%
Operational Programme "Transport"	1	Development of railway infrastructure along the Trans-European and major national transport axes			I-Road	34%
	2	Development of road infrastructure along the Trans-European and major national transport axes			I-Road	42%
	3	Improvement of intermodality for passengers and freight			I-Road	20%
	4	Improvement of the maritime and inter-waterway navigation			I-Road	2%
	5	Technical assistance			A-Institut	2%
Rural Development Programme	1	Improving the competitiveness of the agricultural and forestry sector	111 Training, information and diffusion of knowledge		H-Empl	0%
	1		112 Setting up of young farmers		L-General	5%
	1		114 Use by farmers and forestry holders of advisory services		A-Institut	0%
	1		121 Modernisation of agricultural holdings		I-Prod	18%
	1		122 Improving the economic value of the forests		I-Environ	0%
	1		123 Adding value to agricultural and forestry products		I-Prod	10%
	1		141 Supporting semi-subsistence farms undergoing restructuring		Grants	0%
	1		142 Setting up producer groups		A-Institut	0%
	1		143 Provision of farm advisory and extension services in Bulgaria and Romania		A-Institut	0%
	2	Improving the environment and the countryside			I-Environ	28%
	3	Quality of life in rural areas and diversification of the rural economy	311 Diversification into non-agricultural activities		I-Prod	2%
	3		312 Support for the creation and development of micro-enterprises		I-Prod	4%
	3		313 Encouragement of tourism activities		I-Soc	1%
	3		321 Basic services for the economy and rural population		I-Environ	23%
	3		322 Village renewal and development		I-Soc	7%
	4	Leader			A-Institut	1%
	5	Technical assistance			A-Institut	1%

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
	6	Complements to direct payments				0%
Operational Programme "Fisheries Sector Development"	1	Measures for the adaptation of the Bulgarian fishing fleet			I-prod	10%
	2	Aquaculture, inland fishing, processing and marketing of fishery and aquaculture products	2.1 Productive investments in aquaculture		I-prod	17%
	2		2.2 Aqua-environmental measures		I-environ	0%
	2		2.5 Inland fishing		I-prod	0%
	2		2.6 Investments in processing and marketing of fishery and aquaculture products		I-prod	4%
	2		2.7 Financial engineering scheme		I-prod	37%
	3	Measures of common interest	Measure 3.1 Collective actions		A-Institut	1%
	3		Measure 3.2. Measures intended to protect and develop aquatic fauna and flora		I-environ	0%
	3		Measure 3.3. Investments in reconstruction and modernisation of fishing ports, landing sites and shelters		I-Soc	10%
	3		Measure 3.4 Development of new markets and promotional campaigns		A-R&D	2%
	3		Measure 3.5 Pilot projects		A-R&D	0%
	3		Measure 3.6 Modification for reassignment of fishing vessels		I-prod	0%
	4	Sustainable development of fisheries areas			A-Institut	14%
	5	Technical assistance			A-Institut	4%
Programming period 2014-20						
Operational Programme "Science and Education for Smart Growth"	1	Research and technological development			I-Prod	41%
	2	Education and lifelong learning			H-General	37%
	3	Educational environment for active social inclusion			H-General	18%
	4	Technical assistance			A-Institut	4%
Operational Programme "Human Resources Development"	1	Improving the access to employment and the quality of jobs			H-General	8%
	1				L-General	52%
	2	Reducing poverty and promoting social exclusion			A-Soc	10%
	2				H-General	10%
	2				L-General	10%
	3	Modernising the institutions in the area of social inclusion, healthcare, equal opportunities and non-discrimination and working conditions			A-Institut	4%
	4	Transnational cooperation			A-Institut	2%
	5	Technical assistance			A-Institut	4%
Operational Programme "Good Governance"	1	Administrative service delivery and e-governance			A-Institut	41%
	2	Effective and professional governance in partnership with the civil society and the business			A-Institut	23%
	3	Transparent and effective judiciary			A-Institut	11%
	4	Technical assistance for the management of ESIF			A-Institut	22%
	5	Technical assistance			A-Institut	4%
Operational Programme "Transport and	1	Development of railway infrastructure along the "core" TEN-T			I-Road	36%
	2	Development of road infrastructure along the "core" and "comprehensive" TEN-T			I-Road	36%

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
Transport Infrastructure"	3	Improvement of intermodal transport services for passengers and freights and development of sustainable urban transport			I-Road	23%
	4	Innovations in management and services – establishment of modern infrastructure for traffic management and transport safety improvement			I-Road	4%
	5	Technical assistance			A-Institut	3%
Operational Programme "Environment"	1	Water			I-Environ	68%
	2	Waste			I-Environ	16%
	3	Natura 2000 and biodiversity			I-Environ	6%
	4	Flood and landslides risk prevention and management			I-Energy	4%
	5	Improvement of ambient air quality			I-Environ	3%
	6	Technical assistance			A-Institut	3%
Operational Programme "Regions in Growth"	1	Sustainable and integrated urban development			I-Soc	54%
	2	Support for energy efficiency in support centres in peripheral areas			I-Energy	7%
	3	Regional educational infrastructure			I-Soc	7%
	4	Regional health infrastructure			I-Soc	5%
	5	Regional social infrastructure			I-Soc	3%
	6	Regional tourism			I-Soc	7%
	7	Regional road infrastructure			I-Road	13%
	8	Technical assistance			A-Institut	3%
Operational Programme "Innovation and Competitiveness"	1	Technological development and innovation			A-R&D	12%
	1				I-Prod	12%
	2	Entrepreneurship and capacity for growth of SMEs			A-R&D	23%
	2				I-Prod	23%
	3	Energy and resource efficiency			I-Energy	24%
	4	Removing bottlenecks in security of gas supplies			I-Energy	4%
	5	Technical assistance			A-Institut	3%
Operational Programme "SME Initiative"	1	Enhancing the access to debt finance for SMEs in Bulgaria			A-R&D	50%
	1				I-Prod	50%
Rural Development Programme			M01 Knowledge transfer and information actions		A-Institut	1%
			M02 Advisory services, farm management and farm relief services		A-Institut	1%
			M06 Farm and business development		I-Prod	10%
			M04 Investments in physical assets		I-Prod	28%
			M13 Payments to areas facing natural or other specific constraints		I-Environ	9%
			M15 Forest environmental and climate services and forest conservation		I-Environ	0%
			M17 Risk management		I-Environ	0%
			M07 Basic services and village renewal in rural areas		I-Soc	22%
			M08 Investments in forest area development and improvement of the viability of forests		I-Environ	2%
			M10 Agri-environment-climate		I-Environ	7%

Operational programme		Priority axis	Sub-priority	Procedure	Production factor	Share of total
			M11 Organic farming		I-Prod	5%
			M12 Natura 2000 and Water Framework Directive payments		I-Environ	4%
			M14 Animal welfare		I-Prod	2%
			M09 Setting-up of producer groups and organisations		A-Institut	0%
			M16 Co-operation		A-Institut	1%
			M19 Support for LEADER local development		A-Institut	5%
			Technical assistance		A-Institut	2%
Programme for Maritime Affairs and Fisheries	1	Fostering environmentally sustainable, resource efficient, innovative, competitive and knowledge-based fisheries			I-Prod	21%
	2	Fostering environmentally sustainable, resource efficient, innovative, competitive and knowledge-based aquaculture (Article 13 (2) EMFF)			I-Prod	31%
	3	Fostering the implementation of CFP			A-Institut	12%
	4	Increasing employment and territorial cohesion (Article 13 (2) EMFF)			I-Prod	17%
	5	Fostering marketing and processing			I-Prod	11%
	6	Fostering the implementation of IMP (Article 13 (7) EMFF)			A-Institut	3%
	7	Technical assistance (Article 13 (2) EMFF)			A-Institut	5%

2. List of variables in SIBILA 2.0

No.	Variable name	Interpretation	Type	Obtained based on:
1	act_15_64	Labour force (15-64)	Endogenous	Econometrically estimated shor-term relationships
2	activity_a1	Economic activity of industry A1	Endogenous	Embedded input-output model
3	activity_b_e	Economic activity of industries B to E	Endogenous	Embedded input-output model
4	activity_f	Economic activity of industry F	Endogenous	Embedded input-output model
5	activity_g_i	Economic activity of industries G to I	Endogenous	Embedded input-output model
6	activity_j	Economic activity of industry J	Endogenous	Embedded input-output model
7	activity_k	Economic activity of industry K	Endogenous	Embedded input-output model
8	activity_l	Economic activity of industry L	Endogenous	Embedded input-output model
9	activity_m_n	Economic activity of industries M and N	Endogenous	Embedded input-output model
10	activity_o_q	Economic activity of industries O to Q	Endogenous	Embedded input-output model
11	activity_r_u	Economic activity of industries R to U	Endogenous	Embedded input-output model
12	b1gq	GDP at current prices	Endogenous	Identity
13	b1gq_2010	GDP at 2010 prices	Endogenous	Identity
14	b1gq_2010_a	NA	Add factor	Values set according to expert judgment
15	b1gq_p2010	GDP deflator	Endogenous	Identity
16	b9_s13	Budget balance	Endogenous	Identity
17	bankdept	Deposit of Banking Department in Issue Department	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
18	bop993nt	Current account balance	Endogenous	Identity
19	cash	Money outside of banks	Endogenous	Econometrically estimated shor-term relationships
20	cbassets	Issue Department assets	Endogenous	Identity
21	commexp	Communication expenditure	Endogenous	Manually calibrated relationship
22	cp00_avx	Harmonised Index of Consumer Prices (HICP)	Endogenous	Econometrically estimated shor-term relationships
23	currexp	Current expenditure	Endogenous	Identity
24	d21	Indirect taxes	Endogenous	Manually calibrated relationship
25	d29	Other taxes on production	Endogenous	Manually calibrated relationship
26	d3_d62_d63_d7	Social benefits (other than social transfers in kind and other current transfers)	Endogenous	Manually calibrated relationship
27	d4	Non-tax revenue	Endogenous	Manually calibrated relationship
28	d41pay	Interest expenditure	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
29	d5_d61	Income taxes	Endogenous	Manually calibrated relationship
30	d92	Grants	Endogenous	Identity
31	d92_eu	EU grants	Exogenous	EU funds data
32	d92_x_eu	Grants less EU grants	Endogenous	Manually calibrated relationship
33	dispy	Gross national disposable income at current prices	Endogenous	Econometrically estimated shor-term relationships
34	dispy_2010	Gross national disposable income at 2010 prices	Endogenous	Identity
35	dum07	Dummy variable for 2007	Exogenous	NA
36	dum08	Dummy variable for 2008	Exogenous	NA
37	dum12	Dummy variable for 2012	Exogenous	NA
38	dum13	Dummy variable for 2013	Exogenous	NA
39	dum14	Dummy variable for 2014	Exogenous	NA
40	dum2	Dummy variable for the 2007 and 2008 economic boom	Exogenous	NA
41	edu_att	Average number of years of education	Exogenous	Kyriacou (1991) equation calibrated

No.	Variable name	Interpretation	Type	Obtained based on:
				additionally with a pseudo-fixed effect
42	emp_15_64	Employment (15-64)	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
43	emp_15_64_a	NA	Add factor	Values set according to expert judgment
44	emp_15_64_a1	Employment in industry A1	Endogenous	Embedded input-output model
45	emp_15_64_b_e	Employment in industries B to E	Endogenous	Embedded input-output model
46	emp_15_64_f	Employment in industry F	Endogenous	Embedded input-output model
47	emp_15_64_g_i	Employment in industries G to I	Endogenous	Embedded input-output model
48	emp_15_64_j	Employment in industry J	Endogenous	Embedded input-output model
49	emp_15_64_k	Employment in industry K	Endogenous	Embedded input-output model
50	emp_15_64_l	Employment in industry L	Endogenous	Embedded input-output model
51	emp_15_64_m_n	Employment in industries M and N	Endogenous	Embedded input-output model
52	emp_15_64_o_q	Employment in industries O to Q	Endogenous	Embedded input-output model
53	emp_15_64_r_u	Employment in industries R to U	Endogenous	Embedded input-output model
54	eubudget	Contribution to EU budget	Endogenous	Econometrically estimated shor-term relationships
55	euribor_12	12-month Euribor	Exogenous	World Economic Outlook
56	fiscres	Fiscal reserve	Endogenous	Identity
57	fiscrule	Fiscal rule	Endogenous	Binary-value variable
58	gd	Government debt	Endogenous	Identity
59	gerd	R&D expenditures	Endogenous	Manually calibrated relationship
60	hkt	Human capital	Endogenous	Identity
61	infrkt_2010	Infrastructure capital	Endogenous	Manually calibrated relationship
62	int_diff	Interest rate differential	Endogenous	Identity
63	intrate	Nomimal interest rate	Endogenous	Identity
64	itexpen	IT expenditure	Endogenous	Manually calibrated relationship
65	kt_2010	Physical capital	Endogenous	Manually calibrated relationship
66	liabbanks	Liabilities to banks	Endogenous	Manually calibrated relationship
67	liabgov	Liabilities to government	Endogenous	Econometrically estimated shor-term relationships
68	m1	M1 monetary aggregate	Endogenous	Identity
69	m2	M2 monetary aggregate	Endogenous	Identity
70	minwage	Annual minimum wage	Endogenous	Manually calibrated relationship
71	n1112_2010	Investment in other buildings and structures	Endogenous	Manually calibrated relationship
72	ngdp_rpch	World GDP rate of change	Exogenous	World Economic Outlook
73	notescoins	Notes and coins in circulation	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
74	numvoc_eu	Number of participants in EU-funds-financed vocational training	Exogenous	EU funds data
75	numvoc_int	Number of participants in own-funds-financed vocational training	Endogenous	Manually calibrated relationship
76	overn1	Overnight deposits	Endogenous	Econometrically estimated shor-term relationships
77	p118_a1	Trade and transport margins in industry A1	Endogenous	Embedded input-output model
78	p118_b_e	Trade and transport margins in industries B to E	Endogenous	Embedded input-output model
79	p118_f	Trade and transport margins in industry F	Endogenous	Embedded input-output model
80	p118_g_i	Trade and transport margins in industries G to I	Endogenous	Embedded input-output model
81	p118_j	Trade and transport margins in industry J	Endogenous	Embedded input-output model
82	p118_k	Trade and transport margins in industry K	Endogenous	Embedded input-output model
83	p118_l	Trade and transport margins in industry L	Endogenous	Embedded input-output model
84	p118_m_n	Trade and transport margins in industries M and N	Endogenous	Embedded input-output model
85	p118_o_q	Trade and transport margins in industries O to Q	Endogenous	Embedded input-output model

No.	Variable name	Interpretation	Type	Obtained based on:
86	p118_r_u	Trade and transport margins in industries R to U	Endogenous	Embedded input-output model
87	p1_a1	Gross output of industry A1	Endogenous	Embedded input-output model
88	p1_b_e	Gross output of industries B to E	Endogenous	Embedded input-output model
89	p1_f	Gross output of industry F	Endogenous	Embedded input-output model
90	p1_g_i	Gross output of industries G to I	Endogenous	Embedded input-output model
91	p1_j	Gross output of industry J	Endogenous	Embedded input-output model
92	p1_k	Gross output of industry K	Endogenous	Embedded input-output model
93	p1_l	Gross output of industry L	Endogenous	Embedded input-output model
94	p1_m_n	Gross output of industries M and N	Endogenous	Embedded input-output model
95	p1_o_q	Gross output of industries O to Q	Endogenous	Embedded input-output model
96	p1_r_u	Gross output of industries R to U	Endogenous	Embedded input-output model
97	p2_a1	Intermediate consumption of industry A1	Endogenous	Embedded input-output model
98	p2_a1_by_a1	Intermediate consumption of industry A1 from industry A1	Endogenous	Embedded input-output model
99	p2_a1_by_b_e	Intermediate consumption of industry A1 from industries B to E	Endogenous	Embedded input-output model
100	p2_a1_by_f	Intermediate consumption of industry A1 from industry F	Endogenous	Embedded input-output model
101	p2_a1_by_g_i	Intermediate consumption of industry A1 from industries G to I	Endogenous	Embedded input-output model
102	p2_a1_by_j	Intermediate consumption of industry A1 from industry J	Endogenous	Embedded input-output model
103	p2_a1_by_k	Intermediate consumption of industry A1 from industry K	Endogenous	Embedded input-output model
104	p2_a1_by_l	Intermediate consumption of industry A1 from industry L	Endogenous	Embedded input-output model
105	p2_a1_by_m_n	Intermediate consumption of industry A1 from industries M to N	Endogenous	Embedded input-output model
106	p2_a1_by_o_q	Intermediate consumption of industry A1 from industries O to Q	Endogenous	Embedded input-output model
107	p2_a1_by_r_u	Intermediate consumption of industry A1 from industries R to U	Endogenous	Embedded input-output model
108	p2_b_e	Intermediate consumption of industries B to E	Endogenous	Embedded input-output model
109	p2_b_e_by_a1	Intermediate consumption of industries B to E from industry A1	Endogenous	Embedded input-output model
110	p2_b_e_by_b_e	Intermediate consumption of industries B to E from industries B to E	Endogenous	Embedded input-output model
111	p2_b_e_by_f	Intermediate consumption of industries B to E from industry F	Endogenous	Embedded input-output model
112	p2_b_e_by_g_i	Intermediate consumption of industries B to E from industries G to I	Endogenous	Embedded input-output model
113	p2_b_e_by_j	Intermediate consumption of industries B to E from industry J	Endogenous	Embedded input-output model
114	p2_b_e_by_k	Intermediate consumption of industries B to E from industry K	Endogenous	Embedded input-output model
115	p2_b_e_by_l	Intermediate consumption of industries B to E from industry L	Endogenous	Embedded input-output model
116	p2_b_e_by_m_n	Intermediate consumption of industries B to E from industries M to N	Endogenous	Embedded input-output model
117	p2_b_e_by_o_q	Intermediate consumption of industries B to E from industries O to Q	Endogenous	Embedded input-output model
118	p2_b_e_by_r_u	Intermediate consumption of industries B to E from industries R to U	Endogenous	Embedded input-output model
119	p2_f	Intermediate consumption of industry F	Endogenous	Embedded input-output model
120	p2_f_by_a1	Intermediate consumption of industry F from industry A1	Endogenous	Embedded input-output model
121	p2_f_by_b_e	Intermediate consumption of industry F from industries B to E	Endogenous	Embedded input-output model
122	p2_f_by_f	Intermediate consumption of industry F from industry F	Endogenous	Embedded input-output model
123	p2_f_by_g_i	Intermediate consumption of industry F from industries G to I	Endogenous	Embedded input-output model
124	p2_f_by_j	Intermediate consumption of industry F from industry J	Endogenous	Embedded input-output model
125	p2_f_by_k	Intermediate consumption of industry F from industry K	Endogenous	Embedded input-output model
126	p2_f_by_l	Intermediate consumption of industry F from industry L	Endogenous	Embedded input-output model
127	p2_f_by_m_n	Intermediate consumption of industry F from industries M to N	Endogenous	Embedded input-output model
128	p2_f_by_o_q	Intermediate consumption of industry F from industries O to Q	Endogenous	Embedded input-output model
129	p2_f_by_r_u	Intermediate consumption of industry F from industries R to U	Endogenous	Embedded input-output model
130	p2_g_i	Intermediate consumption of industries G to I	Endogenous	Embedded input-output model
131	p2_g_i_by_a1	Intermediate consumption of industries G to I from industry A1	Endogenous	Embedded input-output model
132	p2_g_i_by_b_e	Intermediate consumption of industries G to I from industries B to E	Endogenous	Embedded input-output model
133	p2_g_i_by_f	Intermediate consumption of industries G to I from industry F	Endogenous	Embedded input-output model

No.	Variable name	Interpretation	Type	Obtained based on:
134	p2_g_i_by_g_i	Intermediate consumption of industries G to I from industries G to I	Endogenous	Embedded input-output model
135	p2_g_i_by_j	Intermediate consumption of industries G to I from industry J	Endogenous	Embedded input-output model
136	p2_g_i_by_k	Intermediate consumption of industries G to I from industry K	Endogenous	Embedded input-output model
137	p2_g_i_by_l	Intermediate consumption of industries G to I from industry L	Endogenous	Embedded input-output model
138	p2_g_i_by_m_n	Intermediate consumption of industries G to I from industries M to N	Endogenous	Embedded input-output model
139	p2_g_i_by_o_q	Intermediate consumption of industries G to I from industries O to Q	Endogenous	Embedded input-output model
140	p2_g_i_by_r_u	Intermediate consumption of industries G to I from industries R to U	Endogenous	Embedded input-output model
141	p2_j	Intermediate consumption of industry J	Endogenous	Embedded input-output model
142	p2_j_by_a1	Intermediate consumption of industry J from industry A1	Endogenous	Embedded input-output model
143	p2_j_by_b_e	Intermediate consumption of industry J from industries B to E	Endogenous	Embedded input-output model
144	p2_j_by_f	Intermediate consumption of industry J from industry F	Endogenous	Embedded input-output model
145	p2_j_by_g_i	Intermediate consumption of industry J from industries G to I	Endogenous	Embedded input-output model
146	p2_j_by_j	Intermediate consumption of industry J from industry J	Endogenous	Embedded input-output model
147	p2_j_by_k	Intermediate consumption of industry J from industry K	Endogenous	Embedded input-output model
148	p2_j_by_l	Intermediate consumption of industry J from industry L	Endogenous	Embedded input-output model
149	p2_j_by_m_n	Intermediate consumption of industry J from industries M to N	Endogenous	Embedded input-output model
150	p2_j_by_o_q	Intermediate consumption of industry J from industries O to Q	Endogenous	Embedded input-output model
151	p2_j_by_r_u	Intermediate consumption of industry J from industries R to U	Endogenous	Embedded input-output model
152	p2_k	Intermediate consumption of industry K	Endogenous	Embedded input-output model
153	p2_k_by_a1	Intermediate consumption of industry K from industry A1	Endogenous	Embedded input-output model
154	p2_k_by_b_e	Intermediate consumption of industry K from industries B to E	Endogenous	Embedded input-output model
155	p2_k_by_f	Intermediate consumption of industry K from industry F	Endogenous	Embedded input-output model
156	p2_k_by_g_i	Intermediate consumption of industry K from industries G to I	Endogenous	Embedded input-output model
157	p2_k_by_j	Intermediate consumption of industry K from industry J	Endogenous	Embedded input-output model
158	p2_k_by_k	Intermediate consumption of industry K from industry K	Endogenous	Embedded input-output model
159	p2_k_by_l	Intermediate consumption of industry K from industry L	Endogenous	Embedded input-output model
160	p2_k_by_m_n	Intermediate consumption of industry K from industries M to N	Endogenous	Embedded input-output model
161	p2_k_by_o_q	Intermediate consumption of industry K from industries O to Q	Endogenous	Embedded input-output model
162	p2_k_by_r_u	Intermediate consumption of industry K from industries R to U	Endogenous	Embedded input-output model
163	p2_l	Intermediate consumption of industry L	Endogenous	Embedded input-output model
164	p2_l_by_a1	Intermediate consumption of industry L from industry A1	Endogenous	Embedded input-output model
165	p2_l_by_b_e	Intermediate consumption of industry L from industries B to E	Endogenous	Embedded input-output model
166	p2_l_by_f	Intermediate consumption of industry L from industry F	Endogenous	Embedded input-output model
167	p2_l_by_g_i	Intermediate consumption of industry L from industries G to I	Endogenous	Embedded input-output model
168	p2_l_by_j	Intermediate consumption of industry L from industry J	Endogenous	Embedded input-output model
169	p2_l_by_k	Intermediate consumption of industry L from industry K	Endogenous	Embedded input-output model
170	p2_l_by_l	Intermediate consumption of industry L from industry L	Endogenous	Embedded input-output model
171	p2_l_by_m_n	Intermediate consumption of industry L from industries M to N	Endogenous	Embedded input-output model
172	p2_l_by_o_q	Intermediate consumption of industry L from industries O to Q	Endogenous	Embedded input-output model
173	p2_l_by_r_u	Intermediate consumption of industry L from industries R to U	Endogenous	Embedded input-output model
174	p2_m_n	Intermediate consumption of industries M and N	Endogenous	Embedded input-output model
175	p2_m_n_by_a1	Intermediate consumption of industries M and N from industry A1	Endogenous	Embedded input-output model
176	p2_m_n_by_b_e	Intermediate consumption of industries M and N from industries B to E	Endogenous	Embedded input-output model
177	p2_m_n_by_f	Intermediate consumption of industries M and N from industry F	Endogenous	Embedded input-output model
178	p2_m_n_by_g_i	Intermediate consumption of industries M and N from industries G to I	Endogenous	Embedded input-output model
179	p2_m_n_by_j	Intermediate consumption of industries M and N from industry J	Endogenous	Embedded input-output model
180	p2_m_n_by_k	Intermediate consumption of industries M and N from industry K	Endogenous	Embedded input-output model
181	p2_m_n_by_l	Intermediate consumption of industries M and N from industry L	Endogenous	Embedded input-output model

No.	Variable name	Interpretation	Type	Obtained based on:
182	p2_m_n_by_m_n	Intermediate consumption of industries M and N from industries M to N	Endogenous	Embedded input-output model
183	p2_m_n_by_o_q	Intermediate consumption of industries M and N from industries O to Q	Endogenous	Embedded input-output model
184	p2_m_n_by_r_u	Intermediate consumption of industries M and N from industries R to U	Endogenous	Embedded input-output model
185	p2_o_q	Intermediate consumption of industries O to Q	Endogenous	Embedded input-output model
186	p2_o_q_by_a1	Intermediate consumption of industries O to Q from industry A1	Endogenous	Embedded input-output model
187	p2_o_q_by_b_e	Intermediate consumption of industries O to Q from industries B to E	Endogenous	Embedded input-output model
188	p2_o_q_by_f	Intermediate consumption of industries O to Q from industry F	Endogenous	Embedded input-output model
189	p2_o_q_by_g_i	Intermediate consumption of industries O to Q from industries G to I	Endogenous	Embedded input-output model
190	p2_o_q_by_j	Intermediate consumption of industries O to Q from industry J	Endogenous	Embedded input-output model
191	p2_o_q_by_k	Intermediate consumption of industries O to Q from industry K	Endogenous	Embedded input-output model
192	p2_o_q_by_l	Intermediate consumption of industries O to Q from industry L	Endogenous	Embedded input-output model
193	p2_o_q_by_m_n	Intermediate consumption of industries O to Q from industries M to N	Endogenous	Embedded input-output model
194	p2_o_q_by_o_q	Intermediate consumption of industries O to Q from industries O to Q	Endogenous	Embedded input-output model
195	p2_o_q_by_r_u	Intermediate consumption of industries O to Q from industries R to U	Endogenous	Embedded input-output model
196	p2_r_u	Intermediate consumption of industries R to U	Endogenous	Embedded input-output model
197	p2_r_u_by_a1	Intermediate consumption of industries R to U from industry A1	Endogenous	Embedded input-output model
198	p2_r_u_by_b_e	Intermediate consumption of industries R to U from industries B to E	Endogenous	Embedded input-output model
199	p2_r_u_by_f	Intermediate consumption of industries R to U from industry F	Endogenous	Embedded input-output model
200	p2_r_u_by_g_i	Intermediate consumption of industries R to U from industries G to I	Endogenous	Embedded input-output model
201	p2_r_u_by_j	Intermediate consumption of industries R to U from industry J	Endogenous	Embedded input-output model
202	p2_r_u_by_k	Intermediate consumption of industries R to U from industry K	Endogenous	Embedded input-output model
203	p2_r_u_by_l	Intermediate consumption of industries R to U from industry L	Endogenous	Embedded input-output model
204	p2_r_u_by_m_n	Intermediate consumption of industries R to U from industries M to N	Endogenous	Embedded input-output model
205	p2_r_u_by_o_q	Intermediate consumption of industries R to U from industries O to Q	Endogenous	Embedded input-output model
206	p2_r_u_by_r_u	Intermediate consumption of industries R to U from industries R to U	Endogenous	Embedded input-output model
207	p3	Final consumption at current prices	Endogenous	Identity
208	p3_2010	Final consumption at 2010 prices	Endogenous	Identity
209	p3_a1	Final consumption of industry A1	Endogenous	Embedded input-output model
210	p3_b_e	Final consumption of industries B to E	Endogenous	Embedded input-output model
211	p3_f	Final consumption of industry F	Endogenous	Embedded input-output model
212	p3_g_i	Final consumption of industries G to I	Endogenous	Embedded input-output model
213	p3_j	Final consumption of industry J	Endogenous	Embedded input-output model
214	p3_k	Final consumption of industry K	Endogenous	Embedded input-output model
215	p3_l	Final consumption of industry L	Endogenous	Embedded input-output model
216	p3_m_n	Final consumption of industries M and N	Endogenous	Embedded input-output model
217	p3_o_q	Final consumption of industries O to Q	Endogenous	Embedded input-output model
218	p3_p2010	Final consumption deflator	Endogenous	Embedded input-output model
219	p3_r_u	Final consumption of industries R to U	Endogenous	Embedded input-output model
220	p3_s13	Final consumption of government at current prices	Endogenous	Identity
221	p3_s13_2010	Final consumption of government at 2010 prices	Endogenous	Identity
222	p3_s13_a1	Final consumption of government from industry A1	Endogenous	Embedded input-output model
223	p3_s13_b_e	Final consumption of government from industries B to E	Endogenous	Embedded input-output model
224	p3_s13_eu	EU-funds-financed final consumption of government	Exogenous	EU funds data
225	p3_s13_f	Final consumption of government from industry F	Endogenous	Embedded input-output model
226	p3_s13_g_i	Final consumption of government from industries G to I	Endogenous	Embedded input-output model
227	p3_s13_j	Final consumption of government from industry J	Endogenous	Embedded input-output model
228	p3_s13_k	Final consumption of government from industry K	Endogenous	Embedded input-output model

No.	Variable name	Interpretation	Type	Obtained based on:
229	p3_s13_l	Final consumption of government from industry L	Endogenous	Embedded input-output model
230	p3_s13_m_n	Final consumption of government from industries M to N	Endogenous	Embedded input-output model
231	p3_s13_o_q	Final consumption of government from industries O to Q	Endogenous	Embedded input-output model
232	p3_s13_p2010	Deflator of final consumption of government	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
233	p3_s13_r_u	Final consumption of government from industries R to U	Endogenous	Embedded input-output model
234	p3_s13_x_eu	Final consumption of government less EU-funds-financed final consumption of government at current prices	Endogenous	Identity
235	p3_s13_x_eu_2010	Final consumption of government less EU-funds-financed final consumption of government at 2010 prices	Exogenous	Outcome of a no policy change assumption
236	p3_s14_s15	Final consumption of households and NPISHs at current prices	Endogenous	Identity
237	p3_s14_s15_2010	Final consumption of households and NPISHs at 2010 prices	Endogenous	Econometrically estimated shor-term relationships
238	p3_s14_s15_a1	Final consumption of households and NPISHs from industry A1	Endogenous	Embedded input-output model
239	p3_s14_s15_b_e	Final consumption of households and NPISHs from industries B to E	Endogenous	Embedded input-output model
240	p3_s14_s15_f	Final consumption of households and NPISHs from industry F	Endogenous	Embedded input-output model
241	p3_s14_s15_g_i	Final consumption of households and NPISHs from industries G to I	Endogenous	Embedded input-output model
242	p3_s14_s15_j	Final consumption of households and NPISHs from industry J	Endogenous	Embedded input-output model
243	p3_s14_s15_k	Final consumption of households and NPISHs from industry K	Endogenous	Embedded input-output model
244	p3_s14_s15_l	Final consumption of households and NPISHs from industry L	Endogenous	Embedded input-output model
245	p3_s14_s15_m_n	Final consumption of households and NPISHs from industries M to N	Endogenous	Embedded input-output model
246	p3_s14_s15_o_q	Final consumption of households and NPISHs from industries O to Q	Endogenous	Embedded input-output model
247	p3_s14_s15_p2010	Deflator of final consumption of households and NPISHs	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
248	p3_s14_s15_r_u	Final consumption of households and NPISHs from industries R to U	Endogenous	Embedded input-output model
249	p5	Gross investment at current prices	Endogenous	Identity
250	p5_2010	Gross investment at 2010 prices	Endogenous	Identity
251	p5_a1	Gross investment of industry A1	Endogenous	Embedded input-output model
252	p5_b_e	Gross investment of industries B to E	Endogenous	Embedded input-output model
253	p5_f	Gross investment of industry F	Endogenous	Embedded input-output model
254	p5_g_i	Gross investment of industries G to I	Endogenous	Embedded input-output model
255	p5_j	Gross investment of industry J	Endogenous	Embedded input-output model
256	p5_k	Gross investment of industry K	Endogenous	Embedded input-output model
257	p5_l	Gross investment of industry L	Endogenous	Embedded input-output model
258	p5_m_n	Gross investment of industries M and N	Endogenous	Embedded input-output model
259	p5_o_q	Gross investment of industries O to Q	Endogenous	Embedded input-output model
260	p5_p2010	Deflator of gross investment	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
261	p5_r_u	Gross investment of industries R to U	Endogenous	Embedded input-output model
262	p5_s13	Public investment at current prices	Endogenous	Identity
263	p5_s13_2010	Public investment at 2010 prices	Endogenous	Identity
264	p5_s13_eu	EU-funds-financed public investment at current prices	Exogenous	EU funds data
265	p5_s13_eu_2010	EU-funds-financed public investment at 2010 prices	Endogenous	Identity
266	p5_s13_x_eu	Public investment at current prices less EU-funds-financed public investment at current prices	Endogenous	Identity
267	p5_s13_x_eu_2010	Public investment at 2010 prices less EU-funds-financed public investment at 2010 prices	Exogenous	Outcome of a no policy change assumption
268	p5_x_eu_2010	Gross investment less EU-funds-financed gross investment, at 2010 prices	Endogenous	Identity
269	p5_x_s13	Gross public investment at current prices	Endogenous	Identity
270	p5_x_s13_2010	Gross public investment at 2010 prices	Endogenous	Identity
271	p5_x_s13_eu	EU-funds-financed gross public investment at current prices	Exogenous	EU funds data

No.	Variable name	Interpretation	Type	Obtained based on:
272	p5_x_s13_eu_2010	EU-funds-financed gross public investment at 2010 prices	Endogenous	Identity
273	p5_x_s13_x_eu_2010	Gross public investment at 2010 prices less EU-funds-financed gross public investment at 2010 prices	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
274	p6	Export at current prices	Endogenous	Identity
275	p6_2010	Export at 2010 prices	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
276	p6_a1	Export of industry A1	Endogenous	Embedded input-output model
277	p6_b_e	Export of industries B to E	Endogenous	Embedded input-output model
278	p6_f	Export of industry F	Endogenous	Embedded input-output model
279	p6_g_i	Export of industries G to I	Endogenous	Embedded input-output model
280	p6_j	Export of industry J	Endogenous	Embedded input-output model
281	p6_k	Export of industry K	Endogenous	Embedded input-output model
282	p6_l	Export of industry L	Endogenous	Embedded input-output model
283	p6_m_n	Export of industries M and N	Endogenous	Embedded input-output model
284	p6_o_q	Export of industries O to Q	Endogenous	Embedded input-output model
285	p6_p2010	Export deflator	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
286	p6_r_u	Export of industries R to U	Endogenous	Embedded input-output model
287	p7	Import at current prices	Endogenous	Identity
288	p7_2010	Import at 2010 prices	Endogenous	Econometrically estimated shor-term relationships
289	p7_a1	Import of industry A1	Endogenous	Embedded input-output model
290	p7_b_e	Import of industries B to E	Endogenous	Embedded input-output model
291	p7_f	Import of industry F	Endogenous	Embedded input-output model
292	p7_g_i	Import of industries G to I	Endogenous	Embedded input-output model
293	p7_j	Import of industry J	Endogenous	Embedded input-output model
294	p7_k	Import of industry K	Endogenous	Embedded input-output model
295	p7_l	Import of industry L	Endogenous	Embedded input-output model
296	p7_m_n	Import of industries M and N	Endogenous	Embedded input-output model
297	p7_o_q	Import of industries O to Q	Endogenous	Embedded input-output model
298	p7_p2010	Deflator of Import	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
299	p7_r_u	Import of industries R to U	Endogenous	Embedded input-output model
300	pfoodw	World food price index	Exogenous	World Economic Outlook
301	pindu	World industrial goods price index	Exogenous	World Economic Outlook
302	pmeta	World metals price index	Exogenous	World Economic Outlook
303	pnrg	World energy price index	Exogenous	World Economic Outlook
304	quasi	Quasi money	Endogenous	Econometrically estimated error-correction mechanism and short-term relationships
305	rintrate	Real interest rate	Endogenous	Manually calibrated relationship
306	shr_commexp	Share of communication expenditure	Exogenous	Assumption
307	shr_d21	Share of indirect taxes	Exogenous	Assumption
308	shr_d29	Share of other taxes on production	Exogenous	Assumption
309	shr_d3_d62_d63_d7	Share of social benefits (other than social transfers in kind and other current transfers)	Exogenous	Assumption
310	shr_d4	Share of non-tax revenue	Exogenous	Assumption
311	shr_d5_d61	Share of income taxes	Exogenous	Assumption
312	shr_d92_x_eu	Share of grants (less EU grants)	Exogenous	Assumption
313	shr_gerd	Share of R&D expenditure	Exogenous	Assumption

No.	Variable name	Interpretation	Type	Obtained based on:
314	shr_itexpen	Share of IT expenditure	Exogenous	Assumption
315	shr_n1112_2010	Share of expenditure on other buildings and structures	Exogenous	Assumption
316	te	Budget expenditure	Endogenous	Identity
317	techexp	Technology expenditure at current prices	Endogenous	Manually calibrated relationship
318	techexp_2010	Technology expenditure at 2010 prices	Endogenous	Identity
319	techkt_2010	Technology capital	Endogenous	Manually calibrated relationship
320	tfp	Solow residual	Endogenous	Manually calibrated relationship
321	tr	Budget revenue	Endogenous	Identity
322	une_15_64	Number of unemployed	Endogenous	Identity
323	une_rt_15_64	Unemployment rate	Endogenous	Identity
324	voc	Human capital accumulated through own-funds-financed vocational training	Endogenous	Manually calibrated relationship
325	voc_eu	Human capital accumulated through EU-funds-financed vocational training	Endogenous	Manually calibrated relationship
326	vochours	Total hours of vocational training for the entire labour force	Endogenous	Manually calibrated relationship
327	vochours_rt	Average number of hours of vocational training per person in the labour force	Exogenous	Assumption
328	vocyrs	Total number of years of vocational training per person in the labour force	Endogenous	Manually calibrated relationship
329	vocyrs_avg	Average number of years of vocational training of the labour force	Endogenous	Identity
330	wage_total	Annual average real wage	Endogenous	Econometrically estimated shor-term relationships
331	wage_total_2010	Annual average nominal wage	Endogenous	Identity

3. Econometric estimation in SIBILA 2.0

Dependent Variable: DLOG(ACT_15_64)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2004 2014
Included observations: 11
DLOG(ACT_15_64) = C(2)*DLOG(EMP_15_64)

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	0.461469	0.060000	7.691165	0.0000

R-squared	0.852977	Mean dependent var	0.002124
Adjusted R-squared	0.852977	S.D. dependent var	0.017225
S.E. of regression	0.006605	Akaike info criterion	-7.115530
Sum squared resid	0.000436	Schwarz criterion	-7.079358
Log likelihood	40.13542	Hannan-Quinn criter.	-7.138332
Durbin-Watson stat	2.496282		

Dependent Variable: DLOG(BANKDEPT)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2002 2014
Included observations: 13
DLOG(BANKDEPT) = C(1) +C(2)*(LOG(BANKDEPT(-1)) - LOG(QUASI(-1)))
+ C(4)*DUM13

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.972463	0.345684	-2.813153	0.0184
C(2)	-0.574217	0.176770	-3.248386	0.0087
C(4)	-0.296662	0.106428	-2.787450	0.0192

R-squared	0.680780	Mean dependent var	0.119835
Adjusted R-squared	0.616937	S.D. dependent var	0.163534
S.E. of regression	0.101214	Akaike info criterion	-1.543976
Sum squared resid	0.102444	Schwarz criterion	-1.413603
Log likelihood	13.03584	Hannan-Quinn criter.	-1.570773
F-statistic	10.66320	Durbin-Watson stat	2.093736
Prob(F-statistic)	0.003315		

Dependent Variable: DLOG(CASH)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2003 2014
Included observations: 12
DLOG(CASH) = C(1) + C(4)*DLOG(B1GQ_2010) + C(5)*DLOG(CP00_AVX)
+ C(6)*DUM12

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.043843	0.005873	7.464747	0.0001
C(4)	2.826956	0.130221	21.70898	0.0000
C(5)	-1.002356	0.130601	-7.674942	0.0001
C(6)	0.052617	0.012913	4.074833	0.0036

R-squared	0.984682	Mean dependent var	0.092901
Adjusted R-squared	0.978938	S.D. dependent var	0.082937
S.E. of regression	0.012036	Akaike info criterion	-5.740564
Sum squared resid	0.001159	Schwarz criterion	-5.578928
Log likelihood	38.44338	Hannan-Quinn criter.	-5.800407
F-statistic	171.4223	Durbin-Watson stat	2.710269
Prob(F-statistic)	0.000000		

Dependent Variable: DLOG(CP00_AVX)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2003 2014
Included observations: 12
DLOG(CP00_AVX) = C(2)*DLOG(PFOODW) + C(3)*DLOG(P3_2010(-1)) +
C(4)*DLOG(CP00_AVX(-1))

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	0.201017	0.041816	4.807177	0.0010
C(3)	0.275792	0.128152	2.152066	0.0598
C(4)	0.452115	0.114204	3.958832	0.0033

R-squared	0.842114	Mean dependent var	0.041492
Adjusted R-squared	0.807029	S.D. dependent var	0.035042
S.E. of regression	0.015394	Akaike info criterion	-5.297419
Sum squared resid	0.002133	Schwarz criterion	-5.176193
Log likelihood	34.78452	Hannan-Quinn criter.	-5.342302
Durbin-Watson stat	2.268922		

Dependent Variable: DLOG(D41PAY)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2003 2014
Included observations: 12
DLOG(D41PAY) = C(2)*(LOG(D41PAY(-1)) - LOG(GD(-1))) + C(4)*LOG(GD(
-1)) + C(5)*EURIBOR_12/100 + C(6)*DUM13

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	-0.831683	0.131791	-6.310615	0.0002
C(4)	-0.279005	0.043475	-6.417586	0.0002
C(5)	4.337971	1.031039	4.207378	0.0030
C(6)	0.151367	0.042739	3.541624	0.0076

R-squared	0.902692	Mean dependent var	-0.017206
Adjusted R-squared	0.866201	S.D. dependent var	0.098680
S.E. of regression	0.036096	Akaike info criterion	-3.544081
Sum squared resid	0.010423	Schwarz criterion	-3.382446
Log likelihood	25.26449	Hannan-Quinn criter.	-3.603925
Durbin-Watson stat	2.118538		

Dependent Variable: DLOG(DISPY)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample (adjusted): 1999 2014
Included observations: 16 after adjustments
DLOG(DISPY) = C(2)*DLOG(B1GQ_2010) + C(5)*DLOG(B1GQ_P2010) +
C(3)*DUM07

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	0.805786	0.152380	5.287992	0.0001
C(5)	1.191084	0.144784	8.226646	0.0000
C(3)	-0.061178	0.023064	-2.652518	0.0199

R-squared	0.875109	Mean dependent var	0.073848
Adjusted R-squared	0.855895	S.D. dependent var	0.052711
S.E. of regression	0.020010	Akaike info criterion	-4.817850
Sum squared resid	0.005205	Schwarz criterion	-4.672990
Log likelihood	41.54280	Hannan-Quinn criter.	-4.810432
Durbin-Watson stat	2.088274		

Dependent Variable: DLOG(EMP_15_64)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2002 2014
Included observations: 13
DLOG(EMP_15_64) = C(2)*(LOG(EMP_15_64(-1)) - 0.7*LOG(B1GQ_2010(
-1))) + C(4)*DLOG(B1GQ_2010) + C(5)*DLOG(B1GQ_2010(-1))

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	-0.138006	0.020535	-6.720472	0.0001
C(4)	0.620621	0.097795	6.346116	0.0001
C(5)	0.585222	0.098416	5.946392	0.0001

R-squared	0.920048	Mean dependent var	0.007031
Adjusted R-squared	0.904057	S.D. dependent var	0.032195
S.E. of regression	0.009972	Akaike info criterion	-6.178859
Sum squared resid	0.000994	Schwarz criterion	-6.048486
Log likelihood	43.16258	Hannan-Quinn criter.	-6.205656
Durbin-Watson stat	1.363432		

Dependent Variable: EUBUDGET
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2007 2014
Included observations: 8
EUBUDGET = C(1)*DISPY(-1)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.010934	0.000283	38.61920	0.0000

R-squared	0.783181	Mean dependent var	776.0820
Adjusted R-squared	0.783181	S.D. dependent var	123.1157
S.E. of regression	57.32740	Akaike info criterion	11.05190
Sum squared resid	23005.02	Schwarz criterion	11.06183
Log likelihood	-43.20761	Hannan-Quinn criter.	10.98493
Durbin-Watson stat	1.407720		

Dependent Variable: D(LIABGOV)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2007 2014
Included observations: 8
D(LIABGOV) = C(1)*D(FISCRES)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.678194	0.098019	6.919021	0.0002

R-squared	0.869428	Mean dependent var	216.8885
Adjusted R-squared	0.869428	S.D. dependent var	1510.946
S.E. of regression	545.9759	Akaike info criterion	15.55950
Sum squared resid	2086627.	Schwarz criterion	15.56943
Log likelihood	-61.23798	Hannan-Quinn criter.	15.49252
Durbin-Watson stat	1.741305		

Dependent Variable: DLOG(NOTESCOINS)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample (adjusted): 1998 2014
Included observations: 17 after adjustments
DLOG(NOTESCOINS) = C(1) + C(2)*DLOG(CASH) + C(3)
*(LOG(NOTESCOINS(-1)) - LOG(CASH(-1))) + C(4)*LOG(CASH(-1))

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.194669	0.054695	-3.559175	0.0035
C(2)	0.998764	0.033602	29.72368	0.0000
C(3)	-0.696965	0.175152	-3.979196	0.0016
C(4)	0.031362	0.007714	4.065735	0.0013

R-squared	0.992407	Mean dependent var	0.123492
Adjusted R-squared	0.990654	S.D. dependent var	0.093007
S.E. of regression	0.008991	Akaike info criterion	-6.382795
Sum squared resid	0.001051	Schwarz criterion	-6.186745
Log likelihood	58.25376	Hannan-Quinn criter.	-6.363307
F-statistic	566.3398	Durbin-Watson stat	1.568538
Prob(F-statistic)	0.000000		

Dependent Variable: DLOG(OVERN1)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2002 2014
Included observations: 13
DLOG(OVERN1) = C(1)*DLOG(CASH) + C(2)*DUM08

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.618186	0.164467	9.838954	0.0000
C(2)	-0.240757	0.070836	-3.398819	0.0059

R-squared	0.779004	Mean dependent var	0.150716
Adjusted R-squared	0.758914	S.D. dependent var	0.141936
S.E. of regression	0.069691	Akaike info criterion	-2.348845
Sum squared resid	0.053426	Schwarz criterion	-2.261929
Log likelihood	17.26749	Hannan-Quinn criter.	-2.366710
Durbin-Watson stat	2.987563		

Dependent Variable: DLOG(P3_S13_P2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2000 2014
Included observations: 15
DLOG(P3_S13_P2010) = C(1) + C(3)*(LOG(P3_S13_P2010(-1)) - LOG(CP00_AVX(-1))) + C(5)*DLOG(TE) + C(6)*DUM08

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.020911	0.008465	2.470202	0.0311
C(3)	-0.518773	0.144452	-3.591313	0.0042
C(5)	0.296431	0.104448	2.838073	0.0161
C(6)	0.082065	0.018369	4.467492	0.0010

R-squared	0.866664	Mean dependent var	0.058227
Adjusted R-squared	0.830299	S.D. dependent var	0.040011
S.E. of regression	0.016483	Akaike info criterion	-5.149856
Sum squared resid	0.002988	Schwarz criterion	-4.961042
Log likelihood	42.62392	Hannan-Quinn criter.	-5.151867
F-statistic	23.83274	Durbin-Watson stat	2.210415
Prob(F-statistic)	0.000041		

Dependent Variable: DLOG(P3_S14_S15_2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2000 2014
Included observations: 15
DLOG(P3_S14_S15_2010) = C(2)*DLOG(B1GQ_2010)

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	1.199350	0.108604	11.04338	0.0000

R-squared	0.810181	Mean dependent var	0.039482
Adjusted R-squared	0.810181	S.D. dependent var	0.044502
S.E. of regression	0.019389	Akaike info criterion	-4.983912
Sum squared resid	0.005263	Schwarz criterion	-4.936708
Log likelihood	38.37934	Hannan-Quinn criter.	-4.984415
Durbin-Watson stat	2.877299		

Dependent Variable: DLOG(P3_S14_S15_P2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample (adjusted): 1999 2014
Included observations: 16 after adjustments
DLOG(P3_S14_S15_P2010) = C(1) + C(2)*(LOG(P3_S14_S15_P2010(-1))
- 0.71*LOG(CP00_AVX(-1))) + C(3)*DLOG(CP00_AVX)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.074144	0.175617	6.116405	0.0000
C(2)	-0.795046	0.132224	-6.012897	0.0000
C(3)	0.682329	0.102033	6.687305	0.0000

R-squared	0.785367	Mean dependent var	0.032302
Adjusted R-squared	0.752346	S.D. dependent var	0.027436
S.E. of regression	0.013653	Akaike info criterion	-5.582294
Sum squared resid	0.002423	Schwarz criterion	-5.437433
Log likelihood	47.65835	Hannan-Quinn criter.	-5.574876
F-statistic	23.78418	Durbin-Watson stat	2.454279
Prob(F-statistic)	0.000045		

Dependent Variable: DLOG(P5_P2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2000 2014
Included observations: 15
DLOG(P5_P2010) = C(2)*DLOG(CP00_AVX) + C(3)*(LOG(P5_P2010(-1)) - LOG(CP00_AVX(-1))) + C(4)*DLOG(PINDU(-1))

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	1.006482	0.182073	5.527907	0.0001
C(3)	-0.359551	0.105405	-3.411130	0.0052
C(4)	0.103481	0.036748	2.815993	0.0156

R-squared	0.849684	Mean dependent var	0.032327
Adjusted R-squared	0.824632	S.D. dependent var	0.041528
S.E. of regression	0.017391	Akaike info criterion	-5.088928
Sum squared resid	0.003629	Schwarz criterion	-4.947318
Log likelihood	41.16696	Hannan-Quinn criter.	-5.090437
Durbin-Watson stat	2.450688		

Dependent Variable: DLOG(P5_X_S13_X_EU_2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2001 2014
Included observations: 14
DLOG(P5_X_S13_X_EU_2010) = C(1) + C(2)*(LOG(P5_X_S13_X_EU_2010(-1)) - NGDP_RPCH(-1)) + C(4)*NGDP_RPCH(-1) +C(5) *DLOG(B1GQ_2010)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.241997	0.370083	3.355998	0.0073
C(2)	-0.158182	0.039333	-4.021641	0.0024
C(4)	-0.108540	0.038337	-2.831184	0.0178
C(5)	2.850643	0.472100	6.038218	0.0001

R-squared	0.946928	Mean dependent var	0.039186
Adjusted R-squared	0.931006	S.D. dependent var	0.172610
S.E. of regression	0.045339	Akaike info criterion	-3.114337
Sum squared resid	0.020556	Schwarz criterion	-2.931749
Log likelihood	25.80036	Hannan-Quinn criter.	-3.131239
F-statistic	59.47384	Durbin-Watson stat	2.663146
Prob(F-statistic)	0.000001		

Dependent Variable: DLOG(P6_2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2001 2014
Included observations: 14
DLOG(P6_2010) = C(2) * NGDP_RPCH/100 + C(4)*(LOG(P6_2010(-1)) - LOG(TECHEXP_2010(-1)))

	Coefficient	Std. Error	t-Statistic	Prob.
C(2)	4.604543	0.647865	7.107254	0.0000
C(4)	-0.056443	0.014234	-3.965423	0.0019

R-squared	0.791195	Mean dependent var	0.071718
Adjusted R-squared	0.773795	S.D. dependent var	0.084972
S.E. of regression	0.040414	Akaike info criterion	-3.447727
Sum squared resid	0.019599	Schwarz criterion	-3.356434
Log likelihood	26.13409	Hannan-Quinn criter.	-3.456178
Durbin-Watson stat	2.731902		

Dependent Variable: DLOG(P6_P2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2000 2014
Included observations: 15
DLOG(P6_P2010) = C(1) + C(2)*DLOG(PNRG) + C(3)*(LOG(P6_P2010(-1)) - 0.26*LOG(PNRG(-1)) - 0.24*LOG(PMETA(-1)))

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.962666	0.238966	4.028459	0.0017
C(2)	0.228180	0.032391	7.044517	0.0000
C(3)	-0.458766	0.117176	-3.915181	0.0021

R-squared	0.872616	Mean dependent var	0.055670
Adjusted R-squared	0.851385	S.D. dependent var	0.070029
S.E. of regression	0.026997	Akaike info criterion	-4.209358
Sum squared resid	0.008746	Schwarz criterion	-4.067748
Log likelihood	34.57018	Hannan-Quinn criter.	-4.210866
F-statistic	41.10171	Durbin-Watson stat	2.189874
Prob(F-statistic)	0.000004		

Dependent Variable: DLOG(P7_2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2002 2014
Included observations: 13
DLOG(P7_2010) = C(1)*DLOG(P3_2010(-1)) + C(2)*DLOG(P5_2010) +
C(3)*DLOG(P6_2010)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.325976	0.136251	-2.392468	0.0378
C(2)	0.496132	0.048514	10.22660	0.0000
C(3)	0.828665	0.052937	15.65391	0.0000

R-squared	0.978493	Mean dependent var	0.075189
Adjusted R-squared	0.974192	S.D. dependent var	0.115709
S.E. of regression	0.018588	Akaike info criterion	-4.933389
Sum squared resid	0.003455	Schwarz criterion	-4.803016
Log likelihood	35.06703	Hannan-Quinn criter.	-4.960186
Durbin-Watson stat	2.422663		

Dependent Variable: DLOG(P7_P2010)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2002 2014
Included observations: 13
DLOG(P7_P2010) = C(1) + C(2)*DLOG(PNRG) + C(3)*(LOG(P7_P2010(-1))
- 0.28*LOG(PNRG(-1)) - 0.21*LOG(PINDU(-1)))

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.916160	0.182763	5.012832	0.0005
C(2)	0.257525	0.023039	11.17800	0.0000
C(3)	-0.420373	0.084488	-4.975559	0.0006

R-squared	0.939816	Mean dependent var	0.033652
Adjusted R-squared	0.927780	S.D. dependent var	0.064752
S.E. of regression	0.017401	Akaike info criterion	-5.065360
Sum squared resid	0.003028	Schwarz criterion	-4.934987
Log likelihood	35.92484	Hannan-Quinn criter.	-5.092157
F-statistic	78.07919	Durbin-Watson stat	2.332461
Prob(F-statistic)	0.000001		

Dependent Variable: DLOG(QUASI)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample: 2001 2014
Included observations: 14
DLOG(QUASI) = C(1) + C(3)*(LOG(QUASI(-1)) - 4.05*LOG(B1GQ_2010(-1)))
+ C(6)*DLOG(B1GQ_2010) + C(7)*DUM14

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-10.52945	2.071358	-5.083358	0.0005
C(3)	-0.303498	0.059066	-5.138245	0.0004
C(6)	0.866054	0.298391	2.902413	0.0158
C(7)	-0.143038	0.037970	-3.767138	0.0037

R-squared	0.910334	Mean dependent var	0.141782
Adjusted R-squared	0.883435	S.D. dependent var	0.096993
S.E. of regression	0.033115	Akaike info criterion	-3.742711
Sum squared resid	0.010966	Schwarz criterion	-3.560123
Log likelihood	30.19898	Hannan-Quinn criter.	-3.759613
F-statistic	33.84179	Durbin-Watson stat	2.314736
Prob(F-statistic)	0.000015		

Dependent Variable: DLOG(WAGE_TOTAL)
Method: Least Squares
Date: 09/22/15 Time: 21:02
Sample (adjusted): 2001 2014
Included observations: 14 after adjustments
DLOG(WAGE_TOTAL) = C(1) + C(2)*UNE_RT_15_64/100 + C(3)
*DLOG(CP00_AVX) + C(4)*DUM2

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.102000	0.015612	6.533526	0.0001
C(2)	-0.401775	0.122805	-3.271645	0.0084
C(3)	0.579845	0.161829	3.583076	0.0050
C(4)	0.076151	0.017415	4.372749	0.0014

R-squared	0.939833	Mean dependent var	0.092283
Adjusted R-squared	0.921783	S.D. dependent var	0.053360
S.E. of regression	0.014923	Akaike info criterion	-5.336830
Sum squared resid	0.002227	Schwarz criterion	-5.154242
Log likelihood	41.35781	Hannan-Quinn criter.	-5.353732
F-statistic	52.06833	Durbin-Watson stat	1.908331
Prob(F-statistic)	0.000002		

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РЕГЛАМЕНТ (ЕС) № 1300/2013 НА ЕВРОПЕЙСКИЯ ПАРЛАМЕНТ И НА СЪВЕТА от 17 декември 2013 година относно Кохезионния фонд и за отмяна на Регламент (ЕО) № 1084/2006 – http://www.eufunds.bg/bg/page/65

РЕГЛАМЕНТ (ЕС) № 1301/2013 НА ЕВРОПЕЙСКИЯ ПАРЛАМЕНТ И НА СЪВЕТА от 17 декември 2013 година относно Европейския фонд за регионално развитие и специални разпоредби по отношение на целта „Инвестиции за растеж и работни места“ и за отмяна на Регламент (ЕО) № 1080/2006 – http://www.eufunds.bg/bg/page/65

РЕГЛАМЕНТ (ЕС) № 1303/2013 НА ЕВРОПЕЙСКИЯ ПАРЛАМЕНТ И НА СЪВЕТА от 17 декември 2013 година за определяне на общоприложими разпоредби за Европейския фонд за регионално развитие, Европейския социален фонд, Кохезионния фонд, Европейския земеделски фонд за развитие на селските райони и Европейския фонд за морско дело и рибарство и за определяне на общи разпоредби за Европейския фонд за регионално развитие, Европейския социален фонд, Кохезионния фонд и Европейския фонд за морско дело и рибарство, и за отмяна на Регламент (ЕО) № 1083/2006 на Съвета - http://www.eufunds.bg/bg/page/65

РЕГЛАМЕНТ (ЕС) № 1304/2013 НА ЕВРОПЕЙСКИЯ ПАРЛАМЕНТ И НА СЪВЕТА от 17 декември 2013 г. относно Европейския социален фонд и за отмяна на Регламент (ЕО) № 1081/2006 на Съвета – http://www.eufunds.bg/bg/page/65

Регламент на Съвета (ЕС) № 1083/2006 от 11 юли 2006 г., определящ общите разпоредби относно Европейския фонд за регионално развитие, Европейския социален фонд и Кохезионния фонд;

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