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Macro-Econometric Multi-Country Model: MEMMOD

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Introduction

I. The challenge of international economic integration and globalisation

With the further removal of foreign trade barriers, the growing liberalisation of international capital transactions and the tremendous progress in information technology, the global integration of the markets for goods, labour and financial assets has intensified considerably in recent years. This process has made particularly great progress in the European Economic Union through the accession of further countries, the creation of a common market and the establishment of the European Monetary System as well as the European Monetary Union. The effects of monetary and fiscal policy measures are therefore transmitted far more strongly from one country to another than before. For that reason the analysis of economic developments can no longer be restricted to a single country. Likewise, the feedback effects of higher interest rates or higher government deficits from other countries have to be considered more than hitherto in monetary and fiscal policy. In addition the creation of the euro in the European Monetary Union and the problems of international cooperation in monetary, fiscal and exchange policy, particularly in Europe and among the G-7 countries, have made it more necessary to take mutual economic dependencies into consideration than in the past.

For many years, the World Economic Outlook of the International Monetary Fund[1] as well as the Economic Outlook of the OECD[2] have therefore contained macro-

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1 Masson, P., Symansky, S., Haas, R., and Dooley, M., MULTIMOD - A Multi-Region Econometric Model, in International Monetary Fund Staff Studies for the World Economic Outlook, July 1988, Masson, P., Symansky, S., and Meredith, G., MULTIMOD Mark II: A Revised and Extended Model, International Monetary Fund Occasional Paper, No. 71, Washington D. C., July 1990, Laxton, D., Isard, P. Faruquee, H., Prasad, E. and Turtelboom, B., MULTIMOD Mark III, The Core Dynamic and Steady-state Models, International Monetary Fund Occasional Paper No. 164, Washington D. C., May 1998

2 OECD, The OECD Interlink System, Reference Manual, Paris, January 1988, O'Brien, P., Meuro, L. and Camilleri, A., Revised Groupings for Non-OECD Countries in OECD's Macroeconomic Model INTERLINK, OECD Working Paper No. 64, January 1989, Coe, D., Herd, R. and Bonnefous, M.-C., International Investment Income Determination in INTERLINK, OECD Working Paper No. 45, May 1987, Egebo, T. and Lienert, I., Modelling Housing Investment for Seven Major OECD Countries, OECD Working Paper No. 63, January 1989, Holtham, G. and Durand, M., OECD Economic Activity and Non-Oil Commodity Prices: Reduced-Form Equations for INTERLINK, OECD Working Paper No. 42, April 1987, Jarrett, P. and Torres, R., A Revised Supply Block for the Major Seven Countries in INTERLINK, OECD Working Paper No. 41, April 1987, Richardson, P., Tracking the U.S. External Deficit, 1980 - 1985: Experience with the OECD INTERLINK Model, OECD Working Paper No. 38, February 1987, Richardson, P., Recent Developments in OECD's International Macroeconomic Model, OECD Working Paper No. 46, June 1987, Richardson, P., A Review of the Simulation Properties of OECD's INTERLINK Model, OECD Working Paper No. 47, July 1987, Richardson, P., The Structure and Simulation Properties of OECD's INTERLINK Model, OECD Economic Studies, No. 10, Spring 1988, Stiehler, U., Price Determination in INTERLINK, OECD Working Paper No. 44, May 1987.

economic forecasts and economic policy scenario analyses using the econometric multi-country models of those institutions. The Commission of the European Union[3] has also used this instrument of analysis intensively. Several central banks[4], the Economic Planning Agency of the Japanese government[5] and economic research institutes and academics have likewise applied econometric multi-country models in their analyses[6]. The European System of Central Banks is also working on an econometric multi-country model.[7]

Econometric models for the economy of a single country, such as the former econometric model of the Bundesbank for the German economy,[8] can only be applied to the analysis of economic developments in that particular country. As the economic developments abroad have been assumed to be exogenous in such cases, these models show an open foreign economic flank. Effects of domestic developments on other countries as well as feedback effects from abroad are not taken into consideration. The consistency of economic forecasts is therefore not guaranteed. That means that neglecting the international economic linkages in large open economies like Germany can result in considerable forecast errors.

Because the feedback effects from abroad are neglected, international economic problems can be analysed with a national econometric model only to a very

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3 Bakhoven, A., Dramais, A. a. o., Quest - Ein makroökonomisches Modell für die Länder der Europäischen Gemeinschaft als Teil der Weltwirtschaft, Europäische Wirtschaft, Nr. 47, März 1991, Bekx, P., Bucher, A., Italianer, A. Mors, M., The QUEST model (Version 1988), Commission of the European Communities: Economic Papers, No. 75, March 1989, European Commission, One Market, One Money: An Evaluation of the Potential Benefits and Costs of Forming an Economic and Monetary Union, European Economy, 44, October 1990, European Commission, Quest II - A Multi Region Business Cycle and Growth Model, Bruxelles, June 1996, Roeger, W. and in't Veld, J., Quest II - A Multi Country Business Cycle and Growth Model, European Commission Economic Paper No. 123, October 1997.
4 Edison, H. J., Marquez, J. R., and Tryon, R. W., The Structure and Properties of the Federal Reserve Board Multicountry Model, Economic Modelling, 4, 1987. Levin, A. T., Rogers, J. H. and Tryon, R. W., A Guide to FRB / Global, Federal Reserve International Finance Discussion Papers, No. 588, 1997.
5 Economic Planning Agency, International Policy Coordination - The Approach from Macroeconomic Models and Theory, Tokyo 1986, Economic Planning Agency, The EPA World Economic Model - An Overview, Tokyo 1986, Economic Planning Agency, Exchange Rate Adjustment and Macroeconomic Policy Coordination, EPA Discussion Paper, No. 41, 1987, Economic Planning Agency, EPA World Economic Model, Tokyo 1987, Economic Planning Agency, Global and Domestic Policy Implications of Correcting External Imbalances, Tokyo 1988, Economic Planning Agency, How Far Have International Payments Adjustments Made Progress?, Tokyo 1989, Economic Planning Agency, EPA World Econometric Model, Fifth Version, Tokyo, June 1995.
6 National Institute of Economic and Social Research, NIGEM - The National Institute's Global Econometric Model, London 1996, Oxford Economic Forecasting, The Oxford World Macroeconomic Model, January 1999.
7 Henry, J., Euro area-Wide and Country Modelling at the Start of EMU, Economic and Financial Modelling, 1999.
8 Deutsche Bundesbank, Macro-econometric model of the German economy, Frankfurt am Main, April 1994.

Country coverage and size of macro-econometric multi-country models

Table 1

Country	Multi-mod[1]	Inter-link[2]	Quest[3]	FRB Global[4]	EPA[5]	NIGEM[6]	Oxford Model[7]	MEM MOD[8]
USA	x	x	x	x	x	x	x	x
Japan	x	x	x	x	x	x	x	x
Germany	x	x	x	x	x	x	x	x
United Kingdom	x	x	x	x	x	x	x	x
France	x	x	x	x	x	x	x	x
Italy	x	x	x	x	x	x	x	x
Canada	x	x		x	x	x	x	x
Netherlands		x	x			x	x	x
Belgium		x	x			x	x	x
Denmark		x	x			x	x	
Finland		x	x			x	x	
Greece		x	x			x		
Ireland		x	x			x	x	
Austria		x	x			x	x	
Portugal		x	x			x	x	
Sweden		x	x			x	x	
Spain		x	x			x	x	
Iceland		x						
Norway		x					x	
Switzerland		x					x	
Turkey		x						
Australia		x			x		x	
New Zealand		x						
Mexico				x		x	x	
Korea					x		x	
China							x	
Hong Kong							x	
Taiwan							x	
Number of countries	7	23	16	8	9	18	24	9
Number of equations[9]	600	4 200	1 030	1 400	1 230	1 500	4 500	690

1 Laxton, D., et al. Multimod Mark III, International Monetary Fund Occasional Paper No. 164, Washington D.C., May 1998 (www.imf.org). - **2** OECD, Interlink System, Reference Manual, Paris, January 1988. - **3** Roeger, W. and in't Veld, J., Quest II – A Multi Country Business Cycle and Growth Model, European Commission Economic Paper No. 123, Bruxelles, October 1997. - **4** Levin, A. T. et al., A Guide to FRB / Global, Federal Reserve, August 1997. - **5** EPA World Econometric Model, Fifth version, Economic Planning Agency, Discussion Paper No. 20, Tokyo, June 1995. - **6** National Institute of Economic and Social Research, NIGEM – The National Institute's Global Econometric Model, London 1996 (www.niesr.ac.uk/niesr/nigem.htm). - **7** Oxford Economic Forecasting, The Oxford World Macroeconomic Model, January 1999, (www.oef.co.uk). - **8** Deutsche Bundesbank, Macro-econometric Multi-Country Model. - **9** Numbers are rounded.

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limited extent. As the credit and capital markets have become increasingly integrated over the years, interest rate changes, for example, cannot be analysed in isolation. A change in monetary policy instruments triggers international transmission processes, which in turn react to developments in various money markets.

Unlike in national econometric models, in multi-country models, the international economic linkages are of fundamental importance. International economic interdependencies have to be considered in the analysis of economic policy measures. The explicit modelling of other important countries helps enhance the consistency of forecasts in the model context. A macro-econometric multi-country model therefore possesses a considerable comparative advantage over national econometric models in the analysis of international economic policy problems.

Given the obvious limitations of single-country models, the Deutsche Bundesbank has developed its macro-econometric multi-country model MEMMOD, which serves to maintain the international consistency of forecasts and to analyse international cooperation in monetary and fiscal policy, particularly since the establishment of the European Monetary Union. The current version of the model consists of compact country models for Germany’s most important trade partners. These models have been connected by international linkages. The multi-country model of the Deutsche Bundesbank covers European Union member states Belgium, France, Germany, Italy, the Netherlands and the United Kingdom. In addition, country models for the USA, Canada and Japan have been included, which means the model contains all G-7 countries. The remaining countries have been aggregated into three regions which contain other EU countries, other OECD countries and the rest of the world.

II. A reconsideration of the spectrum of modelling approaches

MEMMOD is a macro-econometric model with relatively solid theoretical foundations. The spectrum of alternative modelling strategies ranges from more data based models to strict theoretical models. The two extremes thus reflect strategies where either the model has to fit the data, or vice versa. Vector autoregressive models (VAR) represent, in their basic form, the strictly data based models. They do not require any theoretical assumptions. VARs are free of any restrictions, and can therefore be used to explain the dynamic interactions between endogenous variables. However, since they are purely data based, their key field of application is limited to short-term forecasts and analyses. Structural VARs (SVARs) deviate from the purely data based foundation of VARs and impose some restrictions on the model, which are derived from economic theory. This already enables them to be used in a wider range of applications. Both VARs and SVARs can be used to analyse economic shocks in the form of impulse response functions. The advantage of SVARs is that, as opposed to basic VARs, the economic shock can be associated with a specific economic interpretation.

Computable general equilibrium models are located at the other end of the spectrum, the theory based models. Optimising behaviour of agents and equilibrium are the foundation of such models. Since these conditions are not generally found in the data, such models need to be calibrated in order for the data to fit the model. With their rather loose link to underlying data, such models have very limited power in terms of short-term forecasts and analyses. Although theoretically appealing, the relevance of such models for longer term policy analyses seems equally questionable, given the apparent disequilibria observed in the "real world".

It is evident from the above considerations that any modelling strategy represents a compromise. For the Bundesbank's purposes it is important to have a universal tool that can be used for both short-term and long-term analyses. It is also important that the model incorporates institutional arrangements and that, especially the German part of the model, incorporates in detail the interdependencies of a broad range of variables. Moreover, as outlined in the first part of this chapter, the international interdependencies need to be reflected in the model. Information obtained from VARs in that respect is not sufficient because their small size implies that not all variables of interest can be explained, let alone the international framework. Strictly theoretical models, on the other hand, lack short-term explanatory power, and this probably holds for long-term explanations, too. The model of the euro area monetary sector, however, has been influenced more by theoretical considerations, since there is an obvious lack of aggregated euro area data.

An alternative approach would be to produce a range of models where each one is tailor-made for a particular set of applications. For one thing, the group of models would be intended to cover the spectrum from data based models to theory based models outlined above. Different models can also be used to encompass a range of different levels of aggregation and coverage. Developing and maintaining models that cover these two dimensions would be very costly. Another problem associated with such a strategy is that a range of models would obviously produce a range of solutions, unless their respective fields of applications are strictly separated. The resulting policy recommendations would therefore be largely discretionary, similar to ad hoc or model-free analyses. However, the limitations of an one-model strategy cannot be ignored, and the appropriate analysis tool would have to be considered on a case-by-case basis.

III. Modelling international economic integration using a structural multi-country model

The long-run properties of the country models in MEMMOD can be described as neo-classical. Potential GDP has been estimated on the basis of a Cobb-Douglas production function with constant returns to scale in the long run, and decreasing returns to scale in the short run. Potential GDP is in the long run equivalent to actual production, which implies full capacity utilisation. This is achieved by optimising the behaviour of economic agents in the central behavioural equations of the model. The expectation formation process of economic agents is partly assumed to be backward-looking, i.e. adaptive, and partly forward-looking, i.e. model-consistent or rational. Wage and price formations offset actual and trend unemployment and thus lead to labour market equilibrium; the Phillips curve is vertical in the long run. Inflation is therefore seen as a nominal phenomenon. Economic growth in the long run is determined by population growth and productivity progress. Price rigidities affect the short-run properties of the model. The rather slow adjustment of prices and wages to their equilibrium levels causes market disequilibria and cyclical fluctuations around the path of potential gross domestic product.

The development of the macro-econometric multi-country model MEMMOD has been based on many years of experience with the Bundesbank model for the German economy. The micro-economic foundation of the behavioural equations as well as the macro-economic disaggregation of sectors and markets are formed in a manner similar to this model. This enables real developments and monetary and financial processes, in which the Bundesbank is particularly interested, to be taken into consideration. Regarding the linkage of the separate country models by foreign current transactions and exchange markets, to some extent it has been possible to build on the experiences of other central banks and international institutions with econometric multi-country models. But the concepts applied there could not be adapted directly to the multi-country model of the Deutsche Bundesbank in every respect. Especially the enlargement of the area covered due to German unification in 1990 necessitated the inclusion of various special factors in the German block of the model.

The introduction of the D-Mark in East Germany in 1990 rendered a separate recording of financial variables for the new and the old federal states, Länder, ultimately impossible. In this area, new equations applying to Germany as a whole had to be estimated. In line with the large differences in behaviour and supply side conditions between eastern and western Germany, the data for real variables have been recorded separately for some time, however. This has made it possible to temporarily specify a small real block for eastern Germany (alongside the existing western German model), for which the coefficients have been calibrated under the assumption of convergence in economic conditions and behaviour to western German structures.[9] Starting at the beginning of 1995 this separate recording of data has been largely discontinued, however, making a further respecification of the model necessary. Since it can be assumed that the process of adjustment in eastern Germany has made visible progress ten years after German unification, the German block of the model has now been based almost entirely on data belonging to Germany as a whole. Unification-induced jumps in the data or changes in behaviour are dealt with in the respective equations by unification dummies.

After the start of the European Monetary Union in 1999 the model was respecified again. The financial markets of the countries participating in the euro area have been integrated into a common European financial market. Once the euro banknotes and coins have been introduced, it will no longer be possible to record national contributions to the single monetary aggregate. The single monetary policy of the European System of Central Banks already influences financial markets. These changes have therefore been taken into consideration in the specification of an euro area financial sector in the model.

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9 See Deutsche Bundesbank, Macro-econometric model of the German economy, Frankfurt am Main, April 1994 and Tödter, K.-H., Modelling the German Economy after Unification, in Suomen Pankki (Bank of Finland), Economic Policy Coordination in an Integrating Europe, Helsinki 1992.

Structure of the country models

I. Countries of the model

1. Country coverage

In order to be able to easily keep the model in perspective and to keep the data requirements in manageable dimensions, the Bundesbank's econometric multi-country model has been built as compactly as possible. From this it follows that only a selection of countries or regions can be included in the model. From a world-wide economic standpoint the USA, Japan, Germany, United Kingdom, France, Italy and Canada, which are represented at world economic summits as G-7, have demonstrably been the most important industrial countries in recent years. With respect to Germany's foreign transactions the two EU countries of Belgium and the Netherlands are additionally of special importance. All other countries have been aggregated into one of three regions: "other EU countries", "other OECD countries" and "rest of world".

The G-7 countries together account for more than half of world GDP. The "other EU countries" and "other OECD countries" together make up only 10 % of world GDP. In addition, the G-7 countries have a share of nearly 50 % in world trade. The share of the "other OECD countries" together with "other EU countries", on the other hand, likewise amounts only to just over 10 %. The G-7 countries are Germany's most important trade partners. Along with Belgium and the Netherlands, Germany exported more than 50 % of its goods to those countries in 1997. On the other hand, nearly 50 % of German imports were delivered from those countries.

The multi-country model specifies the most significant macro-economic interdependencies within important industrial countries as well as their international trade linkages in a consistent manner. From the Bundesbank's perspective, the modelling of monetary developments, interest rates and exchange rates deserves special attention, particularly with regard to the European integration process. This helps to explain the development of the most relevant economic policy variables. Despite the highly aggregated nature of the single country models, the whole multi-country model contains around 690 equations.

World trade and German foreign trade in 1997

Table 2

Share in per cent

Country Or region	World trade[1]	German exports	German imports
USA	14.3	8.4	7.8
Japan	6.9	2.4	4.9
Germany	8.6	-	-
United Kingdom	5.3	8.2	7.0
France	5.0	8.8	10.5
Italy	4.0	7.2	7.8
Canada	3.7	0.8	0.7
G-7 countries	47.9	35.8	38.7
Netherlands	3.4	8.0	8.5
Belgium[2]	3.0	5.5	6.2
Total	54.3	49.3	53.4
Other EU countries[3]	7.6	16.8	14.4
Other OECD countries[4]	4.2	12.2	14.0
Rest of world	33.9	21.7	18.2
World	100	100	100
Memo items:			
Euro area	29.2	40.5	43.2
EU countries	37.0	54.5	54.4
OECD countries	66.1	78.3	81.8

Sources: IMF, International Financial Statistics, December 1999; OECD, Monthly Statistics of Foreign Trade, October 1998.

1 World trade defined as average of world imports and world exports. — **2** Including Luxembourg. — **3** Austria, Denmark, Finland, Greece, Ireland, Portugal, Spain and Sweden. — **4** Australia, Iceland, New Zealand, Norway, Switzerland and Turkey.

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2. General structure of the country models

At nearly 120 equations for Germany and around 60 equations for the other countries, the model has deliberately been built in a compact way. Nonetheless, the present version of the model covers all essential aspects of a country's macroeconomic development and contains important monetary and fiscal policy instruments. The model comprises markets for goods, labour and financial assets, i.e. money and foreign exchange assets. Economic agents have been aggregated into the sectors of households, firms, government and foreign countries. Total demand has been disaggregated into private consumption, government demand, private investment (fixed investment and inventory investment), exports and imports. For these components of gross domestic product, the nominal and real development as well as the development of the price deflators belonging to them are each explained in the country models.

The demand side is faced by the supply side with labour force, employment and potential output. The disequilibrium between supply and demand is indicated on the labour market by the unemployment rate and on the goods market by the output gap (capacity utilisation). These disequilibria on the labour and goods markets are seen by themselves as important factors determining the development of wages and prices. The development of wage rates together with the changes in employment are used to derive gross wage income. After deducting direct taxes and social security contributions, what remains is net wage income, which, together with government transfers, forms the most important part of households' disposable income.

Beyond that, indirect taxes and depreciation allowances are considered in the distribution of gross domestic product, which means that the financial balances of households (savings), of government (budget balance), of firms (net lending) and of foreign countries (current account balance) can be derived in the country models. In the financial sector, the country models contain a money demand function and the setting of long-term interest rates and exchange rates of the respective local currency against the US-Dollar, with the exchange rates and interest rates of the currencies which have participated in the exchange rate mechanism of the European Monetary System having been taken into account in a special manner. The monetary sector of the euro area has been specified separately following the launch of the euro in 1999. It replaces the monetary sectors of the individual participating countries. The development of endogenous variables is affected by several economic policy variables, to which the monetary

Sector accounts in the country models*

Table 3

Households

Priv. consumption: CP	Wage income: L Profit income
	National income: VE - Direct taxes and social sec. contributions: TDB
Financial balance: FH	Transfers from government: SB
Disposable income	Disposable income

Firms

Fixed investment: IAN Inventory investment: V	Depreciation allowances: D
	- Transfers to foreign countries: U
Financial balance: FU	

Government

Gov. demand: G	Direct taxes and social security contributions: TDB
Transfers to households: SB	Indirect taxes: TIS
Financial balance: FS	

Foreign countries

Exports: EX - Imports: IM	Transfers to foreign countries: U
	Current account balance: LBS

Income and expenditure

Wage income: L Profit income	Priv. consumption: CP Gov. demand: G
National income: VE Depreciation allowances: D	Fixed investment: IAN Inventory investment: V Exports: EX
Indirect taxes: TIS	Final demand: END - Imports: IM
Gross domestic product: BIP	Gross domestic product: BIP

Financial balances

Households: FH	Foreign countries: LBS
Government: FS	
Firms: FU	

*The model abbreviation is listed alongside the variable for which it stands.

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and fiscal policy instruments belong: real government demand, direct and indirect tax rates and the short-term interest rates which are determined by monetary policy rules. The linkage of the country models takes place through current and capital transactions with foreign countries, meaning that exports and import prices are both exogenous in the single country models but endogenous in the complete model.

It turned out to be extraordinary difficult to obtain the necessary quarterly data. Apart from national statistics, the "Quarterly National Accounts", the "Main Economic Indicators", the "Economic Outlook" and the "Quarterly Labour Force Statistics" of the OECD are the most important sources of data, nevertheless, they had to be checked for internal consistency. They have been supplemented by data from the Bank for International Settlements, the International Monetary Fund and the European Central Bank. The German block of the model is based on data for Germany as a whole from various statistical sources such as national accounts, banking statistics, financial accounts, balance of payments and foreign trade statistics for example. The application of various statistical sources sometimes made it necessary to introduce dummy variables and residual items. Generally the data are seasonally adjusted. But in some cases only annual data are available, they then have to be converted into quarterly data. Moreover, the base year of price deflators is different from one country to the next. Special problems arise from the up-dating at the actual end of the series, which in some cases is only possible with delays. In those cases the data are extrapolated using simple approaches. The time series are analysed by means of several tests on their trend, seasonal and stationarity properties, the idea being to find suitable statistical specifications for the behavioural equations.

The most important behavioural equations on the goods market are the consumption equation, the investment equations, the import equation, the production function (which determines potential output) and the price equations for domestic and export prices. On the labour market the supply of labour force provided by households, the demand of firms and government for employment and the development of wages are explained by behavioural equations. The centre of financial markets is built by the money demand equation, an interest rate equation and the determination of exchange rates on foreign exchange markets.

The economic transactions between the different sectors of the economy have been condensed into a highly aggregated system of income accounts, from which the most important definition equations building the backbone of the country models can be derived. They include, for example, the definition of final demand, gross domestic product, national income and households' disposable income. The distribution and expenditure of gross domestic product are two sides of one and the same coin. The financial balances of households and government, aggregated into total domestic savings, can be derived from the income accounts. They are offset by net investment of firms and the current account balance against foreign countries.

The economic activities of the different sectors are performed in the model on three highly aggregated macro-economic markets: the goods market, the labour market and the financial markets. On each of these markets demand meets supply. The theoretical foundation of the behavioural equations in the country models takes into consideration neo-classical elements as well as Keynesian elements. The time dimension plays an important role in this. In the short run prices and wages are regarded as relatively inflexible and rigid, because they are fixed by contracts or cannot be adjusted without considerable transaction costs either. Volume reactions are therefore of high importance in shorter time horizons and market disequilibria can arise. On goods markets these disequilibria are expressed in an overutilisation or underutilisation of production capacities and on labour markets in unemployment or overemployment.

Generally private agents try to maximise their profits or their utility. This utility or profit maximising behaviour on the part of households and firms causes market forces to be set in motion with corresponding price and wage reactions. In the long run those forces help remove the existing disequilibria. Because it is sometimes assumed in the model that economic agents form their expectations adaptively and react with time lags, it is nevertheless possible for imbalances on the goods and labour markets to continue for longer periods. For the money market as well as for other financial markets, however, it is assumed that arising disequilibria are removed very quickly by the utilisation of arbitrage possibilities or that agents react in a forward-looking manner. Due to the assumed homogeneity of the traded financial products and to the relatively low information and transaction costs, price rigidities on financial markets are neglected and price or interest rate reactions will promptly cause the market to return to a state of equilibrium.

Supply and demand of the economic sectors of the economy meet each other on the different markets. Economic activities of households are extended to goods,

Simplified version of a country model

Table 4

I. Aggregate demand

(1) Private consumption: $\Delta \ln\left(\frac{C}{WO}\right) = \alpha_{C0} + \alpha_{C1}\,\Delta \ln\left(\frac{YV}{p * WO}\right) + \alpha_{C2}\left(r - \pi^{e}\right)$

$$+ \alpha_{C3}\,\Delta \ln\left(\frac{C_{-1}}{WO_{-1}}\right) + \alpha_{C4} \ln\left(\frac{C_{-4}}{Y_{-4} - IM_{-4}}\right)$$

(2) Labour supply: $\ln\left(\frac{E}{WO}\right) = \alpha_{E0} + \alpha_{E1} \ln\left(\frac{E_{-1}}{WO_{-1}}\right)$

(3) Real final demand: $Y = C + I + G + X$

(4) National income: $VE = Y * p - d * K * p - TI - IM * m$

(5) Disposable income: $YV = VE + SB - TD$

II. Aggregate supply

(6) Private investment: $\ln(I) = \alpha_{I0} + \alpha_{I1} \ln(Y) + \alpha_{I2}\left(r - \pi^{e}\right)$

(7) Labour demand: $\ln(A) = \alpha_{A0} + \alpha_{A1} \ln(Y) + \alpha_{A2} \ln\left(\frac{p * (1 - ti)}{w}\right)$

(8) Imports: $\ln(IM) = \alpha_{IM0} + \alpha_{IM1} \ln(Y) + \alpha_{IM2} \ln\left(\frac{p * (1 - ti)}{m}\right)$

(9) Potential output: $\ln\left(Y^{*}\right) = \alpha_{Y^{*}1} + \alpha_{Y^{*}2}\,T + \alpha_{Y^{*}3} \ln(E) + \left(1 - \alpha_{Y^{*}3}\right) \ln(K_{-1})$

(10) Real capital stock: $K = (1 - d) * K_{-1} + I$

III. Factor costs and price deflators

(11) Wage rate: $\Delta \ln(w) = \alpha_{w0} + \alpha_{w1}\,\Delta \ln(w_{-1}) + (1 - \alpha_{w1})\,\Delta \ln(p) + (1 - \alpha_{w1})$

$$* \alpha_{w2}\,\Delta \ln\left(Y^{*}\right) + \alpha_{w3}\,\Delta\left(\frac{E - A}{E}\right) + \alpha_{w4}\left(\frac{E_{-4} - A_{-4}}{E_{-4}}\right)$$

(12) Inflation rate: $\pi = \alpha_{\pi 1}\,\Delta^{2} \ln\left(\frac{co}{1 - ti}\right) + \alpha_{\pi 2}\left[(1 - \phi)\,\pi_{-1} + \phi\left[(1 - \mu)\,\pi_{+1} + \mu\,\hat{\pi}\right]\right]$

$$+ \alpha_{\pi 3} \ln\left(\frac{Y - IM}{Y^{*}}\right) + (1 - \alpha_{\pi 2})\,\Delta \ln\left(p^{*}\right) + \alpha_{\pi 4} \ln\left(\frac{p^{*}_{-4}}{p_{-4}}\right)$$

(13) Adaptive inflation expectations: $\pi^{e} = \beta\,\pi^{e}_{-1} + (1 - \beta)\,\pi_{-1}$

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Simplified version of a country model (cont'd)

Table 4

(14) Production costs: $\ln(co) = \gamma_1 \ln(w) + (1-\gamma_1)\ln(m)$

(15) Price deflator: $\ln(p) = \ln(p_{-4}) + 0.01 * \pi$

IV. Government

(16) Direct taxes: $TD = td * VE$

(17) Indirect taxes: $TI = ti * Y * p$

(18) Government expenditure:

$$\Delta \ln(G) = \alpha_{G1}\,\Delta \ln(G_{-1}) + (1-\alpha_{G1})\,\Delta \ln(Y - IM) + \alpha_{G2} \ln\left(\frac{Y - IM}{Y^*}\right)$$

(19) Transfer payments:

$$\ln\left(\frac{SB}{(Y - IM) * p}\right) = \alpha_{SB0} + \alpha_{SB1} \ln\left(\frac{SB_{-1}}{(Y_{-1} - IM_{-1}) * p_{-1}}\right) + \alpha_{SB2}\,\Delta\left(\frac{E - A}{E}\right)$$

V. Money, interest rates and the exchange rate

(20) Money stock:

$$\ln\left(\frac{M}{p}\right) = \alpha_{M0} + \alpha_{M1} \ln(Y - IM) + \alpha_{M2}\, r$$

(21) Long-term price level:

$$\ln\left(p^*\right) = \ln(M) - \left[\alpha_{M0} + \alpha_{M1} \ln\left(Y^*\right) + \alpha_{M2}\left(\Delta \ln\left(Y^*\right) + \hat{\pi}\right)\right]$$

(22) Short-term interest rate:

$$rs = \alpha_{rs1}\, rs_{-1} + (1-\alpha_{rs1}) * \left[\Delta \ln\left(Y^*\right) + \hat{\pi}\right] + \alpha_{rs2}\,\frac{1}{4}\sum_{1}^{4}\left(\pi_{+i} - \hat{\pi}_{+i}\right) + \alpha_{rs3}\,\frac{1}{4}\sum_{0}^{3}\ln\left(\frac{Y_{-i} - IM_{-i}}{Y^*_{-i}}\right)$$

(23) Long-term interest rate:

$$(1 + 0.01\,r) = (1 + 0.01\,r_{-1})^{(1-\alpha_r)} * (1 + 0.01\,r_{+1})^{\alpha_r} * \left(\frac{1 + 0.01\,rs}{1 + 0.01\left[\Delta \ln\left(Y^*\right) + \hat{\pi}\right]}\right)^{\frac{1}{40}}$$

(24) Exchange rate:

$$\ln(e) = \alpha_{e0} + \alpha_{e1} \ln(e_{-1}) + (1-\alpha_{e1}) \ln\left(\frac{p+1}{pf_{+1}}\right) - (rs - rsf) + \alpha_{e1}\,(rs_{-1} - rsf_{-1})$$

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Simplified version of a country model (cont'd)

Table 4

Variables

The abbreviation of variables in the simplified version is different from that in the complete model.

A	Labour demand (employment)
C	Real private consumption
co	Production costs
d	Depreciation rate (exogenous)
E	Labour supply (labour force)
e	Exchange rate against US-Dollar
G	Real government demand (consumption and investment)
I	Real private investment
IM	Real imports
K	Real private capital stock
M	Money stock
m	Price deflator of imports (exogenous in country model)
p	Price deflator of domestic demand
p^*	Long-term price level
pf	Foreign price deflator of domestic demand (exogenous in country model)
π	Inflation rate
π^e	Adaptive inflation expectations
$\hat{\pi}$	Inflation target (exogenous)
r	Long-term interest rate (government bond yield for ten years)
rs	Short-term interest rate (for three-month funds)
rsf	Foreign short-term interest rate (exogenous in country model)
SB	Transfer payments to households (social benefits)
T	Time (exogenous)
TD	Direct taxes
td	Direct tax rate (explained by autoregression)
TI	Indirect taxes
ti	Indirect tax rate (explained by autoregression)
VE	National income
w	Wage rate
WO	Population (explained by time trend)
X	Real exports (exogenous in country model)
Y	Real final demand
Y^*	Potential output
YV	Disposable income of households

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labour and financial markets. With given preferences, they fix their demand for consumption goods and decide on their labour supply as well as the distribution of their wealth into the different categories of assets, among them the liquid means which are necessary to carry out transactions in goods and services (money demand). Private firms optimise their demand for factors of production and their supply of goods in view of similar aspects. The demand for factors of production consists of capital services, labour demand and the demand for imported inputs. The internal inputs are balanced out by aggregation. Investments are of special importance in macro-economic developments because they form part of aggregate demand and thus determine changes in the real capital stock and aggregate supply possibilities.

The single country models are divided into different blocks by relevant criteria. Although a variety of criteria can be used to justify a given breakdown, and arbitrariness can sometimes result, a certain uniformity has been developed in this respect. First of all, a distinction is made between the real block and the financial block. The real block of the model has been divided into aggregate demand, aggregate supply, the determination of factor costs and prices and the redistribution of income by government. Money and credit demand of households and firms as well as the development of interest rates and exchange rates are included in the financial block. A simplified version of a country model (Table 4) gives a brief overview of the most important relationships covered in the model. This simplified version contains only 24 equations which form the "nucleus" as it were, to which the single country models can be reduced. Table 5 contains an overview of all behavioural and definitional equations in the single blocks of the model. Many of those equations follow from the larger disaggregation of the complete model.

Unlike the behaviour of private economic agents the economic activities of government are not based on optimising assumptions in the model but on other considerations. Government demand (i.e. government consumption and government investment), the demand for labour and the demand of government for financial assets are based more on national and social considerations and are described in the model by simple (reaction) functions. Accordingly, government demand and tax rates are important economic policy instrument variables.

The demand for exported goods plays an important role in the strongly linked, labour-divided economies of the industrial countries. The exports of each country are determined by the weighted sum of all other countries' imports. The weights

Size and block structure of the model

Table 5

Number of equations

Block model		US	JP	GY	UK	FR	IT	CA	NL	BE	EMU	FT	Total
I.	Aggregate demand												
	Behav. equations	4	4	7	4	4	4	4	4	4		9	48
	Def. equations	11	11	22	11	13	13	11	13	13	3	29	150
	Total	15	15	29	15	17	17	15	17	17	3	38	198
II.	Aggregate supply												
	Behav. equations	9	9	16	8	8	9	9	9	8			85
	Def. equations	7	7	21	7	7	7	7	7	7	2		79
	Total	16	16	37	15	15	16	16	16	15	2		164
III.	Factor costs and price deflators												
	Behav. equations	6	6	12	6	6	6	6	5	6		10	69
	Def. equations	6	8	8	6	6	8	6	7	6	2	20	83
	Total	12	14	20	12	12	14	12	12	12	2	30	152
IV.	Government												
	Behav. equations	4	4	10	4	4	4	4	4	4			42
	Def. equations	4	4	11	4	4	4	4	4	4			43
	Total	8	8	21	8	8	8	8	8	8			85
V.	Money, interest rates, exchange rates												
	Behav. equations	3	4	7	3	5	5	4	5	5	5		46
	Def. equations	3	3	4	3	5	5	4	5	5	6		43
	Total	6	7	11	6	10	10	8	10	10	11		89
Complete model													
	Behav. equations	26	27	52	25	27	28	27	27	27	5	19	290
	Def. equations	31	33	66	31	35	37	32	36	35	13	49	398
	Total	57	60	118	56	62	65	59	63	62	18	68	688
	Exogenous variables	5	5	22	5	5	7	7	6	5	1	4	72

Abbreviations: BE: Belgium, CA: Canada, EMU: Euro area, FR: France, FT: Foreign trade, GY: Germany, IT: Italy, JP: Japan, NL: Netherlands, UK: United Kingdom, US: USA.

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are taken from a trade share matrix. By aggregating the demand components private consumption, private investment, government demand and the foreign trade balance, i.e. exports minus imports, gross domestic product can be calculated, which is met on the supply side by potential output. The difference between the supply and demand of goods yields the output gap, which is a measure of disequilibrium. An overutilisation or an underutilisation of production capacities leads to an acceleration or a deceleration, respectively, of the increase of goods prices in the model. The reaction of prices itself contributes to creating a goods market equilibrium in the long run.

The macro-economic labour market shows a structure similar to that of the goods market. The labour supply of households is met by the labour demand of firms and government. The difference of the two variables yields the unemployment rate, which is a measure of the macro-economic disequilibrium on the labour market. Along with other variables, the unemployment rate helps determine the development of wages. Contrary to real economic markets, an equilibrium concept with fast market clearance is assumed for financial markets. For the money market, this implies that money demand and the short-term interest rate are determined in the model, whereas money supply is implicitly given by the equilibrium condition.

Labour, capital and the rate of technological progress determine the real growth and real wealth of a country in the long run. The cyclical fluctuations of macro-economic demand exert a considerable impact on production in the short and medium run, however.

II. Behavioural equations

1. Theoretical basis of specification

The long-run equilibrium relationships which have been developed in economic theory serve as a basis for the specification of the behavioural equations in all countries. Yet empirical estimations then result in clear differences of long-run structural coefficients and dynamic adjustment parameters from one country to the next. In this way homogeneous structural models can be developed which still take into account the country-specific differences in the behaviour and reactions of economic agents.

In the specification of the behavioural equations, dynamic adjustment processes have been frequently assumed to follow an error-correction model. Specifications have been based in this case on long-run economic relationships between different macro-economic variables such as the relationship between the disposable income of households and private consumption, the relationship between production of firms and labour demand, or the relationship between transactions volume and money demand. Temporary deviations from these long-run equilibrium relationships trigger dynamic adjustment processes by which such "errors" are corrected. This method of equation specification ensures that both short-run and long-run aspects of the behaviour of economic agents are taken into consideration. In this manner, the equations show long-run properties which essentially correspond to the propositions of neo-classical economic theory. The development of a variable depends in the long run on the level, but in the short run also on the changes of its factors of determination.

To estimate the coefficients, seasonally adjusted quarterly data are used for the most part. The statistical properties of the variables are in each case analysed by different unit root and cointegration tests. If the dependent variable is characterised by Y and, furthermore, the independent variable by X and if these variables are integrated and cointegrated, then in many cases the estimation is based on the following error-correction model:[10]

$$\ln Y = \alpha_0 + \alpha_1 \ln X + Y\_EC$$

$$\Delta \ln Y = \sum_{i=1}^{m} \beta_{1i} \Delta \ln Y_{-i} + \sum_{j=0}^{n} \beta_{2j} \Delta \ln X_{-j} + \beta_3 Y\_EC_{-4}.$$

In this equation the difference operator is defined as $\Delta Y = Y - Y_{-4}$ and the natural logarithm is represented by ln. The expression $\Delta \ln Y$ is therefore the relative change in the variable Y against the corresponding quarter of the previous year. The long-run equilibrium is described by the error-correction term EC. The adjustment process is stable if the coefficient β_3 is negative. This coefficient measures to which extent deviations from equilibrium ("errors"), which have

10 Engle, R. F. and Granger, C. W. J., Cointegration and Error Correction: Representation, Estimation, and Testing, Econometrica, 55, 1987.

arisen in the previous quarter, will be corrected in the current quarter. Beyond that, the velocity of adjustment is influenced by the coefficients β_{1i} and β_{2j}. Cointegration exists, if the adjustment coefficient β_3 with the "right" sign is significantly different from zero.

2. Aggregate demand

2.1. Private consumption

Real private consumption expenditure is generally assumed to be proportional to households' real disposable income, thus implying a constant consumption or savings ratio. In the past, however, the development of the consumption ratio has varied from one country to the next. In some countries, such as the USA, the United Kingdom, Italy and Canada, the consumption ratio has increased in recent years. By contrast, in other countries the consumption ratio has remained constant over the long run.

Apart from the indeterminate development of the consumption ratio in the past, tying real consumption expenditures in the long run to real disposable income is not compatible with the steady-state solution of the model, either. In the steady-state, the growth rate of nominal disposable income is equal to nominal GDP growth. The deflator for private consumption is tied to the central price equation of the model. This does not apply to the GDP deflator[11], which implies that real disposable income is not proportional to real GDP. With real consumption as the main component of GDP, this would lead to an unstable steady-state solution. This necessitated an error-correction mechanism which ensures that real private consumption is proportional to real GDP in the long run.

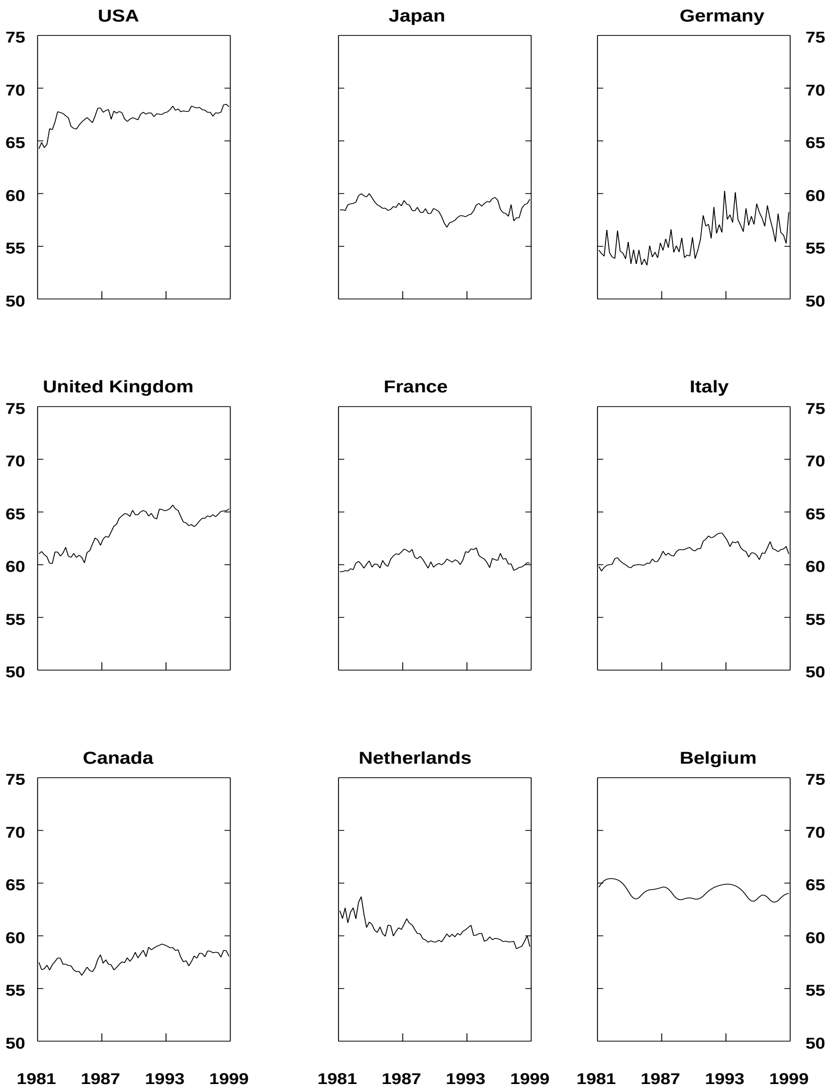
It is questionable to which extent effects of interest rate changes and the resulting influences of the valuation of assets on consumption behaviour can be estimated empirically. In the long run, real interest rates will be stationary and therefore will have no impact on changes in consumption. The short-run influence of interest rates on consumption behaviour is difficult to determine because the real interest

11 The GDP deflator is calculated as the ratio of nominal to real GDP. The deflators of all domestic GDP components are proportional to the overall price deflator of domestic demand, which is the central price in the model. But since import and export price inflation do not coincide with overall inflation, the GDP deflator is not proportional to the price deflator of domestic demand, either.

Consumption ratio from 1981 to 1998

Chart 1

Real private consumption in per cent of real GDP



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Consumption equation

Table 6

Real private consumption per capita

$$\Delta \ln\left(\frac{CPR}{WOBE}\right) = \alpha_0 + \alpha_1 \Delta \ln\left(\frac{100 * YV}{PCP * WOBE}\right) + \alpha_2 * 0.01 (RL - PCPD) + \alpha_3 \Delta \ln\left(\frac{CPR_{-1}}{WOBE_{-1}}\right) + \alpha_4 \ln\left(\frac{CPR_{-4}}{BIPR_{-4}}\right)$$

Estimation period: 1975 / 1 - 1997 / 4

Data base: March 1999

Country	α_0	α_1	α_2	α_3	α_4	$\bar{R}^2$	DW
USA	-0.01	0.27	-0.14	0.67	-0.03	0.78	1.67
	(0.21)	(3.86)	(2.32)	(9.74)	(0.55)		
Japan	-0.06	0.36	-0.13	0.55	-0.12	0.47	1.86
	(1.15)	(4.58)	(1.97)	(7.35)	(1.27)		
United Kingdom[1]	-0.04	0.31	-0.34	0.48	-0.17	0.70	2.14
	(2.31)	(4.20)	(3.35)	(6.66)	(3.31)		
France	-0.16	0.46	-0.12	0.35	-0.31	0.71	1.53
	(5.91)	(6.47)	(2.03)	(4.70)	(6.08)		
Italy	-0.02	0.15	-0.07	0.73	-0.05	0.86	0.53
	(12.17)	(3.53)	(2.33)	(13.06)			
Canada	-0.11	0.07	-0.24	0.73	-0.23	0.70	1.90
	(2.39)	(1.20)	(3.19)	(10.83)	(2.63)		
Netherlands[2]	-0.08	0.15	-0.08	0.54	-0.18	0.69	2.34
	(3.18)	(2.82)	(0.90)	(6.64)	(3.43)		
Belgium	-0.06	0.04	-0.05	0.84	-0.14	0.84	0.42
	(2.01)	(1.39)	(1.54)	(16.99)	(2.18)		

1 Weighted average of nominal short- and long-term interest rates used.
2 Estimation period: 1979 / 1 - 1997 / 4

BIPR	Real gross domestic product
CPR	Real private consumption
PCP	Price deflator of private consumption
PCPD	Expected inflation rate of private consumption
RL	Yield on government bonds
WOBE	Population
YV	Disposable income of households
Δ	Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$	Adjusted coefficient of determination
DW	Durbin Watson Statistic
	t-values below coefficients

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rates and the expected inflation rates cannot be observed directly. However, the long-term real interest rate is included into all estimated consumption equations. If real private consumption is expressed as CPR, disposable income as YV, the price deflator and private consumption as PCP, total population as WOBE, the yield on ten-year government bonds as RL and the expected inflation rate as PCPD, then the consumption behaviour of households per capita, taking into account dynamic adjustment to long-run equilibrium, can be described as follows:

$$\Delta \ln\left(\frac{CPR}{WOBE}\right) = \alpha_0 + \alpha_1 \Delta \ln\left(\frac{100 * YV}{PCP * WOBE}\right) + \alpha_2 * 0.01 \left(RL - PCPD\right)$$
$$+ \alpha_3 \Delta \ln\left(\frac{CPR_{-1}}{WOBE_{-1}}\right) + \alpha_4 \ln\left(\frac{CPR_{-4}}{BIPR_{-4}}\right).$$

In the long run this is equivalent to

$$\ln(CPR) = -\frac{\alpha_0}{\alpha_4} + \ln(BIPR) - \frac{\alpha_2}{\alpha_4} 0.01(RL - PCPD) .$$

This implies a constant consumption ratio in the steady-state. The velocity of adjustment is estimated to be low in the USA and Italy and high in France and Canada. The estimates of the long-run semi-interest elasticity of private consumption range from – 0.4 in France, Belgium and the Netherlands to more than – 4 in the USA, where private financial wealth plays an important role.

The consumption equation for Germany follows a two-step error-correction specification. On top of the influences which were accounted for in the other countries, consumption in Germany is also dependent on net financial wealth of households (NGVH) and transfers from households to foreign countries (VERR). With LN being the net wage income and TRN the transfer payments to households, the consumption equation in Germany is specified as

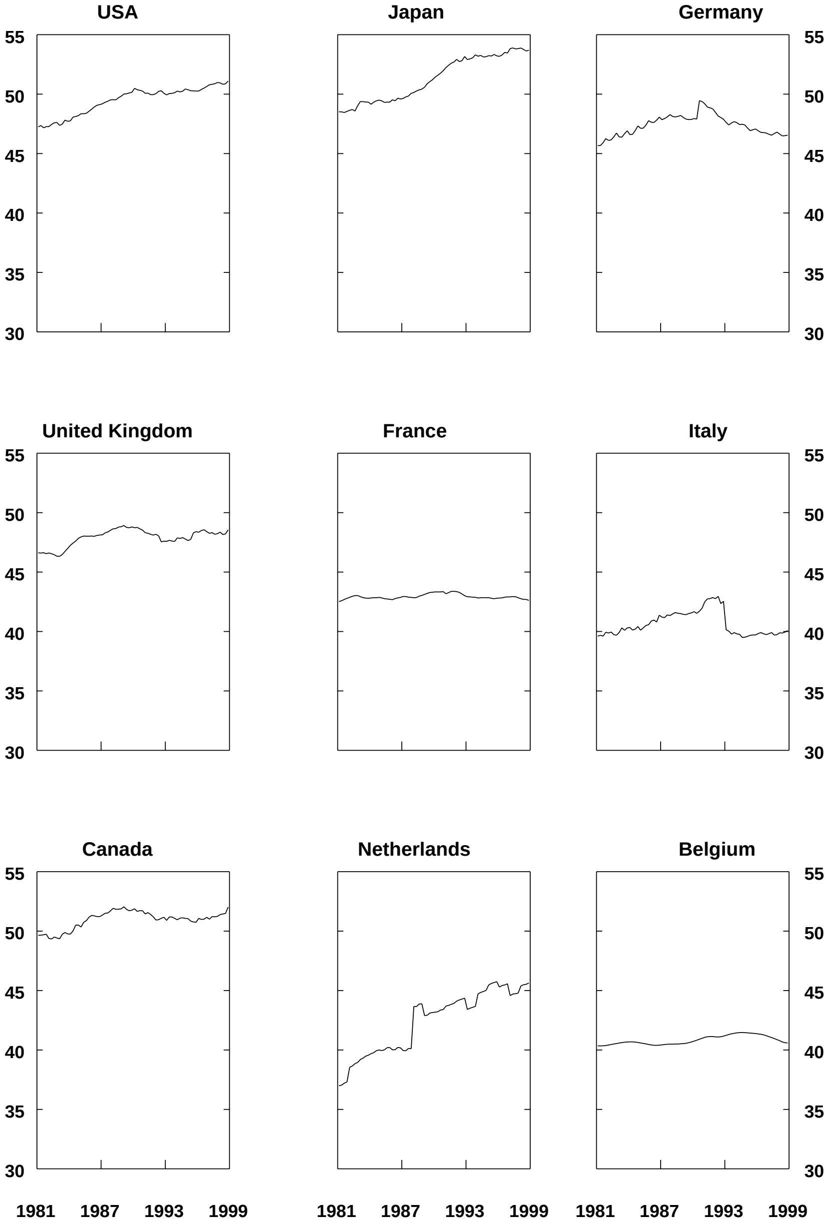
$$\ln\left(\frac{CPR}{WOBE}\right) = \alpha_0 + \alpha_1 \ln\left(\frac{LN + TRN}{PCP * WOBE}\right) + (1 - \alpha_1)\ln\left(\frac{GNEH - VERR - 0.25 * 0.4 * PCPD * NGVH_{-1}}{PCP * WOBE}\right)$$
$$+ CPR\_EC$$

$$\Delta \ln\left(\frac{CPR}{WOBE}\right) = \beta_0 + \beta_1 \Delta \ln\left(\frac{LN + TRN}{PCP * WOBE}\right) + \beta_2 \Delta \ln\left(\frac{GNEH - VERR - 0.25 * 0.4 * PCPD * NGVH_{-1}}{PCP * WOBE}\right)$$
$$+ \beta_3 (0.01RL - PCPD) + \beta_4 \Delta \ln\left(\frac{CPR_{-1}}{WOBE_{-1}}\right) + \beta_5 CPR\_EC_{-4}.$$

Labour participation rate from 1981 to 1998

Chart 2

Labour force in per cent of total population



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2.2. Labour supply

The consumption expenditure of households is financed in large part by wage income, which makes up more than half of disposable income in all countries. In order to earn wage income households offer their labour services. Labour supply of households, i.e. the total labour force, is proportional to population in the long run, which implies constant participation rates in the long run. In the estimation period they changed considerably, partly for statistical reasons. The adjustment of labour supply to changes in the employable population, by migration for example, is considerably slow, which means participation rates can change over the short to medium term.

In the German block of the model a utility-maximising approach has been specified, where households endeavour to realise the optimal combination of labour and leisure. Apart from the population (and its age structure), real net income per employed person is a determinant for labour supply of households in this country model.

3. Aggregate supply

3.1. Fixed and inventory investment

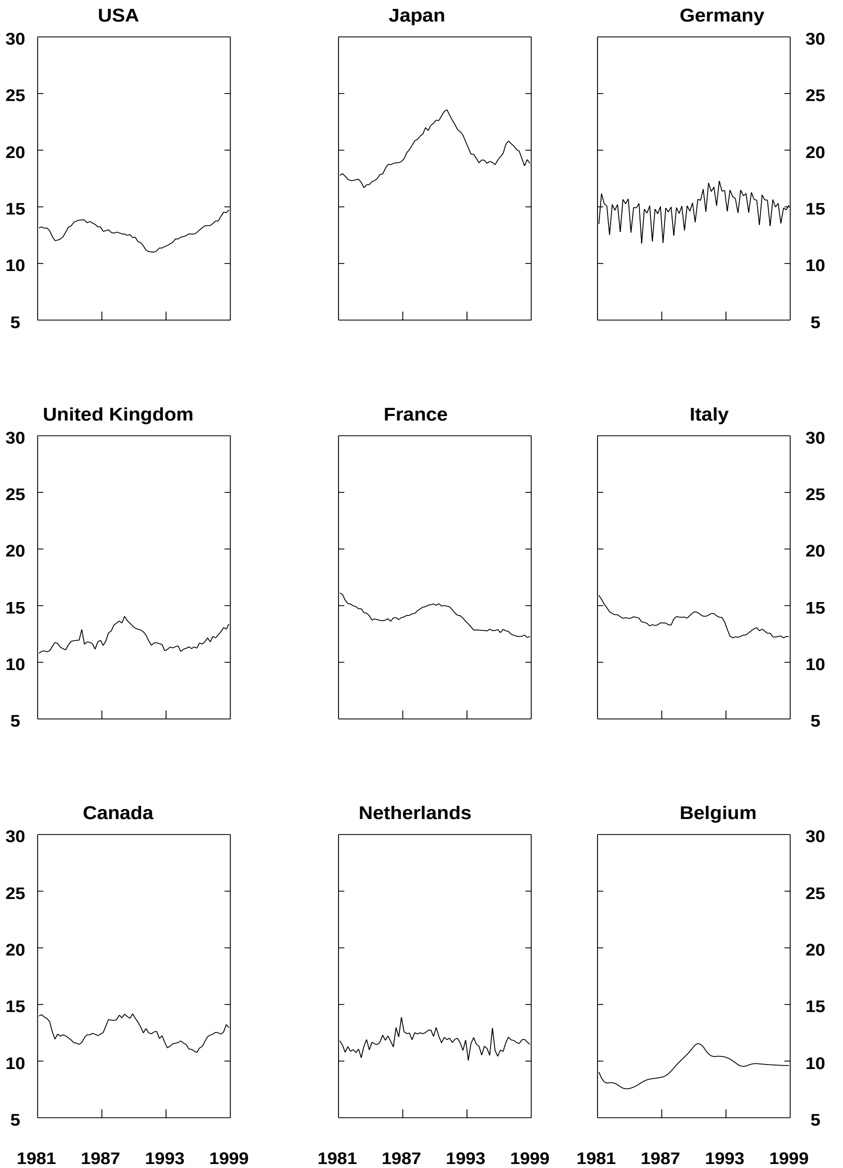
Real investment expenditure is based on profit-maximising behaviour on the part of firms. It is conveniently assumed that the macro-economic production function can be represented by a Cobb-Douglas production technology. Investment expenditure serves to adjust the real capital stock to its optimal long-run level. Given existing technologies and endowments and a constant real capital stock in the short run, firms determine the profit-maximising allocation of their factors of production.

If the production of goods, i. e. real final demand, is abbreviated as ENDR, the real capital stock as KRP, employment as E1, imported inputs as IMR and a time trend as T, then this leads to the following Cobb-Douglas production function:

$$ENDR = \alpha_0 \, e^{\alpha_1 T}\left(KRP^{\alpha}\, E1^{\beta}\, IMR^{\gamma}\right) \qquad \text{with } \alpha + \beta + \gamma = 1.$$

“Investment ratio” from 1981 to 1998 Chart 3

Real gross private fixed investment in per cent of real final demand



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Investment equation

Table 7

Real private fixed investment

Long-term co-integrated equation

$$\ln(IANR) = \alpha_0 + \alpha_1 \ln(ENDR) + \alpha_2 * 0.01(RL - PEVD) + IANR\_EC$$

Short-term error-correction equation

$$\Delta \ln(IANR) = \beta_1 \Delta \ln(ENDR) + \beta_2 * 0.01 \Delta(RL - PEVD) + \beta_3 \Delta \ln(IANR_{-1}) + \beta_4 IANR\_EC_{-4}$$

Estimation period: long-term: 1974 / 1 – 1997 / 4, short-term: 1975 / 1 – 1997 / 4

Data base: March 1999

Country	α_0	α_1	α_2	β_1	β_2	β_3	β_4	$\bar{R}^2_{lt}$	$\bar{R}^2_{st}$	DW_{lt}	DW_{st}
USA[1]	-1.95	0.98		0.66	-0.28	0.66	-0.20	0.90	0.92	0.08	1.02
	(8.14)	(29.96)		(6.51)	(1.63)	(13.86)	(4.89)				
Japan[1]	-1.53	1.00	-1.97	0.56	-0.10	0.67	-0.11	0.18	0.90	0.07	1.57
	(55.41)		(4.71)	(5.85)	(1.08)	(13.07)	(3.54)				
Germany	-4.71	1.30		1.21	-0.41	0.49	-0.10	0.88	0.84	2.01	1.80
	(14.68)	(26.58)		(6.97)	(3.05)	(7.47)	(2.70)				
United	-2.31	1.04	-0.30	0.73	-0.15	0.51	-0.29	0.92	0.80	0.27	1.82
Kingdom[1, 2]	(13.45)	(31.49)		(5.42)	(0.57)	(7.55)	(4.44)				
France[1]	-1.63	1.00	-0.02	0.49	-0.20	0.67	-0.09	0.16	0.87	0.06	1.60
	(89.66)		(4.41)	(5.57)	(3.61)	(13.26)	(3.96)				
Italy[1]	1.37	0.44	-0.55	0.34	-0.07	0.68	-0.23	0.73	0.88	0.11	0.87
	(7.09)	(14.00)	(3.05)	(4.88)	(0.65)	(14.56)	(4.44)				
Canada	-2.93	1.17	-1.00	0.45	-0.83	0.73	-0.15	0.91	0.83	0.09	1.26
	(14.54)	(30.22)		(3.53)	(2.52)	(10.20)	(3.29)				
Nether-	-1.80	1.00		1.00		0.50	-0.71	0.00	0.29	1.09	2.42
Lands[3]	(246.30)						(5.55)				
Belgium	-2.09	0.97		0.44	-0.09	0.80	-0.09	0.67	0.89	0.02	0.43
	(3.84)	(13.80)		(4.47)	(0.41)	(19.41)	(3.88)				

1 Exact specification varies. Please refer to model documentation.

2 Estimation period: long-term: 1975 / 1 - 1997 / 4, short-term: 1976 / 1 – 1997 / 4

3 Estimation period: long-term: 1977 / 1 - 1997 / 4, short-term: 1979 / 1 – 1997 / 4

ENDR	Real final demand
IANR	Real private fixed investment
PEVD	Expected inflation rate of final demand
RL	Yield on government bonds
Δ	Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$	Adjusted coefficient of determination
DW	Durbin Watson Statistic
	t-values below coefficients

Deutsche Bundesbank

Investment equation

Table 8

Real inventory investment

$VR = \alpha_0 + \alpha_1 VR_{-1} + \alpha_2 \Delta ENDR$

Estimation period: 1975 / 1 – 1997 / 4
Data base: March 1999

Country	α_0	α_1	α_2	$\bar{R}^2$	DW
USA[1]	0.002 (2.88)	0.60 (7.18)		0.36	1.71
Japan	0.06 (1.35)	0.49 (5.82)	0.04 (3.84)	0.45	2.30
Germany	-24.75 (16.09)	0.30 (2.91)	0.05 (2.61)	0.92	2.10
United Kingdom	-0.38 (3.04)	0.26 (2.72)	0.12 (5.48)	0.47	2.13
France	-1.85 (2.83)	0.55 (8.20)	0.14 (6.30)	0.62	2.23
Italy	0.46 (1.81)	0.22 (2.52)	0.16 (6.80)	0.50	1.85
Canada[1]	0.00 (0.81)	0.70 (9.82)		0.51	2.01
Netherlands[2]	0.31 (1.36)	0.24 (2.26)	0.04 (1.16)	0.06	2.06
Belgium	-0.91 (2.26)	0.81 (15.22)	0.02 (3.46)	0.77	0.44

1 Equation: $\frac{VR}{ENDR_{-1}} = \alpha_0 + \alpha_1 \frac{VR_{-1}}{ENDR_{-2}}$

2 Estimation period: 1978 / 1 – 1997 / 4

VR — Real inventory investment
ENDR — Real final demand

Δ — Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$ — Adjusted coefficient of determination
DW — Durbin Watson Statistic
t-values below coefficients

Deutsche Bundesbank

In this equation α denotes the production elasticity of capital, β the production elasticity of labour, λ the production elasticity of imported inputs and α_1 the autonomous rate of technical growth. Enterprises' profits (Q) result in the model from sales less the usage costs for the factors of production, i.e. labour, capital and imported inputs[12]. With sales prices being abbreviated as PEV, the wage rate as LA, the number of employed persons as E1, the user costs of capital as CC and import prices as PIM, profits can be defined as:

$$Q = ENDR * PEV\,(1-0.01 * TISS) - E1 * LA - KRP * CC - IMR * PIM.$$

This takes into account the fact that the average indirect tax rate TISS is levied on sales. From the profit-maximising behaviour of firms it follows that the marginal return of capital has to be equal to its marginal costs:

$$\frac{\partial ENDR}{\partial KRP} = \alpha \frac{ENDR}{KRP} = \frac{CC}{PEV\,(1-0.01 * TISS)}.$$

The long-run optimal stock of real capital then follows from:

$$KRP = \alpha\, ENDR \frac{PEV\,(1-0.01 * TISS)}{CC}.$$

The user costs of capital comprise the expected long-term real interest rate after taxes, the depreciation rate, the investment prices and a risk premium. The optimal stock of capital increases with higher production or sales, and it decreases with higher user costs of capital.

In the theoretical framework set out above, there is a problem regarding statistical underpinning. The available data provides no evidence of a long-run effect of the user costs of capital on the capital stock. It follows from above that the change in the capital stock is linearly dependent on final demand. The long-term investment function is thus estimated as:

$$\ln\,(IANR) = \alpha_0 + \alpha_1 \ln\,(ENDR) + \alpha_2 * 0.01\,(RL - PEVD) + IANR\_EC,$$

12 The inclusion of all imports in the profit function implies that only firms are importing goods and services. Although there is a small amount of imports by households, most imports are likely to be carried out through dealers who belong to the business sector.

with the user costs of capital approximated by real long-term interest rates. In some cases the coefficient α_1 has been restricted to 1. The estimated values range from 0.44 for Italy to 1.30 for Germany.

The short-run adjustment to equilibrium values takes the influence of long-term real interest rates into account, too. This leads to the following error-correction equation:

$$\Delta \ln(IANR) = \beta_1 \Delta \ln(ENDR) + \beta_2\, 0.01\, \Delta(RL-PEVD) + \beta_3 \Delta \ln(IANR_{-1}) + \beta_4\, IANR\_EC_{-4}.$$

Real inventory investments depend dynamically on the quarter-on-quarter changes in real final demand:

$$VR = \alpha_0 + \alpha_1 VR_{-1} + \alpha_2 \Delta_4 ENDR.$$

It was not possible to estimate empirically any effect of the user costs of capital or of the interest rate development.

Firms react to economic fluctuations through pro-cyclical changes in their stock of inventories. If real final demand rises, they increase their inventories in order to react flexibly to variations in sales when the demand increases. Theoretically, anti-cyclical reactions are also conceivable, where the stock of inventories is initially be reduced with production unchanged, because it is uncertain whether a sudden increase in demand is temporary or permanent.

3.2. Employment

From the assumptions regarding production technology and behaviour of firms it follows that the relationship between labour income and sales proceeds, which can be interpreted as "wage share" with respect to final demand[13], is constant in the long run. The "wage share" calculated in this manner is relatively stable over shorter time periods in most countries.[14] In accordance with the profit-maximising behaviour of firms, the optimal demand for labour results from the marginal productivity condition, implying that the marginal return from labour input has to

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13 The wage share used here is different from the usual definition which is the ratio of gross wage income to national income.

14 Data for Germany are not seasonally adjusted and therefore vary considerably over the short term.

be equal to its marginal cost. If the number of employed persons is E1, the production of goods, i. e. real final demand, ENDR, sales prices PEV and gross wage income per employed person LA, it holds under these assumptions that

$$\frac{\partial ENDR}{\partial E1} = \frac{LA}{PEV(1 - 0.01 * TISS)} = \beta \frac{ENDR}{E1} .$$

The production elasticity of labour, or the long-run "wage share" β, is assumed to be constant in this equation. The labour demand equation then is

$$E1 = \beta \, ENDR \, \frac{PEV(1 - 0.01 * TISS)}{LA}.$$

An indirect tax rate TISS is levied on production revenues. An increase in indirect taxes leads, ceteris paribus, to a reduction in employment. The estimation is based on the following long-run labour demand equation

$$\ln(E1) = \alpha_0 + \alpha_1 \ln(ENDR) + \alpha_2 \ln\left(\frac{PEV * (1 - 0.01 * TISS)}{LA}\right) + E1\_EC.$$

The restriction $\alpha_1 = \alpha_2$ which is derived from production theory can only partly be assumed to hold. The estimated values for α_1 lie between 0.2 for France and Italy and 0.8 for the USA. The estimated long-run real wage elasticity of labour demand is slightly lower in most cases. The dynamic adjustment to long-run optimal labour demand follows an error-correction equation

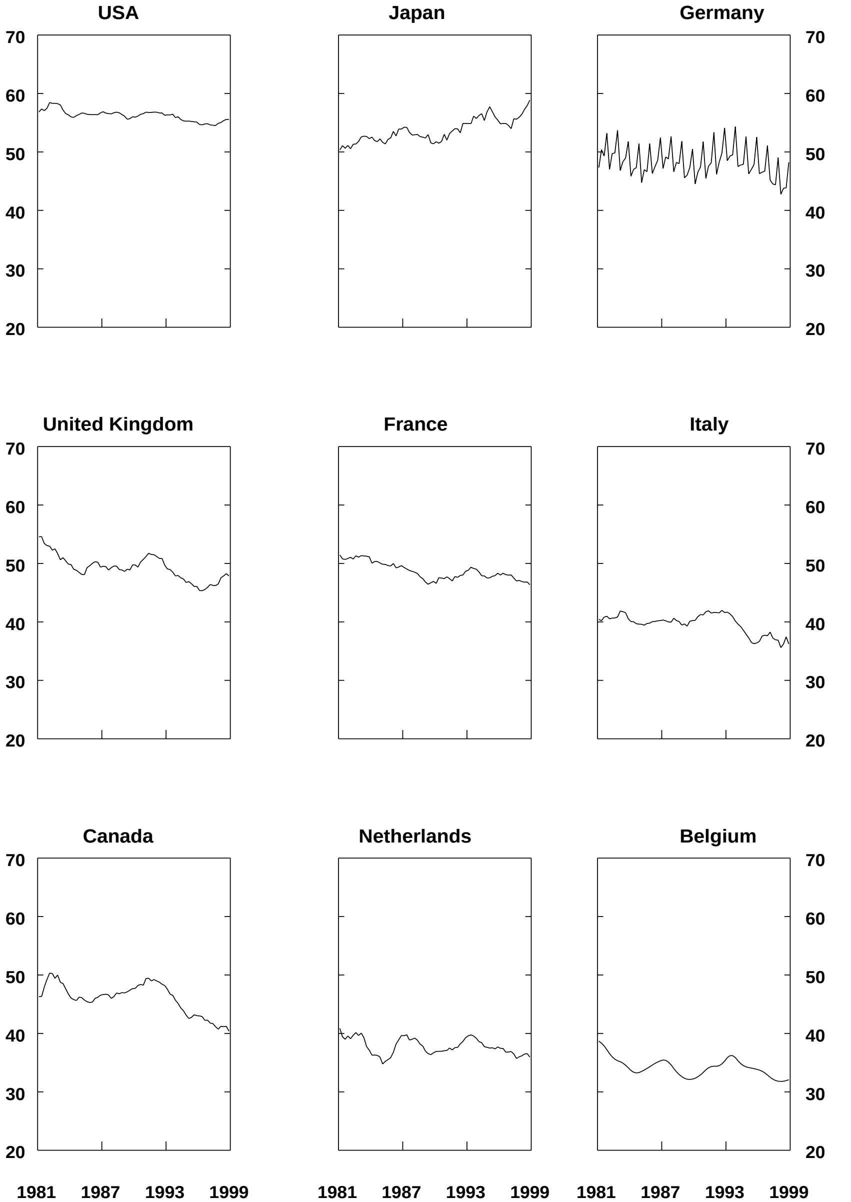
$$\Delta \ln(E1) = \beta_1 \, \Delta \ln(ENDR) + \beta_2 \, \Delta \ln\left(\frac{PEV * (1 - 0.01 * TISS)}{LA}\right) + \beta_3 \, \Delta \ln(E1_{-1}) + \beta_4 \, E1\_EC_{-4}.$$

The interdependence between labour supply and demand in this form is merely given through wages. But wages will only eliminate any discrepancy between supply and demand if labour markets work properly. In some industrial countries unemployment has risen considerably over the past two decades. It is widely argued that wages are only a small factor in that development. It would therefore be inappropriate to model wages as a function of the unemployment rate itself. For that reason the model uses the deviations from an exponentially smoothed unemployment rate as the determining factor of wages. In order to avoid an

"Wage share" from 1981 to 1998

Chart 4

Gross wage income in per cent of nominal final demand



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Labour demand equation

Table 9

Number of employed persons

Long-term co-integrated equation

$\ln(E1) = \alpha_0 + \alpha_1 \ln(ENDR) + \alpha_2 \ln(PEVLA) + E1\_EC$

Short-term error-correction equation

$\Delta \ln E1 = \beta_1 \Delta \ln(ENDR) + \beta_2 \Delta \ln(PEVLA) + \beta_3 \Delta \ln(E1_{-1}) + \beta_4 E1\_EC_{-4}$

Estimation period: long-term: 1974 / 1 - 1997 / 4, short-term: 1975 / 1 - 1997 / 4
Data base: March 1999

Country	α_0	α_1	α_2	β_1	β_2	β_3	β_4	$\bar{R}^2_{lt}$	$\bar{R}^2_{st}$	DW_{lt}	DW_{st}
USA	-1.27	0.82	0.72	0.39	0.24	0.45	-0.21	0.99	0.98	0.32	1.14
	(10.15)	(47.57)	(13.87)	(15.23)	(6.32)	(11.81)	(3.80)				
Japan	2.70	0.30		0.09		0.64	-0.22	0.99	0.92	0.25	2.12
	(192.77)	(97.96)		(5.65)		(11.13)	(3.94)				
Germany[1]	-0.99	0.52	0.72	0.17	0.24	0.55	-0.29	0.98	0.97	0.41	1.50
	(3.16)	(10.78)	(13.40)				(3.85)				
United Kingdom	1.13	0.40	0.40	0.11	0.08	0.80	-0.10	0.67´	0.96	0.10	1.09
	(7.51)	(13.85)		(7.43)	(5.74)	(27.70)	(3.79)				
France	1.79	0.19	0.13	0.19	0.13	0.39	-0.35	0.85	0.75	0.08	0.35
	(12.38)	(8.68)	(4.63)	(12.64)	(6.82)	(7.25)	(5.91)				
Italy	1.80	0.21	0.18	0.20	0.13	0.44	-0.24	0.29	0.34	0.08	0.71
	(4.64)	(3.15)	(2.02)	(4.74)	(2.10)	(4.58)	(4.14)				
Canada	-0.72	0.61	0.23	0.26	0.09	0.59	-0.07	0.96	0.94	0.05	1.43
	(5.82)	(25.88)	(3.55)	(8.66)	(3.00)	(11.65)	(1.99)				
Netherlands[2]	-0.78	0.47	0.12	0.28		0.12	-0.83	0.99	0.93	0.46	0.69
	(8.80)	(26.41)	(5.01)	(7.62)		(2.72)	(7.39)				
Belgium[3]				-0.16	-0.003	0.98			0.99		0.10
				(5.34)	(2.05)	(202.16)					

1 Total hours worked
2 Estimation period: long-term: 1977 / 1 – 1997 / 4, short-term: 1978 / 2 – 1997 / 4
3 Equation: $\ln(E1) = \beta_1 + \beta_2 T + \beta_3 \ln(E1_{-1}) + (1 - \beta_3) \ln(ENDR * PEVLA)$

E1	Number of employed persons	Δ	Difference operator: $\Delta x = x - x_{-4}$
ENDR	Real final demand	$\bar{R}^2$	Adjusted coefficient of determination
LA	Gross wage income per employed person	DW	Durbin Watson Statistic
PEV	Price deflator of final demand		t-values below coefficients
PEVLA	Price ratio between domestic demand deflator and wage rate, defined as: $\frac{PEV(1 - 0.01 * TISS)}{LA}$		
TISS	Indirect tax rate		

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excess demand situation with negative unemployment there is an additional term in the above equation, which reduces labour demand in such a situation[15].

The adjustment of actual employment to long-run optimal labour demand, which is determined by the level of production, real wages and indirect taxation, is relatively sluggish in many cases. This may be due to the fact that firms react to changes in production or demand initially by adjusting average working hours, such as overtime hours, before adjusting the number of employed persons. However, statistical data on working hours are not available for all countries. In the model for Germany the distribution of labour demand on the number of employed persons and the average working time has been specified separately. Considerable rigidities on the labour market are caused by institutional regulations, such as those governing protection against dismissal, and by considerable adjustment costs with respect to the recruitment, training and dismissal of employees.

3.3. Imports

The import equation has been specified as a factor demand equation similar to the investment equation and the employment equation described in the previous sections. It results from the assumed production technology and the optimisation behaviour of firms, which implies that the marginal product of imported inputs has to be equal to its marginal costs. If real imports are denoted by IMR, real final demand by ENDR, import prices by PIM and the price deflator of final demand by PEV, then

$$\frac{\partial \mathrm{ENDR}}{\partial \mathrm{IMR}} = \frac{\mathrm{PIM}}{\mathrm{PEV}\left(1 - 0.01 * \mathrm{TISS}\right)} = \gamma \frac{\mathrm{ENDR}}{\mathrm{IMR}} .$$

Under these conditions the long-run optimal value of imports is given by

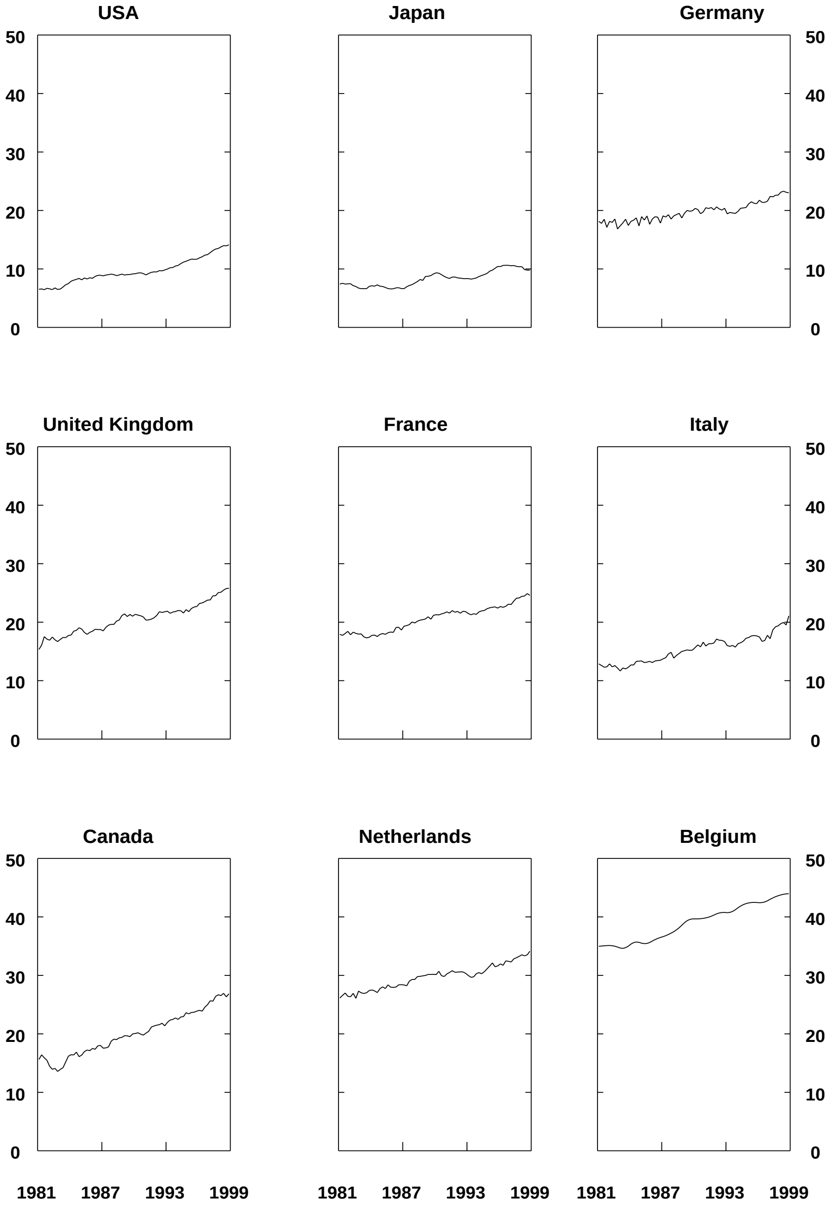
$$\mathrm{IMR} = \gamma\ \mathrm{ENDR} \frac{\mathrm{PEV}\left(1 - 0.01 * \mathrm{TISS}\right)}{\mathrm{PIM}} .$$

15 The exact term is $\min\left[0, \lambda * \ln\left(\frac{0.97\ \mathrm{EW}}{\mathrm{E1}}\right)\right]$, where EW is labour supply and λ is an adjustment factor which in most countries equals unity.

"Import ratio" from 1981 to 1998

Chart 5

Real imports of goods and services in per cent of real final demand



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Import equation

Table 10

Real imports of goods and services

Long-term co-integrated equation

$$\ln(IMR) = \alpha_0 + \alpha_1 \ln(ENDR) + \alpha_2 \ln(PEVPIM) + IMR\_EC$$

Short-term error-correction equation

$$\Delta \ln(IMR) = \beta_1 \Delta \ln(ENDR) + \beta_2 \Delta \ln(PEVPIM) + \beta_3 \Delta \ln(IMR_{-1}) + \beta_4 IMR\_EC_{-4}$$

Estimation period: long-term: 1974 / 1 - 1997 / 4, short-term: 1975 / 1 – 1997 / 4
Data base: March 1999

Country	α_0	α_1	α_2	β_1	β_2	β_3	β_4	$\bar{R}^2_{lt}$	$\bar{R}^2_{st}$	DW_{lt}	DW_{st}
USA	-2.20	1.00	1.58	1.13	0.30	0.47	-0.09	0.85	0.91	0.19	1.35
	(143.73)		(23.30)	(7.59)	(4.20)	(8.36)	(2.19)				
Japan	-2.46	1.00	0.30	0.38	0.06	0.70	-0.20	0.40	0.86	0.08	1.55
	(197.59)		(8.07)	(2.87)	(1.78)	(11.12)	(4.13)				
Germany	-1.84	1.04	1.04	0.33	0.33	0.59	-0.21	0.95	0.78	0.16	1.95
	(5.31)	(18.96)		(5.03)		(9.53)	(4.19)				
United Kingdom[1]	β_0 : -0.35	β_5 :	-0.07	0.29	0.27	1.58	0.27	1.58	0.82		1.54
	(3.59)		(1.16)	(4.79)	(5.08)	(10.04)	(5.08)	(10.04)			
France[2]				0.15	0.003	0.71			0.60		1.47
				(2.06)	(0.09)	(11.36)					
Italy	-5.23	1.57	0.22	1.73	0.05	0.07	-0.52	0.98	0.86	0.44	1.00
	(14.31)	(25.97)	(3.82)	(11.23)	(0.84)	(1.06)	(5.59)				
Canada	-1.52	1.00	1.00	0.48	0.68	0.60	-0.37	0.72	0.85	0.29	1.21
	(209.22)			(2.12)	(5.87)	(6.00)	(4.90)				
Nether-Lands[3]	-1.11	1.00	0.67	1.31	0.20	0.09	-0.39	0.78	0.94	0.26	1.23
	(135.90)		(16.71)	(14.83)	(4.28)	(1.63)	(6.11)				
Belgium	-0.94	1.00	0.66	0.91	0.14	0.45	-0.04	0.35	0.94	0.02	0.31
	(97.59)		(7.16)	(9.26)	(2.97)	(7.63)	(1.53)				

1 Equation : $\Delta \ln(IMR) = \beta_0 + \beta_1 \Delta \ln(IMR_{-1}) + \beta_2 \Delta \ln(ENDR) + \beta_3 \ln(PEVPIM_{-4}) + \beta_4 [\ln(ENDR_{-4}) - \ln(IMR_{-4})] + \beta_5 \ln\left(\frac{IMR_{-4}}{EXR_{-4}}\right)$

2 Equation : $\Delta \ln(IMR) = \beta_1 \Delta \ln(PEVPIM) + \beta_2 \Delta \ln(IMR_{-1}) + \beta_3 \ln(PEVPIM_{-4}) + (1-\beta_2) \Delta \ln(EXR)$

3 Estimation period: long-term: 1978 / 1 – 1997 / 4, short-term: 1979 / 1 - 1997 / 4

ENDR Real final demand
EXR Real exports
IMR Real imports
PEV Price deflator of final demand
PEVPIM Price ratio between domestic demand deflator and import price deflator, defined as: $\frac{PEV(1 - 0.01 * TISS)}{PIM}$
PIM Price deflator of imports

TISS Indirect tax rate
Δ Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$ Adjusted coefficient of determination
DW Durbin Watson Statistic
t-values below coefficients

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The parameter γ represents the production elasticity of imported inputs. It is equal to the average "import ratio", with respect to real final demand, which has, however, increased in most countries. The import ratio in the past has been between around 10 % for the USA and Japan and more than 40 % for Belgium. The estimation of the long-run import equation is based on the following specification:

$$\ln(IMR) = \alpha_0 + \alpha_1 \ln(ENDR) + \alpha_2 \ln\left(\frac{PEV * (1 - 0.01 * TISS)}{PIM}\right) + IMR\_EC.$$

Nevertheless, in most countries a unit elasticity of imports with respect to final demand, i.e. $\alpha_1=1$, is required for feasible long-run solutions. The estimated relative import price elasticities range from 0.2 in Italy to 1.6 in the United States.

The development of actual real imports adjusts in an error-correction process to the long-run optimal import level as follows:

$$\Delta\ln(IMR) = \beta_1 \Delta\ln(ENDR) + \beta_2 \Delta\ln\left(\frac{PEV * (1 - 0.01 * TISS)}{PIM}\right) + \beta_3 \Delta\ln(IMR_{-1}) + \beta_4 IMR\_EC_{-4}.$$

The adjustment process has been estimated to be relatively slow in the USA and Belgium and relatively rapid in Italy, the Netherlands and Canada.

3.4. Potential gross domestic product and rate of capacity utilisation

Aggregate supply in the economy is represented by potential gross domestic product. Potential GDP is determined through labour supply, the capital stock and the level of technical progress. In MEMMOD this is modelled with a Cobb-Douglas production function, containing labour and capital as well as an autonomous rate of technical growth.

The following equation is used to determine potential GDP (BIPQ), where EW stands for the labour force, KRP for the capital stock and T for a time trend:

$$BIPQ = \alpha_0 \left[e^{(\alpha_1 + \alpha_2 T)} \left(E1 + (ARLQ - ARLQN) * EW\right)^{\alpha_3} KRP_{-1}^{(1-\alpha_3)} \right].$$

Production function

Table 11

Real GDP and potential real GDP

$$BIPQ = \alpha_0 * \exp\left[\alpha_1 + \alpha_2\, 0.01T + \alpha_3 \ln\left(E1 + 0.01\left(ARLQ - ARLQN\right) * EW\right) + \left(1 - \alpha_3\right)\ln\left(KRP_{-1}\right)\right]$$

Estimation period: 1974 / 1 – 1998 / 4
Data base: March 1999

Country	α_0	α_1	α_2	α_3	$\bar{R}^2$	DW
USA	0.92	0.99	0.14	0.63	0.91	0.26
		(211.03)	(32.55)			
Japan	1.00	-0.72	0.12	0.59	0.72	0.14
		(85.17)	(16.14)			
Germany	1.00	-2.94	0.23	0.49	0.83	0.27
		(163.32)	(12.24)			
United Kingdom	1.00	0.05	0.32	0.66	0.94	0.18
		(5.42)	(39.96)			
France	0.93	1.23	0.23	0.62	0.98	0.39
		(335.33)	(69.72)			
Italy	0.86	0.17	0.16	0.50	0.90	0.37
		(24.09)	(22.84)			
Canada	0.92	0.99	0.05	0.61	0.00	0.05
		(334.84)				
Netherlands[1]	0.93	1.05	0.14	0.60	0.41	0.26
		(60.62)	(7.73)			
Belgium[2]	0.90	2.74	0.11	0.60	0.87	0.33
		(540.79)	(25.32)			

1 Estimation period: 1978 / 1 – 1998 / 4
2 Estimation period: 1975 / 1 – 1998 / 4

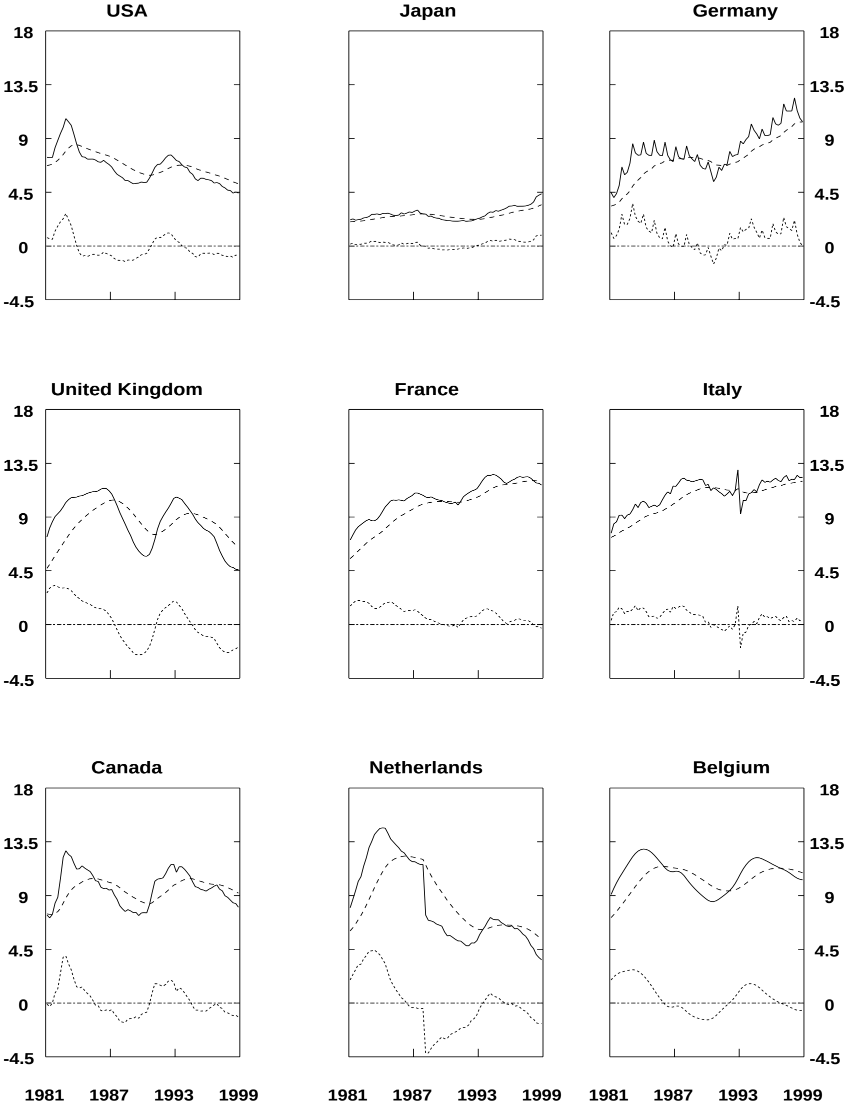
ARLQ	Unemployment rate	α_0	Scale parameter
ARLQN	"Smoothed" unemployment rate	α_1	Level parameter
BIPQ	Potential real GDP	α_2	Technical progress per quarter
E1	Employment	α_3	Average wage ratio
EW	Labour force	$\bar{R}^2$	Adjusted coefficient of determination
KRP	Real capital stock	DW	Durbin Watson Statistic
T	Time trend		t-values below coefficients

Deutsche Bundesbank

Unemployment rate from 1981 to 1998

Chart 6

_____ Actual unemployment rate
- - - - Smoothed unemployment rate
.... Difference between actual and smoothed unemployment rate



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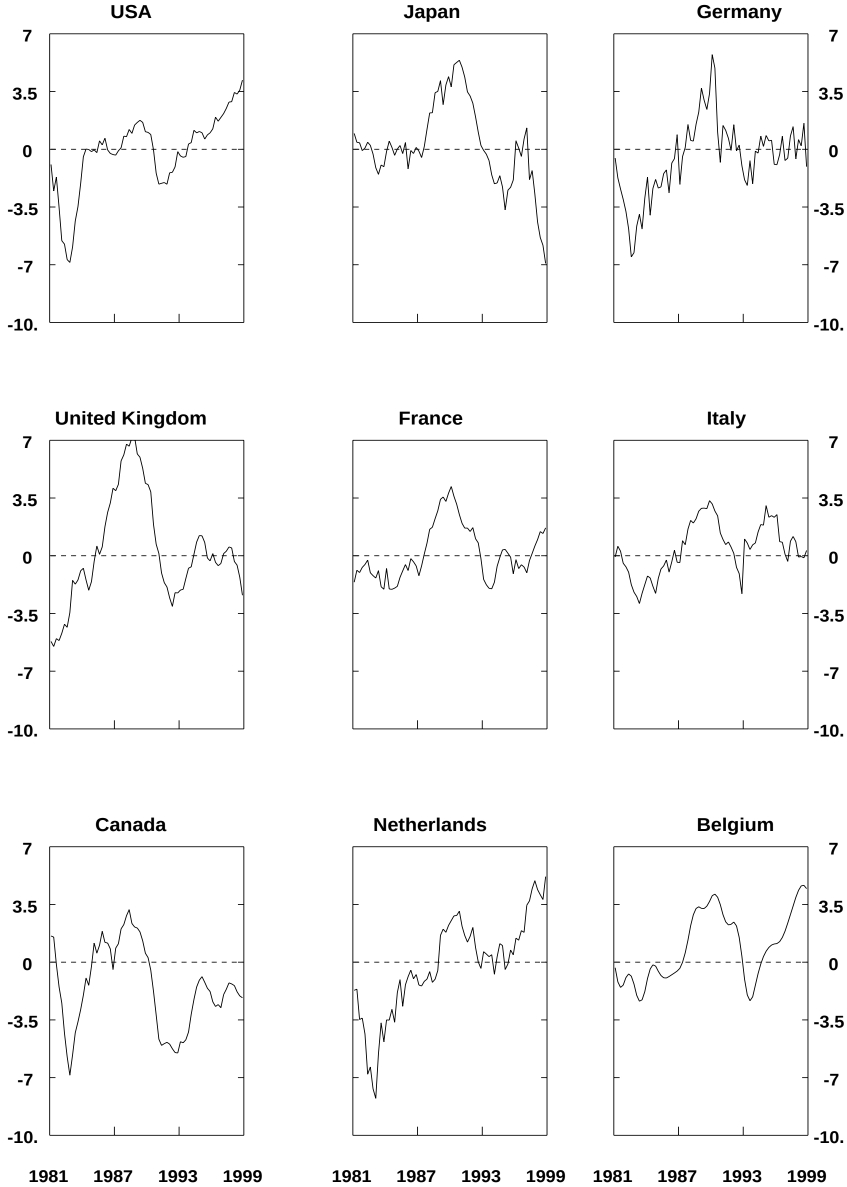
Output gap from 1981 to 1998

Chart 7



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As a consequence of hysteresis effects, it is assumed that only the part of the unemployed which exceeds the long-term trend may be counted as part of the potential labour force. The estimated rate of technical progress ranges between 0.2 % p.a. in Canada and 1.3 % p.a. in the United Kingdom. The elasticity of substitution between the factors of production is equal to one. The distribution parameter α_3 has been calibrated on the basis of the labour income shares ranging from 0.5 for Italy to 0.66 for the United Kingdom.

The discrepancy between aggregate supply and demand is expressed through the rate of capacity utilisation, defined as

$$GAPQ = 100 * \frac{BIPR}{BIPQ} .$$

From this the output gap can easily be calculated.

In its role as the key indicator of equilibrium, the rate of capacity utilisation enters the Phillips curve relationship in the inflation equation. It is furthermore used for the counter-cyclical specification of fiscal expenditures.

4. Factor costs and prices

4.1. Wages

Over the long term, the theoretical wage development takes full account of price inflation and also productivity gains, which can be attributed to labour. In the short term labour market discrepancies exert an additional influence. Classical theory suggests that the wage rate effectively clears the labour market and thus ensures a long-run equilibrium with unemployment equal to the "natural rate". The idea of a natural rate is being increasingly disputed, though, since unemployment has risen considerably in the last two decades in some countries. It is certainly questionable whether this rise in unemployment can be fully attributed to adverse wage developments. Of course, wages are still a key determinant of labour market developments, and vice versa. The particular influence of labour market discrepancies on wage developments, however, are more likely to occur in the form of trend deviations. The trend, or "smoothed" unemployment ARLQN takes the form

$$ARLQN = \theta\, ARLQN_{-1} + (1-\theta) ARLQ\ ,$$

where θ is the smoothing parameter, which is set equal to 0.9. The wage equation can then be formulated as

$$\Delta \ln (LA) = \alpha_0 + \alpha_1\, \Delta \ln (LA_{-1}) + (1-\alpha_1)\, \Delta \ln (PCP) + \alpha_2\ \lambda\ \Delta \ln (BIPQ)$$
$$+ \alpha_3\, \Delta\, 0.01\, (ARLQ - ARLQN) + \alpha_4\, 0.01\, (ARLQ - ARLQN).$$

BIPQ is potential output, which is multiplied by the share of labour in total production costs, in order to approximate the productivity gains attributable to labour in its role as a factor of production.

4.2. Production costs

The index of production costs, COSI, is determined by a weighted average of labour and import costs, reflected by wages (LA) and import prices (PIM), respectively. The weights λ_1 and λ_2 therefore represent the share of the two factors in the production process.[16] The index of production costs can then be calculated as[17]

$$COSI = LA^{\lambda_1}\, PIM^{\lambda_2}\, \frac{100}{COSI_{base}}.$$

4.3. Price inflation

The central price equation in the model refers to the price deflator of domestic demand (PINV). In the short run, prices are influenced by changes in production costs and the level of capacity utilisation. The rate of inflation is anchored to an explicit target rate of inflation (INFT). But the impact of this target rate on current inflation is realised through expectation formation. In the euro area countries, the inflation target is also incorporated in the area-wide equilibrium price level P-star (PSM3)[18].

---

16 Since capital costs are difficult to capture, labour and imports are assumed to be the only factors of production. Let μ_1, μ_2 and μ_3 be the "true" shares of labour, imports and capital, respectively, in the production process. In order to represent the total production costs as a function of two factors, the ratios for labour and imports, λ_1 and λ_2, have to be defined as

$$\lambda_1 = \frac{\mu_1}{\mu_1 + \mu_2}, \lambda_2 = (1-\lambda_1) = \frac{\mu_2}{\mu_1 + \mu_2}.$$

17 The last factor represents an adjustment to the base year of the production cost index.

18 The equilibrium price level PSM3 is derived from the European demand for the monetary aggregate M3 (see section 6 for more detail).

Wage equation

Table 12

Gross wage income per employee

$$\Delta \ln(LA) = \alpha_0 + \alpha_1 \Delta \ln(LA_{-1}) + (1-\alpha_1)\Delta \ln PCP + \alpha_2 \lambda \Delta \ln(BIPQ) + \alpha_3\, 0.01\, \Delta(ARLQ - ARLQN) + \alpha_4\, 0.01\,(ARLQ_{-4} - ARLQN_{-4})$$

Estimation period: 1975 / 1 – 1997 / 4

Data base: March 1999

Country	α_0	α_1	α_2	α_3	α_4	λ	β	$\bar{R}^2$	DW
USA	0.001	0.83		-0.15	-0.15			0.74	1.64
	(1.30)	(15.58)		(3.08)					
Japan[1]		0.31	0.64		0.52		0.80	0.98	1.67
		(5.36)	(10.29)		(7.41)				
Germany		0.91		-0.31	-0.17			0.89	1.74
		(25.48)		(3.51)	(3.33)				
United Kingdom	0.002	0.80		-0.41	-0.20			0.56	1.22
	(0.95)	(10.52)		(2.55)	(1.86)				
France		0.75	0.25		-0.01	0.71		0.77	1.68
		(16.33)			(0.63)				
Italy[1]		0.77	0.21		0.05		0.84	0.99	1.55
		(11.74)	(3.20)		(1.26)				
Canada	0.001	0.74		-0.33	-0.33			0.65	2.40
	(0.75)	(12.13)		(3.65)					
Netherlands[2]		0.44			-0.41			0.81	0.93
		(7.13)			(4.53)				
Belgium	0.001	0.87	0.13		-0.16	0.47		0.88	0.42
	(1.05)	(25.44)			(2.67)				

1 Equation: $\Delta \ln(LA) = \alpha_1 \Delta \ln(LA_{-1}) + \alpha_2 \Delta \ln(LAS) + \alpha_4 \ln\left(\frac{LAS_{-4}}{LA_{-4}}\right)$

2 Estimation period: 1978 / 2 – 1997 / 4

ARLQ	Unemployment rate	PCP	Deflator of private consumption
ARLQN	"Smoothed" unemployment rate	β	Long-term elasticity of real wages with respect to labour productivity
E1	Employment		
ENDR	Real final demand		
LA	Gross wage income per employee	λ	Average labour share in output
LAS	Long-term income: $LAS = PCP\left(\frac{ENDR}{E1}\right)^{\beta}(1-0.01\,ARLQ)^{\beta}$	Δ	Difference operator: $\Delta x = x - x_{-4}$
		$\bar{R}^2$	Adjusted coefficient of determination
		DW	Durbin Watson Statistic
			t-values below coefficients

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Modelling price inflation in the euro area countries follows the idea that real influences are the source of inflation at the national level only. Simply speaking, there is no apparent reason why, for instance, wage developments in Belgium should have any direct impact on prices in Italy. Monetary inflation, on the other hand, can only be formulated at the euro area aggregate level, because after the introduction of the euro it will be impossible to formulate a meaningful national money demand equation. This dualism therefore serves not only to draw a distinction between real and monetary factors of inflation. It also provides the synthesis between national and area-wide influences on inflation.

The key requirement for using the P-star concept to model monetary inflation is a stable money demand equation. Section 6 (and indeed a number of recent studies) will show that this is the case in the euro area. There is relatively scant evidence of the impact of P-star on domestic prices. Germany was the only country where P-star exerts a significant effect on inflation. For that reason, the influence of P-star has not been incorporated in the inflation equations of the countries outside the euro area. The lack of evidence in the euro area countries other than Germany is based on national price gaps[19], based on national money demand equations. However, there is evidence of the impact of P-star on prices at the aggregate level,[20] which is still difficult to quantify at this early stage of monetary union.

Let INF be the rate of national inflation, COSI the index of production costs, TISS the indirect tax rate, GAPQ the rate of capacity utilisation, i.e. the output gap, PINV the national price level, INFT the target rate of inflation and PSM3 the equilibrium price level.[21] The equation for inflation is then given as follows:

$$\begin{aligned} INF &= \alpha_1 \Delta^2 \ln\left(\frac{COSI}{1-0.01 * TISS}\right) + \alpha_2 \left\{(1-\phi)\, INF_{-1} + \phi\left[(1-\mu)\, INF_{+1} + \mu\ INFT\right]\right\} + \alpha_3 \ln(0.01\ GAPQ) \\ &+ (1-\alpha_2)\, \Delta \ln(PSM3) + \alpha_4 \ln\left(\frac{PSM3_{-4}}{PINV_{-4}}\right). \end{aligned}$$

The inflation equation is only consistent in the long run if the coefficients of the inflation terms on the right-hand side add up to one. These inflation terms are in particular the lag and lead of actual inflation, the inflation target, and for the euro area countries also the change in P-star, i.e. equilibrium inflation. For the Euro

19 See equation V.5 in the model documentation below.
20 See Gerlach, S., Svensson, L.E.O.: "Money and Inflation in the euro area: A Case for Monetary Indicators?". The authors construct a measure of the euro wide consumer price index, which is used in their analysis.
21 In the euro area countries, PSM3 refers to the aggregate euro level.

Inflation equation

Table 13

Price deflator of domestic demand

$$0.01 * INF = \alpha_1 \Delta^2 \ln\left(100 \frac{COSI}{1 - 0.01 * TISS}\right) + \alpha_2 * 0.01 \left\{(1-\phi) INF_{-1} + \phi \left[(1-\mu) INF_{+1} + \mu\, INFT\right]\right\}$$

$$+ \alpha_3 \ln(0.01\, GAPQ) + (1 - \alpha_2) \Delta \ln(PSM3) + \alpha_4 \ln\left(\frac{PSM3_{-4}}{PINV_{-4}}\right)$$

Estimation period: 1976 / 1 – 1997 / 4
Data base: March 1999

Country	α_1	α_2	α_3	α_4	ϕ	μ	$\bar{R}^2$	DW
USA[2]	0.03	1.00	0.10		0.31 (7.12)	0.4	0.38	1.71
Japan	0.03 (2.14)	1.00	0.05		0.22 (4.63)	0.4	0.30	1.24
Germany[1]	0.03	0.95 (43.23)	0.03	0.10	0.25 (2.31)	0.4	0.96	1.88
United Kingdom[2]	0.02 (0.87)	1.00	0.10		0.40 (7.76)	0.4	0.99	2.53
France[4]	0.03	0.97 (41.94)	0.03	0.10	0.36 (4.59)	0.4	0.99	0.71
Italy[2]	0.04 (0.99)	0.92 (24.85)	0.03	0.10	0.46 (3.47)	0.4	0.99	0.18
Canada	0.05	1.00	0.10		0.40	0.4		
Nether-lands[5]	0.02 (0.44)	0.89 (14.83)	0.03	0.10	0.37 (2.61)	0.4	0.55	2.00
Belgium[3]	0.03	0.95 (33.47)	0.03	0.10	0.40	0.4	0.96	0.03

1 Inflation adjusted for indirect taxation.
2 Estimation period: 1977 / 1 – 1997 / 4
3 Estimation period: 1978 / 1 – 1997 / 4
4 Estimation period: 1979 / 1 – 1997 / 4
5 Estimation period: 1983 / 4 – 1997 / 4

COSI Index of production costs
GAPQ Rate of capacity utilisation: $\ln(GAPQ) = \ln(BIPR) - \ln(BIPQ)$
INF Inflation rate of domestic demand deflator
INFT Target rate of inflation
PINV Deflator of domestic demand
PSM3 Long-term price level, Euro-aggregate
TISS Indirect tax rate
Δ Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$ Adjusted coefficient of determination
DW Durbin Watson Statistic
t-values below coefficients

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Area countries the restriction is already incorporated in the above equation through the restriction on the coefficient of equilibrium inflation. The other countries require the restriction $\alpha_2 = 1$.

The rational expectations coefficient ϕ was estimated wherever possible. The target rate of inflation is an integral part of expectation formation. The exact influence of the target rate on expectation formation is reflected in the parameter μ. This parameter cannot be estimated because there was no ex-post inflation target.

Because the inflation equation contains its own lead as an explanatory variable, a terminal value is required, which is simply the target rate. The need for a terminal condition is also the reason why there is a separate variable for inflation (INF), rather than simply the rate of change in the price level. The latter would specify the terminal condition in level form as well, which would not make sense. The price level is thus derived from inflation as:

$$\ln(\mathrm{PINV}) = \ln(\mathrm{PINV}_{-4}) + 0.01\ \mathrm{INF}\ .$$

4.4. Other prices

The price inflation rates for other GDP components are adjusted to the central inflation equation. The adjustment process for the price deflators for private consumption (PCP), fixed investment (PIAN), government demand (PG) and exports (PEX) is specified as follows:

$$\Delta \ln(\mathrm{PCP}) = \alpha\ \Delta \ln(\mathrm{PCP}_{-1}) + (1-\alpha)\ \Delta \ln(\mathrm{PINV})$$

$$\Delta \ln(\mathrm{PIAN}) = \alpha\ \Delta \ln(\mathrm{PIAN}_{-1}) + (1-\alpha)\ \Delta \ln(\mathrm{PINV})$$

$$\Delta \ln(\mathrm{PG}) = \alpha\ \Delta \ln(\mathrm{PG}_{-1}) + (1-\alpha)\ \Delta \ln(\mathrm{PINV})$$

$$\Delta \ln(\mathrm{PEX}) = \alpha\ \Delta \ln(\mathrm{PEX}_{-1}) + (1-\alpha) * \Delta\left[((1-\lambda)\ln(\mathrm{PINV}_{-1}) + \lambda \mathrm{LPAC}_{-1})\right].$$

The equation for export prices takes the price deflator of foreign competitors (LPAC) into account, which is explained in more detail in the chapter about the foreign trade block.

Other price equations

Table 14

Price deflator of private consumption, fixed investment and government demand

$$\Delta \ln(P) = \alpha_1 \Delta \ln(P_{-1}) + (1 - \alpha_1) \Delta \ln(PINV)$$

Price deflator of exports

$$\Delta \ln(PEX) = \alpha_1 \Delta \ln(PEX_{-1}) + (1 - \alpha_1) * \Delta [(1-\lambda) \ln(PINV_{-1}) + \lambda \; LPAC_{-1}]$$

Estimation period: 1975 / 1 – 1997 / 4 and1978 / 2 – 1997 / 4 (for PEX)
Data base: March 1999

Country	PCP		PIAN		PG		PEX		
	α_1	$\overline{R}^2$	α_1	$\overline{R}^2$	α_1	$\overline{R}^2$	α_1	λ	$\overline{R}^2$
USA	0.48 (8.12)	0.42	0.88 (23.32)	0.86	0.61 (14.15)	0.69	0.95 (22.43)	0.12	0.87
Japan	0.54 (18.17)	0.78	0.67 (9.34)	0.49	0.28 (5.07)	0.22	0.89 (12.17)	0.12	0.66
Germany[1]							0.96 (26.10)	0.20	0.90
United Kingdom	0.38 (7.21)	0.36	0.78 (11.90)	0.61	0.51 (7.41)	0.38	0.77 (10.41)	0.24	0.58
France	0.41 (6.28)	0.30	0.58 (10.39)	0.54	0.45 (7.69)	0.39	0.83 (11.90)	0.25	0.65
Italy	0.53 (18.18)	0.78	0.44 (8.10)	0.42	0.76 (13.19)	0.66	0.81 (9.87)	0.21	0.56
Canada	0.66 (12.83)	0.64	0.93 (21.62)	0.84	0.43 (6.34)	0.31	0.93 (18.23)	0.27	0.81
Netherlands[2]	0.82 (13.28)	0.69			0.91 (12.86)	0.68	0.77 (10.99)	0.37	0.61
Belgium	0.71 (16.53)	0.75	0.85 (17.18)	0.76	0.81 (20.66)	0.82	0.92 (14.97)	0.46	0.74

1 Equation: $\Delta \ln(P) = \alpha_1 \Delta \ln(P_{-1}) + \alpha_2 \Delta \ln(PINV) + \alpha_3 \ln\left(\frac{PINV_{-4}}{P_{-4}}\right)$

2 Estimation period: 1978 / 2 – 1997 / 4

PCP Price deflator of private consumption
PIAN Price deflator of fixed investment
PG Price deflator of government demand
PINV Price deflator of domestic demand
PEX Price deflator of exports
LPAC Price deflator of foreign competitors (logarithm)
λ Average share of exports in final demand

Δ Difference operator: $\Delta x = x - x_{-4}$
$\overline{R}^2$ Adjusted coefficient of determination
DW Durbin Watson Statistic
t-values below coefficients

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5. Government

Governments, on the one hand, levy direct (TDB) and indirect taxes (TIS), and on the other demand consumer and investment goods as well as services (G) and transfer social benefits to households (SB). Indirect taxes are net of subsidies to private firms. The government balances are further disaggregated in the case of Germany in order to fulfil additional simulation requirements.

A general pattern of fiscal policy within the set of countries included in the model seems to be that within the last twenty years government consumption and investment relative to GDP have either remained constant or decreased, whereas social benefits relative to GDP have increased instead (see Charts 9 and 10). Deficit ratios have improved significantly over the last five years, with the exception of Japan (Chart 8). This is especially true of those countries committed to meet the Maastricht criteria. Tax revenues are calculated as average tax rates (TDBS for direct taxes and TISS for indirect taxes) multiplied by the tax base, which is approximated by national income for direct taxes and social security contributions and by nominal final demand for indirect taxes, respectively. Out of sample, tax rates are determined by autoregressive processes.

Despite the fact that there has been a decrease in government demand relative to GDP at constant prices, it is assumed in the model that this ratio will be constant in the very long run. In the short term, however, adjustments and countercyclical reactions to the output gap, known as built-in stabilisers, are accounted for. This leads to the following equation for real government demand:

$$\Delta \ln(GR) = \alpha_1 \Delta \ln(GR_{-1}) + (1-\alpha_1)\Delta \ln(BIPR) + \alpha_2 \ln(GAPQ) \ .$$

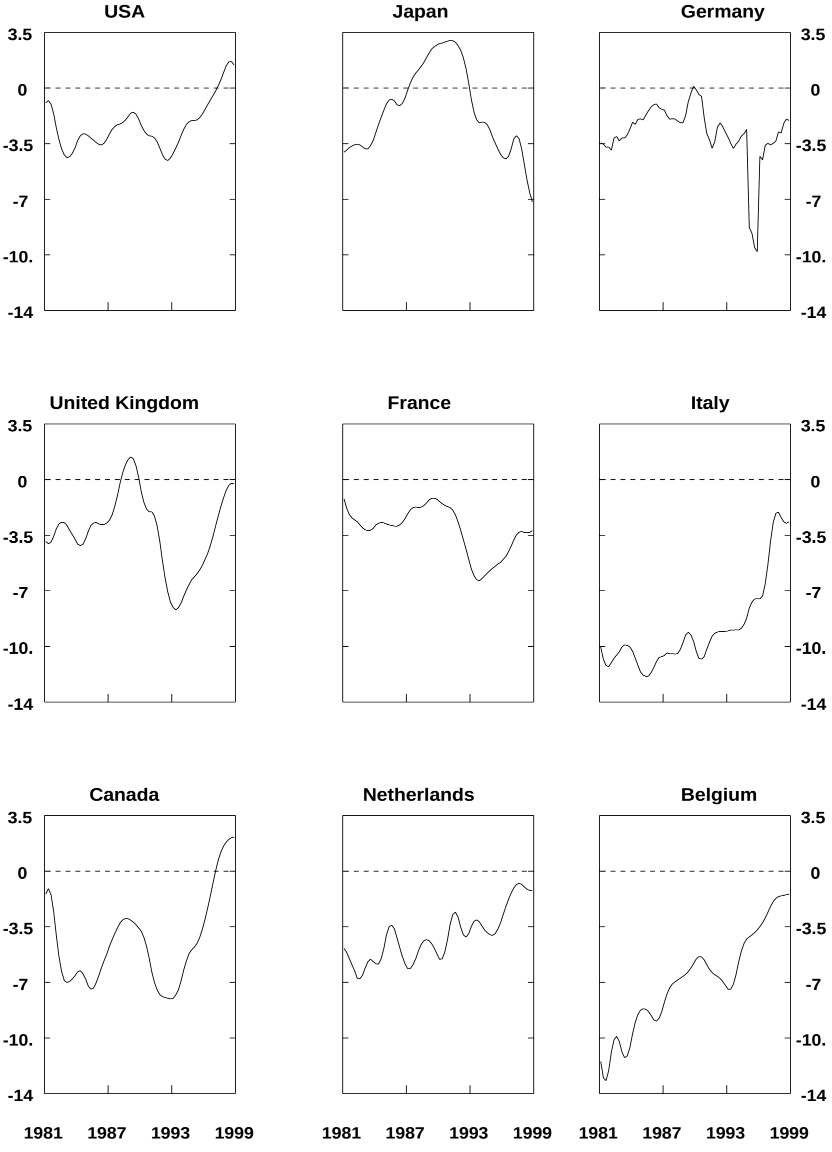
The elasticity of government expenditure with respect to the output gap has been estimated to be low for the USA, the Netherlands and Belgium and relatively high for France and Canada. The German fiscal policy reaction function incorporates the deficit quota, too. This ensures that the deficit will return to zero in the long run, a restriction which is not contained in the other country models.

Government transfers to private households (SB) are determined by the number of children, unemployed persons and senior citizens in the population and are often linked to the level of wages. The different determinants have been approximated in the model by the development of nominal GDP. Despite the trend in the observed data, it has been assumed that the ratio between transfer payments and

Deficit ratio from 1981 to 1998

Chart 8

Government deficit in per cent of nominal GDP



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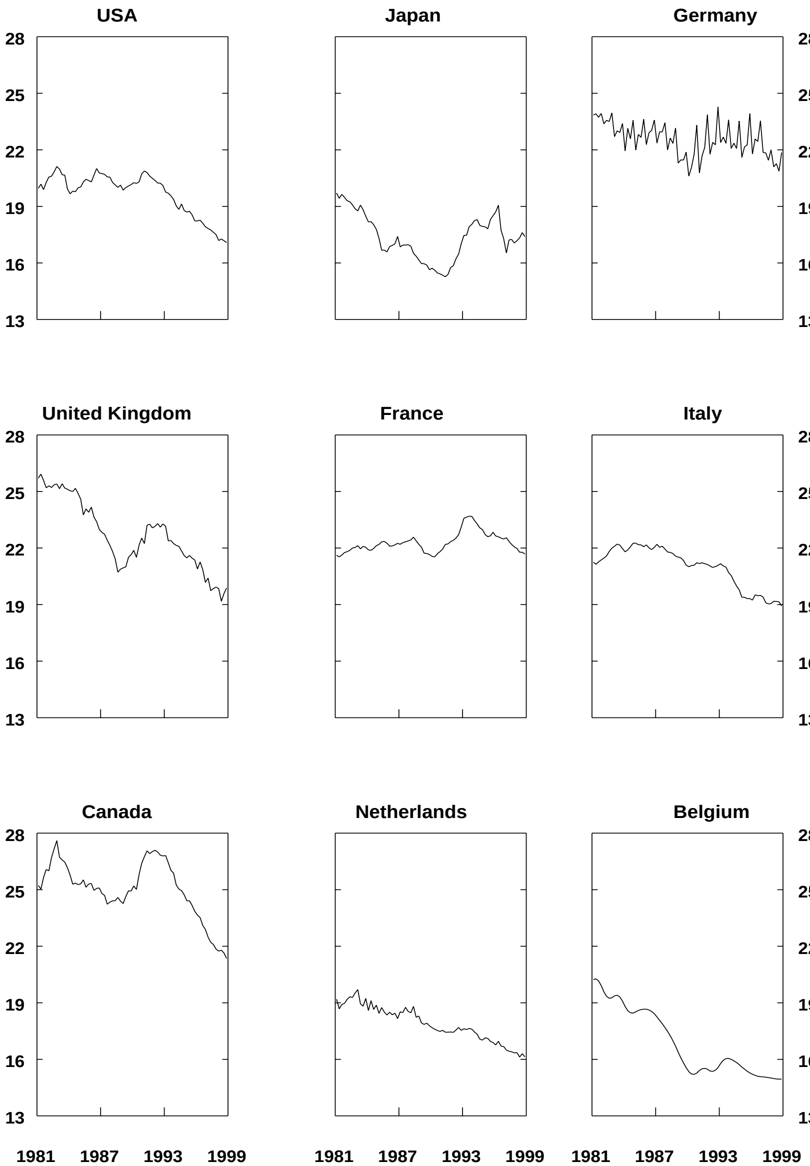
"Government demand ratio" from 1981 to 1998

Chart 9

Real government demand in per cent of real GDP



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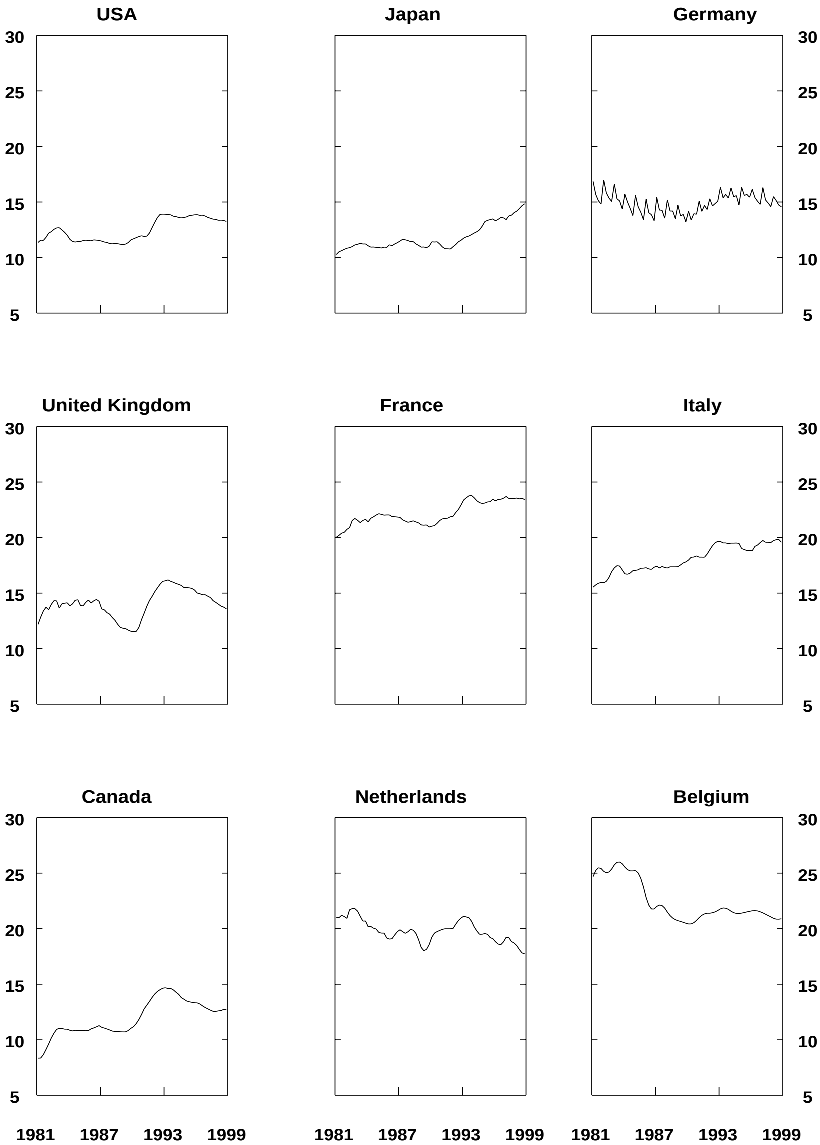
Transfer ratio from 1981 to 1998

Chart 10

Government transfers to private households in per cent of nominal GDP



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Government expenditure and transfer equations

Table 15

Government expenditure

$$\Delta \ln(GR) = \alpha_1 \Delta \ln(GR_{-1}) + (1-\alpha_1)\Delta \ln(BIPR) + \alpha_2 \ln(0.01\ GAPQ)$$

Transfer payments

$$\ln\left(\frac{SB}{BIP}\right) = \alpha_0 + \alpha_1 \ln\left(\frac{SB_{-1}}{BIP_{-1}}\right) + \alpha_2 * 0.01 * (ARLQ - ARLQN)$$

Estimation period: 1975/1 – 1997/4
Data base: March 1999

Country	Expenditure				Transfer payments				
	α_1	α_2	$\bar{R}^2$	DW	α_0	α_1	α_2	$\bar{R}^2$	DW
USA	0.86	- 0.04	0.85	2.20	- 0.04	0.98	0.57	0.97	0.68
	(19.68)	(0.71)			(1.01)	(58.16)	(3.94)		
Japan[1]	0.81	- 0.11	0.65	1.58	0.07	0.98	1.92	0.997	0.30
	(12.28)	(0.85)			(18.91)	(556,34)	(3.95)		
United Kingdom		- 0.41	0.12	0.40	- 0.07	0.97	0.44	0.98	1.41
		(3.58)			(2.11)	(62.86)	(3.25)		
France	0.94	- 0.05	0.85	1.29	- 0.04	0.97	0.15	0.99	0.93
	(20.62)	(0.83)			(2.74)	(92.88)	(0.87)		
Italy		0.61	0.26	0.24	- 0.06	0.96	0.24	0.97	0.58
		(5.62)			(2.02)	(58.16)	(0.67)		
Canada	0.89	- 0.10	0.85	1.80	- 0.02	0.99	0.60	0.99	0.46
	(22.77)				(1.09)	(100.18)	(3.95)		
Netherlands[1]	0.59	- 0.09	0.51	2.30	- 0.14	0.92	0.29	0.89	1.26
	(7.62)	(1.48)			(2.04)	(21.84)	(2.01)		
Belgium	0.98	- 0.01	0.95	0.30	- 0.18	0.88	0.75	0.98	0.34
	(31.12)	(0.14)			(6.11)	(44.80)	(6.49)		

1 Transfer payments: $\ln(SB) = \alpha_0 + \alpha_1 \ln(SB_{-1}) + \alpha_2 (ARLQ - ARLQN)$

2 Estimation period: 1978/1 – 1997/4

ARLQ	Unemployment rate
ARLQN	"Smoothed" unemployment rate
BIP	Nominal gross domestic product
BIPR	Real gross domestic product
GAPQ	Capacity utilisation
GR	Real government demand
SB	Government transfers to households
Δ	Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$	Adjusted coefficient of determination
DW	Durbin Watson Statistic
	t-values below coefficients

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GDP is constant in the long run. Built-in stabilisers have been incorporated into the respective equation by the disequilibrium measure in the labour market. The transfer equation therefore reads as

$$\ln\left(\frac{SB}{BIP}\right) = \alpha_0 + \alpha_1 \ln\left(\frac{SB_{-1}}{BIP_{-1}}\right) + \alpha_2 * 0.01 * (ARLQ - ARLQN).$$

The dynamic adjustment to the long-run ratio has been estimated to be very slow in all countries. This is true also of the adjustment in government demand.

6. Money, interest rates and the exchange rate

Within the financial sector important nominal variables are determined. The sector mainly comprises explanatory equations for the money stock, interest rates and the exchange rate. Money demand serves as the theoretical basis for modelling the money stock. Its characteristics and especially its stability are fundamental for the transmission of monetary policy since it relates the "real" sector of the economy to the financial sector. The central bank's reaction function determines the short-term interest rate. The yield on government bonds depends on these by means of the expectations hypothesis of the term structure. Finally, the exchange rate, i.e. the price of one US-Dollar in local currency, rests on the uncovered interest rate parity combined with the purchasing power parity.

On the one hand, empirical analyses of the past behaviour of the variables have been a guide in selecting a suitable specification. But on the other hand, the simulation characteristics, i.e. the stability, of the model have had a great impact. Therefore, additional knowledge of a changing policy framework has been incorporated where needed in order to achieve more realistic ex-ante simulation results.

Currently two issues have had, and will have, a significant impact on the financial variables in the model: First, the launch of the European Economic and Monetary Union (EMU) invalidated the previous specification of money, interest rates and exchange rates at the national level of the participating countries. Second, rational (i.e. model-consistent) expectations are applied to financial variables. This task is far from being completed, but specifications for interest rates and the exchange rate will be reported. Terminal conditions are consistently and endogenously reached by means of an analogous set of steady-state equations. In the following, therefore, both versions are given where necessary. It needs to be stressed that the steady-state model is not in itself an adequate, richly specified macro-econometric model. It only becomes a useful model when run together with the so-called dynamic model, i.e. the model version that includes equations with forward-looking expectations. The econometric software package TROLL offers different algorithms for solving forward-looking models, Fair-Taylor and Stacked Time. Here, the latter is employed.

6.1. Money demand and P-star

Standard theories of money demand state that money may be held for basically two reasons, i.e. for transaction and speculation purposes. Thus, in the first stage money is regressed on real gross domestic product (GDP) and the yield on government bonds apart from seasonal dummies, a dummy which takes account of the German currency union and a constant. Real GDP serves as a scale variable, whereas the long-term interest rate is a measure for the opportunity costs of holding money. However, when a broad monetary aggregate is used, neither the short-term interest rate nor the inflation rate is included. The former would represent the rate of return of money itself, whereas the latter is supposed to measure the opportunity costs of holding money instead of real assets.

The steady-state growth rate of real money balances equals the target money growth rate minus the target inflation rate. The latter is decided upon by the monetary policy authorities and is assumed to be fully credible in the long run. According to the quantity theory of money the following holds:

$$\frac{M}{PINV} = \frac{BIPR}{V},$$

where M denotes the money stock, PINV the price deflator of domestic demand, BIPR the transaction volume approximated by real GDP and V the velocity of money. Assuming velocity to be constant over time, the above equation says that real money balances are proportional to real GDP. Accordingly, the nominal money stock grows at the same rate as nominal GDP, and the income elasticity of money demand is equal to one. However, this assumption does not hold with regard to countries included in the model, as Chart 11 reveals. Especially in Japan, Germany, the UK, Canada, Belgium and the Netherlands, velocity does show a declining trend over time. This may be due to the fact that money is increasingly held more as a store of value than for transaction purposes. In this case money stocks rise by a higher amount than GDP, and consequently the elasticity of money demand exceeds unity.

Relaxing the assumption of V being constant over time, the above equation may be written as

$$\Delta \ln(M) = \alpha_1 \Delta \ln(BIPR) + \Delta \ln(PINV),$$

where α_1 denotes the income elasticity of money demand and Δ the difference operator. Finally, the money growth target rate MTR is endogenously determined:

$$MTR = \alpha_1 \Delta \ln(BIPQ) + INFT,$$

where $\Delta \ln(BIPQ)$ denotes the growth rate of potential output and INFT the target rate of inflation.

As mentioned before, the steady-state growth rate of real money balances is defined as:

$$\Delta \ln\left(\frac{M}{PINV}\right) = MTR - INFT \equiv \alpha_1 \Delta \ln(BIPQ).$$

However, within the dynamic model (i.e. the model version that includes forward-looking expectations), a two stage estimator is employed. At the first stage, a long-run money demand equation is estimated:

$$\ln\left(\frac{M}{PINV}\right) = \alpha_0 + \alpha_1 \ln(BIPR) + \alpha_2 RL + M\_EC,$$

where RL is the yield on government bonds and EC denotes the error-correction term. The second stage is devoted to estimating an error correction-model:

$$\Delta \ln\left(\frac{M}{PINV}\right) = \beta_1 \Delta \ln\left(\frac{M_{-1}}{PINV_{-1}}\right) + \beta_2 \Delta \ln(BIPR) + \beta_3 \Delta RL + \beta_4 M\_EC_{-4}.$$

In some cases money illusion is allowed for in the short run and the inflation rate is added in order to explain short-run dynamics. In the long run the price elasticity of money demand is restricted to be equal to unity.

Income velocity of money from 1981 to 1998

Chart 11

Ratio of nominal GDP to money balances

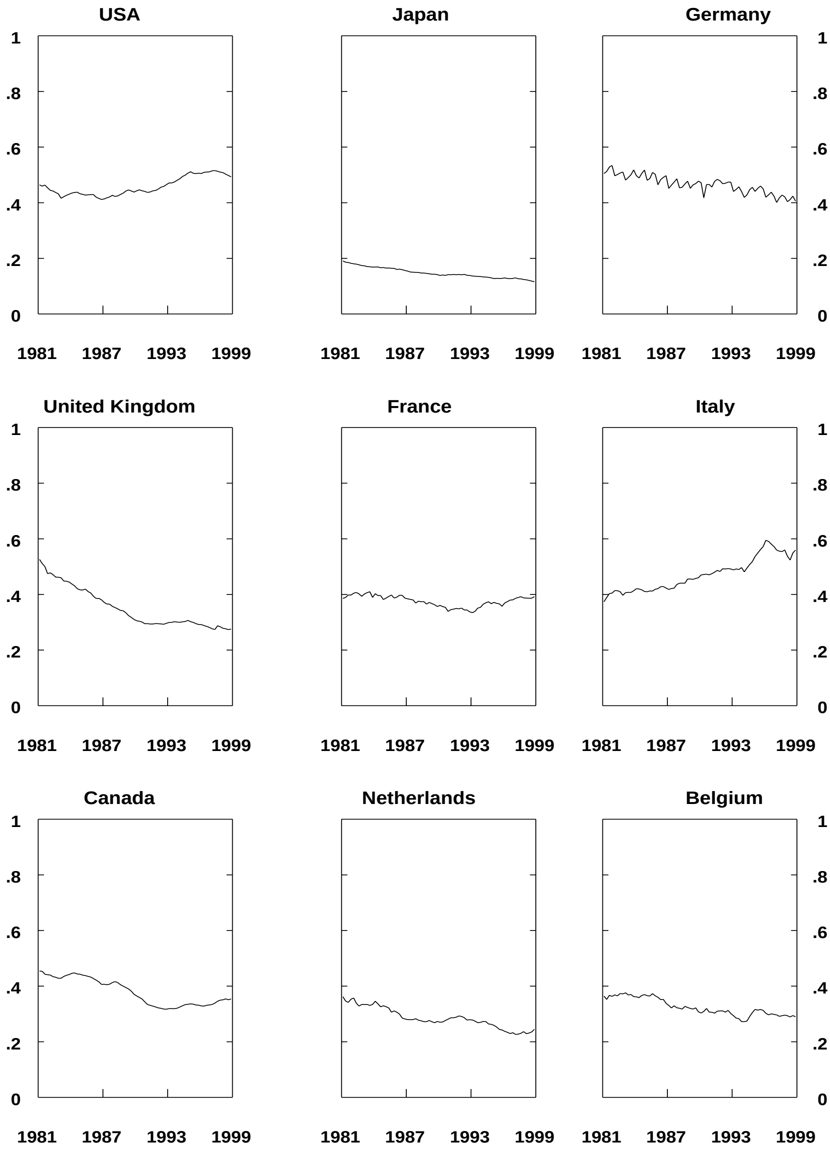

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Table 16 shows the estimated parameter values of the long-run money demand function. The income elasticity of money demand α_1 takes on values ranging from 0.7 in the USA to 2.3 in the United Kingdom. The semi interest rate elasticity is the lowest in the USA (-0.3) and the highest in Japan (-1.10) and the UK (-4.2). According to the critical values[22], the loading coefficients are statistically significant at the five per cent level with the exception of Canada.

Modelling European Economic and Monetary Union (EMU) is a formidable task. Since the ESCB has quantified a reference value for the growth rate of the monetary aggregate M3, the P-star approach appears to be a natural starting point.[23] National price levels are assumed to converge to the EMU equilibrium price level (PSM3) in the long term. Traditionally, P-star follows from the quantity theory of money. It measures the long-term price level given by

$$\ln(PSM3) = \ln(M3) + \ln\left(V^*\right) - \ln(BIPQ),$$

where M3 denotes the broad monetary aggregate as is used by the ESCB, and V^* is equal to long-run velocity. The difference between long-run and actual prices, i. e. the price gap, is decomposed into two components:

$$\ln(PSM3) - \ln(PINV) = \left[\ln\left(V^*\right) - \ln(V)\right] + \left[\ln(BIPR) - \ln(BIPQ)\right].$$

Accordingly a 'velocity gap' or 'liquidity gap' and the 'output gap' constitute the 'price gap', which in turn explains future price movements. This concept is especially useful in modelling euro area prices by estimating a long-term euro area-wide price level to which member country's price levels converge. Moreover, in a recent paper Gerlach and Svensson find convincing evidence of the existence of the P-star model in the euro area.[24]

Introducing the stable money demand function given above together with the quantity theory of money

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22 These values are given in Banerjee, A., Dolado, J. J. and Mestre, R., Error-Correction Mechanism Tests for Cointegration in a Single-Equation Framework, Journal of Time Series Analysis, 19, 1998.
23 Hallmann, J., Porter, R. and Small, D., Is the Price Level Tied to the M2 Monetary Aggregate in the Long-run?, American Economic Review, 81, 1991.
24 Gerlach, S. and Svensson, L.E.O., Money and Inflation in the euro area: A case for Monetary Indicators?, mimeo 1999.

Money demand equation

Table 16

Long-term co-integrated equation

$$\ln\left(\frac{M}{PINV}\right) = \alpha_0 + \alpha_1 \ln(BIPR) + \alpha_2\, 0.01RL + M\_EC$$

Short-term error-correction equation

$$\Delta \ln\left(\frac{M}{PINV}\right) = \beta_1 \Delta \ln\left(\frac{M_{-1}}{PINV_{-1}}\right) + \beta_2 \Delta \ln(BIPR) + \beta_3\, 0.01 \Delta RL + \beta_4\, M\_EC_{-4}$$

Estimation period: long-term: 1974 / 1 – 1997 / 4, short-term: 1975 / 1 - 1997 / 4
Data base: March 1999

Country	α_0	α_1	α_2	β_1	β_2	β_3	β_4	$\bar{R}^2_{lt}$	$\bar{R}^2_{st}$	DW_{lt}	DW_{st}
USA	-1.72	0.72	-0.29	0.81	0.09	-0.43	-0.12	0.90	0.90	0.05	1.37
	(8.30)	(25.95)	(1.27)	(15.70)	(1.97)	(4.70)	(4.54)				
Japan	-5.76	1.68	-1.10	0.71	0.49	-0.36	-0.29	1.00	0.96	0.47	0.83
	(67.77)	(101.50)	(5.28)	(12.22)	(4.80)	(2.78)	(4.11)				
Euro area[1]	-5.54	1.32	-0.68	0.77	0.25	-0.24	-0.28	0.99	0.97	0.45	1.64
	(33.32)	(57.03)	(5.54)	(13.18)	(3.23)	(3.26)	(3.92)				
United Kingdom[2]	-9.39	2.27	-4.21					1.00		1.10	
	(2.66)	(3.00)	(2.19)								
Canada	-8.23	1.90	-0.09	0.92	0.11		-0.05	0.97	0.97	0.09	1.49
	(46.86)	(55.43)	(0.22)	(34.64)	(2.67)		(2.50)				

1 Estimation period: long-term: 1980 / 1 – 1998 / 4, short-term: 1981 / 2 – 1997 / 4
2 Long-run parameter values of the equation:

$$\ln\left(\frac{M}{PINV}\right) = \alpha_0 + \alpha_1 \ln(BIPR) + \alpha_2\, 0.01RL + \alpha_3 \ln\left(\frac{M_{-1}}{PINV_{-1}}\right)$$

BIPR Real gross domestic product
M Money stock
PINV Price deflator of domestic demand
RL Yield on government bonds

Δ Difference operator: $\Delta x = x - x_{-4}$
$\bar{R}^2$ Adjusted coefficient of determination
DW Durbin Watson Statistic
t-values below coefficients

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$$\ln(V) = \ln(PINV) - \ln(M3) + \ln(BIPR)$$

yields

$$\ln(V) = -\alpha_0 + (1-\alpha_1)\ln(BIPR) - \alpha_2 RL.$$

Ultimately this suggests that long-term velocity is determined by

$$\ln\left(V^*\right) = -\alpha_0 + (1-\alpha_1)\ln(BIPQ) - \alpha_2 \, RLST$$

leading to

$$\ln(PSM3) = \ln(M3) - \alpha_0 - \alpha_1 \ln(BIPQ) - \alpha_2 \, RLST,$$

where RLST denotes the steady-state yield on government bonds. It is assumed to be equal to the steady-state values of the real short-term interest rate plus the target inflation rate and the term premium. P-star is a function of nominal money and of the growth rate of potential output. Consequently it is endogenous and by itself cannot serve as the nominal anchor of the model. According to this concept, a stable and controllable long-run euro Area-wide money demand function and a national inflation-driving price gap between the euro area-wide P-star and national price levels (not the output gap alone) suffice to ensure that the ESCB will achieve both its monetary and the underlying inflation target over the medium or long term.

6.2. Monetary policy rules

With exchange rates being flexible in all countries and in the euro area, the three-month money market rate (RS) is the instrumental variable of monetary policy. A forward-looking central bank reaction function determines the three-month interest rate:

$$RS = 0.75 * RS_{-1} + (1-0.75)\,RSST + 0.5 * \left(\frac{1}{4}\sum_{i=1}^{4}\left(INF_{+i} - INFT_{+i}\right)\right)$$
$$+ 0.5 * \left(\frac{1}{4}\sum_{i=0}^{3}\left(\ln\left(BIPR_{-i}\right) - \ln\left(BIPQ_{-i}\right)\right)\right)$$

where $RSST$ denotes the steady-state three-month rate, INF the current inflation rate and $INFT$ its target. The variable $RSST$ is assumed to be equal to the yearly average growth rate of potential output plus the target inflation rate for simulation purposes. The specification for RS, which includes a large amount of interest rate smoothening, is similar to what is commonly known as the Taylor rule supplemented by a long-term solution where the Fisher proposition holds:

$$RS = RSST_{real} + INFT \ .$$

For the European System of Central Banks a different specification was chosen in order to incorporate the two-pillar strategy of the ESCB to maintain price stability. The first of the two pillars gives money a prominent role with a quantitative reference value for the growth rate of the broad monetary aggregate M3. The second follows what is commonly known as inflation forecast targeting where price stability is maintained by keeping the inflation rate below two per cent. To make the two-pillar monetary policy strategy of the ESCB operational, it has been translated into a monetary growth target (the reference value) based on an inflation target. A monetary policy rule based on these targets essentially seems to correspond with the declared monetary policy strategy of the ESCB. However, it is instructive to sum up the P-star concept by noting that the money growth target is

$$MTR = \alpha_1 \ \Delta \ \ln \ (BIPQ) + INFT \ ,$$

while at the same time

$$\Delta \ \ln \ (PSM3) = \Delta \ \ln \ (M3) - \alpha_1 \ \Delta \ \ln \ (BIPQ)$$

holds. Thus it is concluded that

$$\Delta \ \ln \ (M3) - MTR = \Delta \ \ln \ (PSM3) - INFT.$$

Accordingly, the P-star concept, together with monetary targeting, provides a special case of inflation forecast targeting, with P-star as the leading indicator for future inflation. Monetary targeting is thus the optimal monetary policy option of the central bank given the information of a stable money demand and the explanatory power of P-star. This is far less than the information set usually assumed for inflation forecast targeting. Finally, the following central bank reaction function for the euro area is used in the model:

$$RS = 0.75 * RS_{-1} + (1-0.75)RSST + 0.80 * (100 * \Delta \ln(M_{+4}) - MTR_{+4}) .$$

The reaction function ensures that the monetary growth reference value MTR will serve as the nominal anchor of the model for the euro area. Apart from adjustments within the real sector of the model, a difference between expected actual and targeted money growth leads to a reaction in the short-term interest rate due to policy measures taken by the ESCB. This in turn affects the yield on long-term bonds RL. Since the yield on government bonds is used as a measure of the opportunity costs of holding money, actual money growth starts to converge towards its target value MTR .

As the euro only came into existence on January 1, 1999 and the monetary policy of the ESCB is likely to be different from a quasi-average of its member countries, the parameter values of the reaction function which determines the money market rate have been calibrated. The real short-term interest rate of the euro area is approximated by the growth rate of potential output.

6.3. Government bond yields

The yield on ten-year government bonds represents the long end of the yield curve and plays a prominent role in the transmission mechanism of monetary policy. This is due to the fact that money market rates are strongly influenced, if not wholly determined, by central banks; these rates are in turn exogenous to the bond market rates. But at the same time other variables have an effect, inter alia inflation expectations or international interest rate interdependencies. However, the expectations hypothesis has been taken as the starting point for modelling yields. Accordingly, the ten-year yield equals the geometric average of forty future three-month rates plus a time-invariant term premium TERM:

$$1 + RL = \left[\prod_{i=0}^{39}(1+RS_{+i})\right]^{\frac{1}{40}} * (1+TERM) .$$

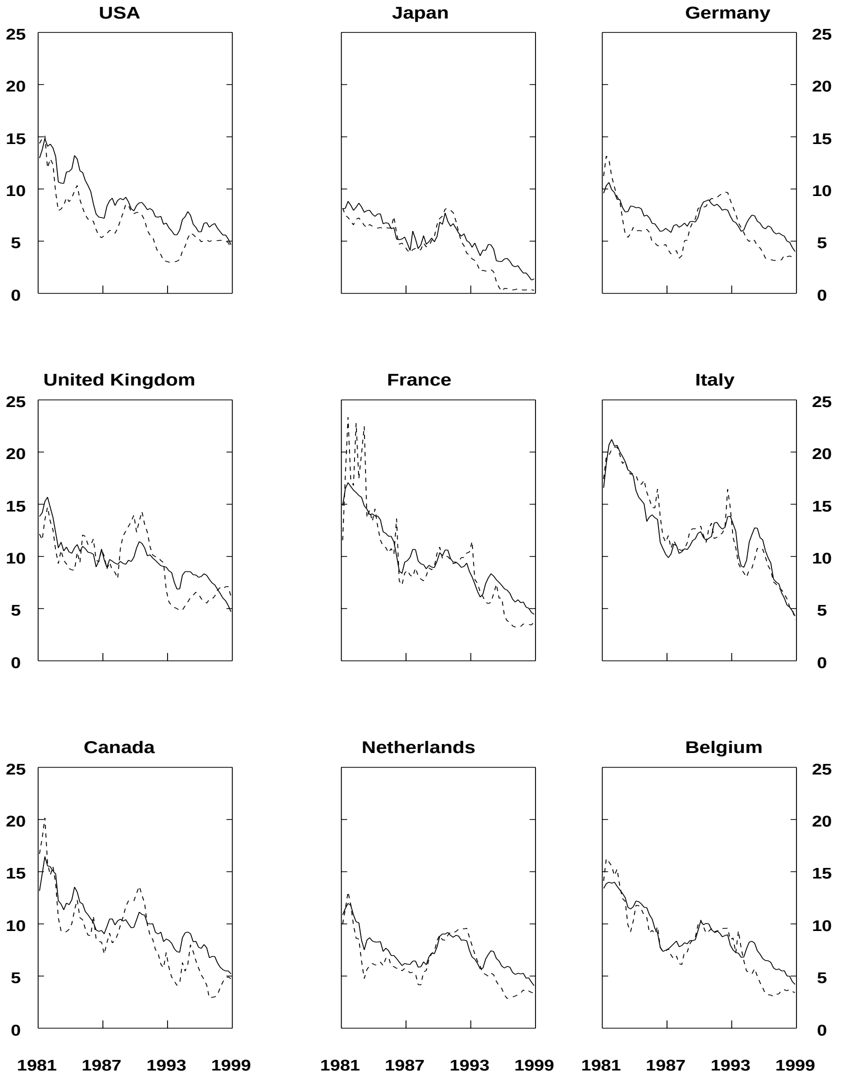
For the period t+1 the equation holds accordingly; thus, simple algebra yields

$$1 + RL = (1 + RL_{+1})\left(\frac{(1 + RS)}{(1 + RS_{+40})}\right)^{\frac{1}{40}} .$$

Short-term and long-term interest rates from 1981 to 1998

Chart 12

% p. a.
------ Short-term interest rate
_____ Yield on ten-year government bonds



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Moreover, the short-term interest rate ten years ahead is set equal to its steady-state value $RSST$ with $RSST = \Delta \ln\left(\sum_{i=0}^{3} BIPQ_{-i}\right) + INFT.$ Finally it is assumed that expectations are a mixture of forward-looking and backward-looking:

$$1 + RL = (1 + RL_{-1})^{(1-\alpha)} (1 + RL_{+1})^{\alpha} \left[\frac{(1 + RS_t)}{(1 + RSST)}\right]^{\frac{1}{40}}.$$

The parameter α is estimated by non-linear least squares and takes on values in the range of 0.476 (Canada) to 0.535 (euro area).

6.4. Exchange rates

A natural starting point for specifying the exchange rate within a macro-econometric model is the uncovered interest rate parity, complemented by the purchasing power parity, serving as a long-term anchor of exchange rate expectations. Furthermore, it is assumed that investors exhibit a home bias and consequently define a risk premium (RISP) for investing abroad as

$$RISP = (RS - US\_RS) - \left[\ln\left(ER^{e}_{+1}\right) - \ln(ER)\right]$$

with ER denoting the exchange rate of the home currency against the US-Dollar at period t and ER^{e}_{+1} its expected value given the information in period t - 1. This is equivalent to

$$\ln(ER) = \ln\left(ER^{e}_{+1}\right) - (RS - US\_RS) + RISP.$$

For the sake of simplicity it is assumed that the risk premium is constant over time. The expected exchange rate in period $t+1$ given the information in period t equals the expected relative price difference (purchasing power parity):

$$\ln\left(ER^{e}_{+1}\right) = \ln\left(PCP^{e}_{+1}\right) - \ln\left(US\_PCP^{e}_{+1}\right).$$

Taking the random walk property of exchange rate movements into account, the exchange rate equation reads as follows

Exchange rate equation Table 17

Exchange rate against US-Dollar

$$\ln(ER) = \alpha_0 + \alpha_1 \ln(ER_{-1}) + (1-\alpha_1)\ln\left(\frac{PCP_{+1}}{US\_PCP_{+1}}\right) - 1.0 * 0.01 * (RS - US\_RS)$$
$$+ \alpha_1 * 0.01 * (RS_{-1} - US\_RS_{-1})$$

Estimation period: 1975 / 1 - 1997 / 4
Data base: March 1999

Country	α_0	α_1	$\bar{R}^2$	DW
Japan	0.16	0.97	0.94	1.24
	(1.28)	(37.99)		
Euro area	-0.01	0.96	0.95	1.34
	(1.57)	(34.51)		
United Kingdom	0.30	0.93	0.85	1.59
	(1.71)	(22.57)		
Canada	0.02	0.95	0.92	1.82
	(2.37)	(33.24)		

ER Exchange rate against US-Dollar
PCP Price deflator of private consumption
RS Short-term interest rate

$\bar{R}^2$ Adjusted coefficient of determination
DW Durbin Watson Statistic
t-values below coefficients

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$$\ln(ER) = \alpha_0 + \alpha_1 \ln(ER_{-1}) + (1-\alpha_1)[\ln(PCP_{+1}) - \ln(US\_PCP_{+1})] - (RS - US\_RS) + \alpha_1(RS_{-1} - US\_RS_{-1}),$$

where the risk premium is absorbed by the constant term. Estimation results reveal a high persistence of shocks in the mean. Purchasing power differences only slowly affect the exchange rate, whereas changes in interest rate differentials influence the exchange rate immediately.

Foreign trade block

I. Coverage of the trade block

The trade block, together with the exchange rate equations and the euro area block, constitutes the main link connecting the individual country blocks of the model. The trade block links the import and export relationships between the individual countries in a consistent manner. The relationships between import and export prices and the price deflator of foreign competitors are also determined in the trade block. The trade block contains, in addition to the countries included in the model, a block for the rest of the EU, a block for the rest of the OECD and a block for the rest of the world. The formation of these blocks is based on the corresponding data grouping of the OECD[25].

The key structure of the trade relationships is derived from a static trade matrix. This matrix contains, in the first place, the trade flows between the countries and blocks considered. The bilateral trade relations can be based on either exports or imports. The US-Dollar-denominated exports from one country to another do not equal the imports of the second country from the first. The discrepancy is to some extent due to differences in definitions, such as for instance the incorporation of customs duties and insurance costs. There are also substantial statistical discrepancies which are widely believed to affect the export figures more than the import figures; hence, the latter are used for the calculation of the trade matrix. The shares of each individual country or block in each country's total exports and imports can be calculated from the import matrix below. The result is given in Tables 17 and 18. Table 17 shows the import shares of each country *(h-matrix)* and Table 18 shows the export shares of each country *(k-matrix)*.

The general idea of the trade specification is to determine the import volume and the export prices domestically, i.e. in the respective country models. The export volume and the import prices are then determined as a function of foreign imports and export prices, respectively.

25 OECD, Monthly Statistics of Foreign Trade.

Import structure in the year 1997

Table 18

Share[1] in per cent (h-matrix)

Exporting country	US	JP	GY	UK	FR	IT	CA	NL	BE[2]
USA		22.44	7.75	13.40	8.57	4.98	67.59	8.31	7.71
Japan	13.95		4.87	5.02	3.32	2.03	4.60	3.62	2.39
Germany	4.95	3.67		13.68	16.60	17.97	1.98	22.14	18.56
United Kingdom	3.76	2.12	6.96		8.47	6.70	2.37	9.75	9.10
France	2.38	1.70	10.50	9.46		13.19	1.89	7.10	14.13
Italy	2.23	1.75	7.80	5.03	9.80		1.12	3.85	3.90
Canada	19.32	2.90	0.68	1.36	0.64	0.83		0.51	0.64
Netherlands	0.84	0.58	8.48	6.54	5.05	6.15	0.39		17.90
Belgium[2]	0.94	0.55	6.15	4.85	8.05	4.67	0.33	11.16	
Other EU[3]	3.02	2.93	14.38	13.52	13.38	11.95	1.77	9.39	8.55
Other OECD[4]	15.19	11.41	14.01	9.20	7.11	8.25	5.96	5.63	4.23
Rest of world	33.43	49.95	18.43	17.94	19.02	23.29	12.00	18.54	12.88
Total	100	100	100	100	100	100	100	100	100
Memo items:									
EU	18.12	13.30	54.27	53.08	61.35	60.63	9.85	63.39	72.15
OECD	66.58	50.05	81.57	82.06	80.98	76.72	88.00	81.46	87.12

Source: OECD, Monthly Statistics of Foreign Trade, Oct. 1998

1 Share of imports of country j (column) from country i (row) in total imports of country j. — **2** Including Luxembourg. — **3** Austria, Denmark, Finland, Greece, Ireland, Portugal, Spain and Sweden. — **4** Australia, Iceland, New Zealand, Norway, Switzerland and Turkey.

Abbreviations: BE: Belgium, CA: Canada, FR: France, GY: Germany, IT: Italy, JP: Japan,
NL: Netherlands, UK: United Kingdom, US: USA.

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Export structure in the year 1997

Table 19

Share[1] in per cent (k-matrix)

Importing country	US	JP	GY	UK	FR	IT	CA	NL	BE[2]
USA		28.83	8.42	11.63	7.26	8.32	77.84	3.57	4.94
Japan	11.06		2.43	2.56	2.02	2.55	4.55	0.96	1.12
Germany	4.91	5.05		10.80	16.03	14.61	1.37	18.14	16.26
United Kingdom	5.99	3.66	8.23		10.17	6.65	1.94	9.86	9.03
France	3.36	2.13	8.76	8.13		11.35	0.79	6.67	13.14
Italy	1.47	0.98	7.15	4.85	9.39		0.78	6.14	5.75
Canada	19.30	2.15	0.76	1.66	1.30	0.95		0.37	0.39
Netherlands	2.23	1.59	7.98	6.40	4.58	3.05	0.43		12.46
Belgium[2]	1.69	0.86	5.47	4.88	7.46	2.53	0.45	13.24	
Other EU[3]	1.22	4.05	16.79	11.08	13.71	13.83	1.36	10.53	7.51
Other OECD[4]	13.11	13.17	12.21	4.62	5.65	8.73	-6.96	4.90	3.96
Rest of world	35.66	37.54	21.80	33.38	22.42	27.45	17.44	25.62	25.45
Total	100	100	100	100	100	100	100	100	100
Memo items:									
EU	20.87	18.31	54.38	46.15	61.35	52.00	7.13	64.58	64.14
OECD	64.34	62.46	78.20	66.62	77.58	72.55	82.56	74.38	74.55

Source: OECD, Monthly Statistics of Foreign Trade, Oct. 1998

1 Share of exports of country j (column) from country i (row) in total exports of country j. — **2** Including Luxembourg. — **3** Austria, Denmark, Finland, Greece, Ireland, Portugal, Spain and Sweden. — **4** Australia, Iceland, New Zealand, Norway, Switzerland and Turkey.

Abbreviations: BE: Belgium, CA: Canada, FR: France, GY: Germany, IT: Italy, JP: Japan, NL: Netherlands, UK: United Kingdom, US: USA.

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II. Price deflator of imports

The import price for each country is determined through the weighted average of its trading partners' export prices. For clarity, this weighted average is first calculated as an index variable before being used in a second step to determine the price deflators of imports. The weights are taken from the trade matrix of import shares *(h-matrix).* The export price index of the rest of the world PEX_{ROW} is represented by the oil price POIL. Prices in the remaining regions (REG, ROE, ROW) are determined in US-Dollars. The equation for the index of foreign export prices is thus given as follows:

$$\ln(PEXA_i) = \ln(ER_i) + \sum_j h_{ji} \ln\left(\frac{PEX_j}{ER_j}\right)$$

$$i = \{US, JP, GY, UK, FR, IT, CA, NL, BE\}$$

$$j = \{US, JP, GY, UK, FR, IT, CA, NL, BE, REG, ROE, ROW\}$$

$$i \neq j$$

$$PEX_{ROW} = POIL$$

$$ER_{REG} = ER_{ROE} = ER_{ROW} = ER_{US} = 1 .$$

The variable *PEXA* is the only determinant of each country's price deflator of imports. Movements in the exchange rate are fully transmitted into the index variable *PEXA*. One can observe, however, that relatively large movements in the exchange rate do not have an immediate impact on import prices in the same order of magnitude. The full adjustment will only be completed in the medium to long term. In order to capture such an adjustment process, the import price equations are modelled dynamically as follows:

$$\Delta_4 \ln(PIM) = (1 - \alpha_1)\Delta_4 \ln(PEXA) + \alpha_1 \Delta_4 (PIM_{-1}) .$$

Table 20 shows the estimation results.

Foreign trade equations

Table 20

Equation for the price deflator of imports

$$\Delta_4 \ln(PIM) = (1-\alpha_1)\Delta_4 \ln(PEXA) + \alpha_1 \Delta_4 \ln(PIM_{-1})$$

Equation for nominal exports

$$\Delta_4 \ln(EX) = (1-\alpha_1)\Delta_4 \ln(IMAK) + \alpha_1 \Delta_4 \ln(EX_{-1})$$

Estimation period: 1978 / 1 – 1997 / 4
Data base: March 1999

Country	Price deflator of imports α_1	Price deflator of imports $\bar{R}^2$	Nominal exports α_1	Nominal exports $\bar{R}^2$
USA	0.82 (40.80)	0.96	0.68 (12.21)	0.65
Japan	0.64 (25.50)	0.89	0.64 (13.40)	0.69
Germany [1]	0.84 (36.75)	0.95	0.78 (21.80)	0.86
United Kingdom	0.72 (18.16)	0.81	0.53 (10.14)	0.57
France	0.74 (23.00)	0.87	0.64 (13.53)	0.70
Italy	0.63 (22.10)	0.86	0.62 (9.89)	0.55
Canada	0.81 (18.80)	0.82	0.51 (8.40)	0.47
Netherlands [2]	0.65 (17.24)	0.80	0.44 (6.37)	0.35
Belgium	0.83 (29.52)	0.92	0.83 (19.83)	0.83

1 The equations contain seasonal dummy variables
2 Estimation period: 1979/1 – 1997/4

ER — Exchange rate against US-Dollar
EX — Nominal exports of goods and services

IM — Nominal imports of goods and services
IMAK — World import demand for exports from country i

$$\ln(IMAK_i) = \ln(ER_i) + \frac{\sum_j k_{ij} \ln\left(\frac{IM_j}{ER_j}\right)}{(1-k_{i,rw})}$$

PEX — Price deflator of exports
PEXA — World export price deflator for imports of country i

$$\ln(PEXA_i) = \ln(ER_i) + \sum_j h_{ji} \ln\left(\frac{PEX_j}{ER_j}\right)$$

PIM — Price deflator for imports of country i

$\bar{R}^2$ — Adjusted coefficient of determination
t-values below coefficients

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III. Nominal exports

The concept for the nominal export equation is similar to the one used for the import price deflators above. The first step is again to calculate an index variable, which in this case is determined by the weighted average of all other countries' nominal import volumes. The weights here are given by the export shares *(k-matrix)*. The specification thus approximates a world trade adding-up. The import volume of the rest of the world block is substituted out due to a shortage of data, i.e. the sum of the shares of all other countries *j* in country *i*'s exports is normalised to unity. The index of foreign activity is thus given as

$$\ln(IMAK_i) = \ln(ER_i) + \frac{\sum_j k_{ij} \ln\left(\frac{IM_j}{ER_j}\right)}{(1 - k_{i,rw})}$$

$$i = \{US, JP, GY, UK, FR, IT, CA, NL, BE\}$$

$$j = \{US, JP, GY, UK, FR, IT, CA, NL, BE, REG, ROE\}$$

$$i \neq j.$$

Analogously to the import price equations, nominal exports are also determined dynamically by the following equation:

$$\Delta_4 \ln(EX) = (1 - \alpha_1)\Delta_4 \ln(IMAK) + \alpha_1 \Delta_4 \ln(EX_{-1}) \; .$$

The estimation results are also shown in Table 20. The adjustment is estimated to take place somewhat more swiftly than in the import price equations.

IV. Foreign competitors' price deflators and oil price

In order to incorporate competition effects, the determination of the export prices in each country takes the price developments of other countries into account. Specifically, an index variable is specified which is calculated as the weighted average of all other countries' domestic prices (PINV*)*, converted into the local currency. The weights are taken from the *k-matrix* of export shares. Substituting the rest of the world's price index in the same way as this was done for the import price deflator equations above, the index variable LPAC is then defined as:

$$LPAC_i = \ln(ER_i) + \frac{\sum_j k_{ij} \ln\left(\frac{PINV_j}{ER_j}\right)}{(1-k_{i,rw})}$$

$$i = \{US, JP, GY, UK, FR, IT, CA, NL, BE\}$$

$$j = \{US, JP, GY, UK, FR, IT, CA, NL, BE, REG, ROE\}$$

$$i \neq j$$

$$PINV_{REG/ROE} = PEX_{REG/ROE}.$$

The foreign competitors' price deflator is then used in the estimated equations for the countries' export prices.

The oil price in the multi-country model is exogenous. The following estimated autoregressive equation is used to determine future values of the oil price:

$$\ln(POIL) = \alpha_0 + \alpha_1 \ln(POIL_{-4}) + \alpha_2\ \Delta_4 \ln(POIL_{-1}) + \alpha_3\ \Delta_4 \ln(POIL_{-2}).$$

Data compilation and equation estimation

I. Data compilation

The size of MEMMOD and particularly its considerable country coverage requires a comprehensive data base. The time series data base of the Bundesbank meets these requirements, giving primary data for 577 time series. However, the time series may originate from various sources, most prominently the German Federal Statistical Office (*Statistisches Bundesamt*) for German data and the OECD for other countries. The frequency of all primary data is quarterly, with the exception of Belgium[26]. However, the loss of information when adjusting all countries but Belgium to a yearly frequency outweighs the cost of employing cubic splines to obtain quarterly data for Belgium. For monthly data either end-of-quarter values (stock variables) or quarterly averages (interest rates) are taken to obtain a quarterly frequency. All data are seasonally adjusted with the exception of Germany.

Occasional re-definitions of variables require appropriate dummy variables in order to capture structural breaks. In addition, non-seasonally adjusted data are assumed to be seasonally co-integrated, and thus quarterly dummies are introduced into the equations.

Another obstacle may be that some series are only available with a considerable time lag. These series need to be deterministically extrapolated up to the current end of the data sample. Moreover, values for exogenous variables must be determined up to the end of the simulation horizon. The population, for instance, is assumed to grow at a constant rate. Dummies are set according to their definition. Usually the time series are re-loaded several times a year, with a re-estimation of the model taking place only once in a year.

The trade matrix of the trade block, as documented in the previous chapter, determines import and export shares of all countries. Exports and imports alike are based on imports reported in OECD publications. In the trade share matrices, imports of country i originating from country j approximate country j's exports to country i. Import shares are used to derive the weighted average of foreign export prices (PEXA), which in turn is exogenous in the individual country's import price equation. Export shares are the weights when calculating the price index of foreign suppliers (LPAC) and the average of foreign imports (IMAK). Imperfectly

26 For simplicity the term"Belgium" is used to comprise both Belgium and Luxembourg due to data availability.

competitive world markets where exporters are not price takers are assumed. Instead, their prices are dependent on those of potential competitors. The weighted average of foreign imports explains exports.

Apart from dummies, the remaining time series (so-called secondary data) are derived at a further stage. Aggregates, price deflators, and ratios are calculated. In addition, potential output, P-star, and the production cost index of wages and imports are estimated. Parameters are stored for further use. Price deflators are equal to aggregates at current prices multiplied by 100 and divided by the aggregate at constant prices. There are only a few cases where this identity is solved for the aggregate at constant prices. Base years vary from 1980 (France) to 1995 (UK and the Netherlands).

With respect to ratios, the labour share of income plays an important role in estimating potential output. It is defined as gross wage income divided by final demand less indirect taxes. The import share of income is defined accordingly, and finally gross capital income is equal to one minus the labour share of income and minus the import share of income.

The model includes stochastic equations for gross wage income per employee (LA), and its definition, in turn, is solved for gross wage income (L). However, when generating the data, primary data for L is loaded and LA is defined:

$$LA = \frac{100}{\lambda} \frac{L}{E1},$$

where λ denotes the base-year mean of gross wage income. The variable E1 stands for employment. Apart from gross wage income per employee, an index of production costs (COSI) is calculated which determines the short-term dynamics of inflation. Two factors, labour and imports, enter the index, which is defined as:

$$COSI = LA^{\alpha_3} \, PIM^{(1-\alpha_3)} \frac{100}{COSI_{base}},$$

where α_3 denotes the labour share of income re-based to suit the two-factor approach taken in the equation. The production cost index is subsequently adjusted in order to equal 100 in the individual country's base year.

Potential output is measured in units of GDP at constant prices. A Cobb-Douglas production function is assumed with a constant labour share of income as calculated above and again re-based because of the two factors of production, labour and capital, such that

$$BIPQ = \exp\left\{a_1 + a_2 T + \alpha_3 * \ln\left(E1 + 0.01\left(ARLQ - ARLQN\right) * EW\right) + \left(1 - \alpha_3\right) * \ln\left(KRP_{-1}\right)\right\},$$

where T denotes a time trend, ARLQN denotes a smoothed unemployment rate with $ARLQN = 0.9 * ARLQN_{-1} + 0.1 * ARLQ$, and KRP is the capital stock. Finally, the rate of capacity utilisation is defined as

$$GAPQ = 100 * \frac{BIPR}{BIPQ}.$$

The capital stock is given by $KRP = (1 - KAB)\, KRP_{-1} + IANR$, where IANR denotes gross fixed capital investment of the business sector. The rate of capital depreciation KAB is obtained by rearranging terms:

$$KAB = \frac{IANR}{KRP_{-1}} - \frac{KRP - KRP_{-1}}{KRP_{-1}},$$

with OECD data for capital stocks. For simulation purposes the rate of capital depreciation KAB is extrapolated and serves as an exogenous variable, whereas investment and the capital stock are determined endogenously. German investment is further disaggregated due to data availability, but essentially the same approach is taken.

With the start of the euro on January 1, 1999, it became necessary to model the single monetary policy. The euro area-wide data aggregation is calculated with fixed weights. Euro area potential output, for instance, is defined as

$$EMU\_BIPQ = \frac{1}{\omega_{ECU}} \sum_{i=1}^{5} \frac{\kappa_i}{\omega_{DM,i}} BIPQ_i ,$$

where ω_{ECU} denotes the 1991 average of the D-Mark / ECU exchange rate, $\omega_{DM,i}$ country i's exchange rate against the D-Mark, and κ_i a factor to adjust the base year of country i's potential output to the year 1991. The same approach was applied to other EMU aggregates such as domestic demand and real GDP.

The euro / US-Dollar exchange rate cannot be appropriately calculated as an average of its constituent members' exchange rate. The D-Mark / US-Dollar exchange rate has therefore been used in the following way:

$$EMU\_ER = \frac{1}{GY\_ER} * \omega_{ECU} \; .$$

The notation refers to the official quotation, in which the value of one euro is measured in units of US-Dollar, whereas the D-Mark exchange rate gives the price of one US-Dollar in D-Mark.

The price deflator of domestic demand in the euro area (EMU_PINV) equals domestic demand at current prices multiplied by 100 and divided by domestic demand at constant prices. The weighted average of the constituent member country's interest rates yields the short- and long-term interest rate, respectively, of the euro area. The weights equal the share in euro area-wide GDP at constant prices. Finally, for the broad money aggregate M3, ECB data are used.

The data compilation faces some important changes now that the European System of National Accounts 1995 (ESA 95) has been introduced. In due course the primary data bases will be adapted to the new system, which will not only lead to major data revisions but also necessitate some re-definitions. Moreover, historical data for Germany will only be available from 1991 onwards. A dummy variable is already used in order to capture the change from West German figures to figures for a united Germany. This might additionally suffice to take into account the change in accounting standards.

II. Specification

Individual country models are independently generated, estimated, and simulated at the next modelling stage. This involves redundant equations for variables determined in other parts of the whole model. Therefore, a meaningful forward-looking multi-country model is created at a further stage only when all necessary equations from the various country models and the trade block are combined.

Models that are used in forecasting and economic policy analysis should meet two requirements simultaneously. On the one hand, they should reflect and explain economic developments in the past from the observed data. Under the assumption of constant economic structures, conclusions regarding future developments can be drawn. On the other hand, models should be in line with economic theory, and should thus exhibit neo-classical long-run equilibrium properties. A further constraint imposed on the model is that simulations should reach a steady-state by the end of the simulation horizon. The steady-state of the model is formulated consistently with neo-classical economic theory. However, dynamic adjustments to these long-run steady-states are in many cases relatively slow. The relatively short observation periods that were available are often not sufficient to estimate the long-run equilibrium structure of an economy. At this point calibration comes into play to impose some long-run restrictions on the model. Too much estimation sometimes contradicts theoretical long-run properties of the models. Too much calibration, however, often stands in stark contrast to observed economic developments. Long-run policy analysis, such as a study on the pension problem, requires a model with reasonable long-term properties. Short-term analyses, and in particular economic forecasts, require a more data based formation of the model. An all-purpose model like MEMMOD has to reach a compromise between the two.

III. Estimation

The use of error-correction equations in many cases allows the short-term dynamics to be reconciled with long-run neo-classical theory. Error-correction models have been used for investment, labour demand, imports and money demand. For private consumption a one-step procedure has been applied. The error-correction coefficients reflect rather slow adjustments in some cases and relatively fast adjustments in other cases. In some cases no long-run co-integration has been found. To guarantee reasonable long-run properties and the dynamic stability of the model, it was necessary to calibrate a lot of coefficients, especially to impose a long-run unit income elasticity in consumption, investment and import equations.

Estimation is based on quarterly data, which normally range from 1975 to 1997. Most data come from different OECD sources such as the "Main Economic

Indicators", "Quarterly National Accounts" and "Economic Outlook". For German data national sources have been used. With the exception of Germany, all data have been seasonally adjusted. Implicitly explained data such as price deflators or ratios – for example, unemployment rates, output gaps, or deficit ratios – have been computed. Other data like potential output, production costs, P-star, or euro area aggregates, have been constructed.

Wherever possible, the estimation method is ordinary least squares. There are a small number of equations which are non-linear in the coefficients and thus require the method of non-linear least squares. The estimation results in the following model documentation show the estimated coefficients of the equations. Additional information includes the t-values of the coefficients, the adjusted coefficient of determination[27], the Durbin-Watson statistic and the standard error of regression.

27 The degree of determination ("R-square") statistic is calculated as a centred R-square if there is a constant term, otherwise it is an uncentred R-square. Non-linear least squares always provide the uncentred R-square statistic. The difference between the two is that the uncentred R-square includes the explanatory power of the constant, whereas the centred R-square does not.

Baseline and simulation properties

I. Baseline

1. Short-run dynamics and long-run properties

As outlined in the previous chapter, specification and estimation in MEMMOD seek to embrace both short-term dynamics and long-term theoretical foundations. This is also reflected in the baseline and simulation properties of the model. The exact distinction between the short term and the long term, and possibly even the medium term, is largely discretionary. The baseline gives an idea of the time horizon required for most adjustments to be accomplished.

Modelling the long run is essential for a variety of reasons[28]. Most importantly, it is a diagnostic device, in order to detect potential instabilities or inconsistencies in the model. In other words, without well-specified long-term properties the model is likely to face significant convergence difficulties during simulations. It is at the modeller's discretion how well-specified the long run ought to be. The perfect (i.e. sustainable) steady-state is only achieved when it is suitably defined for all variables in a model. Too much emphasis on long-term properties, however, often leads to costs in terms of short-term dynamics. Models with greater emphasis on short-term dynamics are likely to tend to compromise the long-term properties, and vice versa. Any compromise in the long-term properties implies eventually a numerical instability or indeterminacy of the model. Minor inconsistencies only cause a breakdown of the model well beyond the time horizon of interest, whereas others may result in instabilities beforehand. The compromise found for MEMMOD allows simulations to be conducted until at least 2050[29].

Suitable long-run properties are not just a technical necessity. In policy simulation analyses it is often important to elucidate the long-term consequences of scenarios in order to derive valuable policy recommendations. As a consequence of an expansive fiscal policy shock, for example, simulations should not result in an explosive trajectory of fiscal balances. Finally, suitable long-run modelling facilitates the setting of terminal conditions, which are the values of lead variables beyond the simulation horizon.

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28 For a more detailed discussion on the long run of macro-economic models see McAdam, P. and Hughes-Hallet, A. J., Nonlinearity, computational complexity and macroeconomic modelling, Journal of Economic Surveys, 13, 1999.
29 The baseline in MEMMOD is usually only run until 2030, because longer simulation periods are very costly in terms of computing time.

A full model out-of-sample simulation, without any shocks being imposed on the system, generates the baseline scenario. The simulation horizon is set sufficiently long to bring the model into equilibrium and to rule out a perceptible influence of the terminal conditions in the short run. The baseline is the scenario against which any alternative simulations are set. Since results of such simulations are commonly reported as deviations from the baseline, the exact pattern of the baseline is of lesser importance, unless the model is highly non-linear.

2. Terminal conditions

A steady-state analogue of the full dynamic model is used to generate the terminal conditions of MEMMOD. The forward-looking equations of the dynamic model are replaced by either a backward-looking analogue or a theoretical steady-state formulation. The overview below shows the variables with forward-looking specifications, their terminal conditions, and the equation(s) in which they occur.

Variable	Terminal Condition	Equation(s)
INF	INFT	INF, RS[1]
MGR	MTR^{ss}	RS[2]
MTR	MTR^{ss}	RS[2]
RS	RSST	RL
PINV	$PINV^{ss}$	ER

1 Non-euro area countries' monetary policy rule.

2 Euro area monetary policy rule.

INF	Inflation rate	INFT	Target inflation rate
MGR	Monetary growth rate	RSST	Long-term level of RS
MTR	Target monetary growth rate	RL	Long-term interest rate
RS	Short-term interest rate	ER	Exchange rate
PINV	Price level	^{ss}	Denotes steady-state value.

The terminal conditions for the short-term interest rate, the inflation rate and the monetary growth rate are set according to their theoretical steady-state values. That means for the short-term interest rate in its steady-state that there are no deviations in the target variables from their target values; thus, the steady-state value of the short-term interest rate is given by the Fisher equation. Steady-state inflation and the monetary growth rate are given by their target rates. Because terminal conditions for these two variables are specified as growth rates, the corresponding variables in the equations of the model refer to growth rates as well[30]. The terminal conditions for the exchange rate are generated by the use of lags instead of leads in the respective equation.

3. Equilibrium and equilibrium mechanism

Having a well-defined equilibrium is in itself not necessarily sufficient for the model to reach this equilibrium. This section therefore highlights the equilibrium mechanisms in MEMMOD. Equilibrium can be defined in various parts of the model, such as government debt, external position, etc. The two key equilibria, however, boil down to the following:

a) Real GDP equals potential output (real equilibrium)

b) Inflation rate equals inflation target (nominal equilibrium).

The real side of the model thus reaches equilibrium when real GDP equals potential output, or simply when aggregate demand equals aggregate supply. Aggregate supply is, according to neo-classical theory, the anchor; in other words, the equilibrium mechanism works through demand adjustments. Although not essential, all components of GDP are expected to constitute a more or less fixed proportion of GDP, and their growth rate is therefore approximately equal to the GDP growth rate[31]. This, however, does not apply to the foreign trade variables. The import demand elasticity with respect to national income is restricted to unity in most countries. Export growth is thus the weighted average of foreign growth. The growth path of potential GDP, however, is not harmonised across countries due to different rates of population growth and technological progress. Export growth therefore does not normally coincide with either domestic GDP growth or import growth.

Using aggregate supply as a real anchor does not imply that it is exogenously determined, as in very simple neo-classical models. The production function used in MEMMOD incorporates some endogenous influences on aggregate supply by

30 The inflation equation, for example, cannot be specified in terms of a growth rate of price levels, because that would imply steady-state price levels rather than a steady-state inflation rate.

31 A "perfect" steady-state solution would be more binding in that respect and force all components to converge to a constant proportion of GDP. However, this would interfere with the plausibility of the short-term dynamics of the model and is thus not binding in MEMMOD.

means of investment and therefore the capital stock. Labour supply is a fixed proportion of the exogenous population[32]. The German part of the model also allows for an endogenous participation rate, which endogenises labour supply in Germany.

Consumption and investment depend on the interest rate, which can thus be used as a policy variable to resolve disequilibrium on the demand side[33]. Interest rate adjustments are not necessarily sufficient to reach equilibrium in each country model. The model therefore uses anti-cyclical fiscal expenditures as an additional equilibrating mechanism[34]. This is also necessary to balance any foreign trade imbalances that come about through reasons explained above.

An explicit inflation target provides the nominal anchor in MEMMOD. The inflation target, in its role as nominal anchor, influences inflation expectations directly. The main instrument used to achieve nominal equilibrium is in all countries the short-term interest rate, which is set by the monetary authorities. The monetary policy equilibrium mechanism in the euro area countries differs from the mechanisms in the other countries. The first difference lies in the formulation of monetary policy itself. The ESCB pursues a strategy of monetary targeting[35], whereas other central banks are assumed[36] to pursue a combination of inflation and output targeting. The transmission mechanism differs as well, insofar as the equilibrium price level has a direct impact on inflation in the euro area countries.

The reaction function of the non-euro area countries is set to react to deviations of output and inflation from their respective equilibrium levels. In the case of an output gap the adjustment of the interest rate leads to an adjustment of consumption and investment and thus to a movement towards equilibrium which continues until equilibrium is reached. The exchange rate effect further amplifies

32 Here the term "exogenous" is also used for purely autoregressive variables.
33 The interest rate also has a direct impact on aggregate supply, which is relatively small, as the diagnostic monetary policy shock simulation below shows.
34 This of course reflects a key aspect of the stability and growth pact (Amsterdam, June 1997), namely fiscal consolidation in the participating countries. The idea is for a sound budgetary position to leave room for fiscal policy manoeuvre to counter asymmetric real developments, without breaching the limit of 3 % of GDP.
35 Strictly speaking, the ESCB pursues a two-pillar strategy of monetary targeting and price stability. However, since the monetary target in MEMMOD already takes account of an explicit inflation target, including an inflation target in the reaction function would only put more weight on inflation.
36 The UK and Canada are the only non-euro area countries in MEMMOD which have an explicitly declared inflation target. Even though output stabilisation is not a declared target, its inclusion in the reaction function is an essential element of the equilibrium mechanism.

the movement towards equilibrium. Deviations of inflation from its target rate also cause an adjustment in the interest rate. With the output gap as one of the determinants of inflation, equilibrating forces are only given through output. Both output and inflation are also anchored independently of monetary policy. Movements in the nominal interest rate thus function as an additional equilibrium force.

The equilibrating mechanism of the ESCB's monetary targeting policy is modelled using what is termed the P-star concept. The general idea is that prices adjust to their long-term equilibrium level, which takes account of the output gap and the liquidity gap. P-star reinforces the stabilising mechanism for price and output equilibrium.

The equilibrium mechanism of P-star and the reaction function of the European System of Central Banks can only be defined at the aggregate level of the euro area[37]. National prices and the aggregate euro area price level are interdependent. The dependency of the euro area aggregate on national prices exists by definition, i.e. the euro area aggregate is calculated as a weighted average of national prices. The European equilibrium price level, on the other hand, factors in the national inflation equations and thus produces price equilibrium at the national level.

There is no comparable mechanism for the output levels. Aggregate European demand might well be in equilibrium whilst national output gaps persist. Neither the nominal exchange rate nor an independent monetary policy can be used as an equilibrium mechanism. MEMMOD incorporates two mechanisms that are designed to bring national output levels into equilibrium. One is the anti-cyclical fiscal policy mentioned above. The other channel is given through the impact of national output gaps on national inflation. National inflation will then affect the real exchange rate, which thus functions as an equilibrating mechanism.

The baseline simulation shows that the non-euro area countries generally follow a rather stable output path such as can be found for the aggregate euro area output level. However, inflation in the non-euro area countries requires a longer adjustment time because the equilibrium price level is not used as the anchor for inflation.

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37 After the introduction of euro coins and notes it will be virtually impossible to determine each individual member country's money demand, which would be necessary to calculate national P-star values.

II. Simulation properties

1. Monetary and fiscal policy shocks

The simulation properties of MEMMOD will be illustrated using a shock on monetary policy as well as a fiscal policy shock. In the monetary shock, a temporary tightening of the monetary policy stance is assumed, with the interest rate being raised for 2000 and 2001 by 100 basis points above the baseline. The fiscal policy shock is also formulated as a contractive shock, with real government expenditure being lowered by 1 % of real GDP[38]. It also lasts for the same two years, before the shock variables are endogenised again. Neither shock has any impact on the terminal conditions of MEMMOD.

Chart 13 shows the effects of the two shocks on the nominal short-term interest rate[39]. The monetary shock, shown on the left-hand side, shifts the level of the interest rate up, as specified in the shock. After the shock, the interest rate moves rapidly back towards the baseline level. In order to bring inflation and output back to the baseline, the interest rate has to undercut its baseline value temporarily. This implies that the negative impact on output is somewhat larger than the favourable effect on inflation. One can see that the movement of the short-term interest rate below baseline is less pronounced in the euro area. This is because of the stronger impact of the interest rate given the influence of P-star. The return of the short-term interest rate to its baseline level is rationally expected. The effect on the long-term interest rate is therefore smaller and the return to the baseline faster.

The effect of the fiscal policy shock is shown on the right-hand side of Charts 13 to 15. The shock causes a monetary policy response to counter the negative impact on output. The interest rate is thus lowered by about two percentage

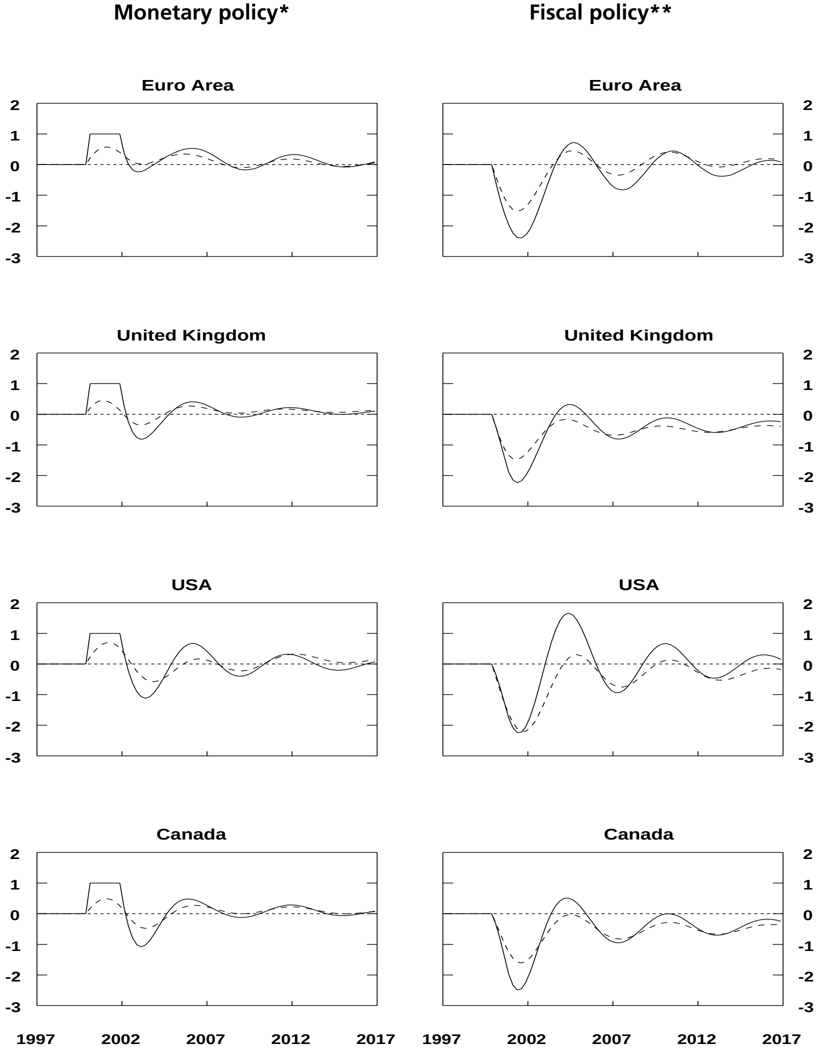
38 Government expenditure in MEMMOD is determined primarily in real terms; nominal government expenditure is thus derived from real expenditure and a price deflator. This necessitates the shock to be imposed on the real component. In the case of Germany, however, government expenditure is primarily determined in nominal terms, meaning the shock was imposed on nominal government expenditure as 1 % of nominal GDP.

39 Simulation results for Japan have only reproduced partly here. This is due to the special economic situation in 1999 where the simulations start: Given a low level of capacity utilisation and a low inflation rate, the interest rate response function hits the lower bound (0.15 % p.a.) almost instantly in the simulations. Simulation experiments built on top of such an extreme baseline are thus not representative of the general simulation properties. Earlier experiments conducted before the severe Japanese recession showed Japan to be roughly in line with the other non-euro area countries.

Effects of simultaneous temporary changes of monetary or fiscal policy in all countries on interest rates

Chart 13

Deviation from baseline in percentage points
_____ Short-term interest rate
------ Ten-year government bond yield



* Increase in short-term interest rates by 100 basis points in 2000 and 2001
** Decrease in government expenditure by 1 % of real GDP in 2000 and 2001

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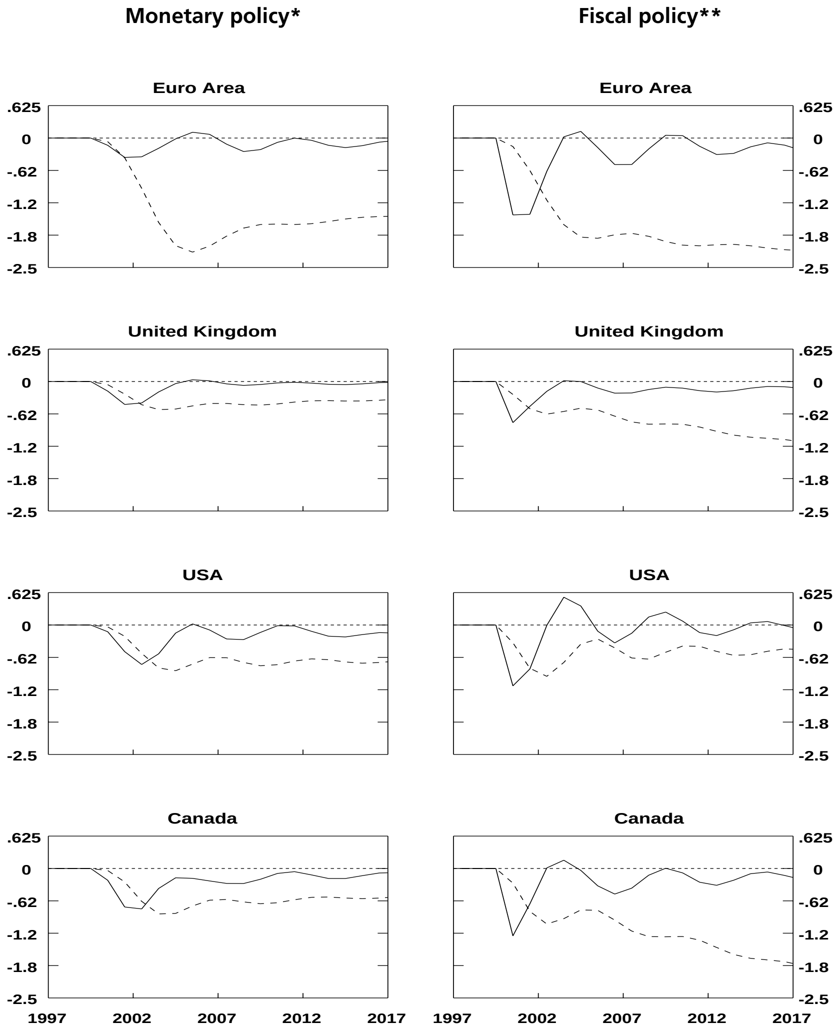
Effects of simultaneous temporary changes of monetary or fiscal policy in all countries on output and price level

Chart 14

Deviation from baseline in percent

_____ Real gross domestic product

------ Domestic demand deflator



* Increase in short-term interest rates by 100 basis points in 2000 and 2001

** Decrease in government expenditure by 1 % of real GDP in 2000 and 2001

Deutsche Bundesbank

points compared to the baseline in all countries. The cyclical swings during the adjustment process are larger than those in response to the monetary shock. Especially in the USA, there appears to be a rather strong initial reaction from the monetary authorities, which subsequently requires a contractive monetary stance.

Chart 14 shows the effects of the two shocks on the levels of real GDP and prices. It shows that there is a permanent negative level effect in prices, whereas the level of GDP returns almost to the baseline. Permanent effects exist because the equilibrium conditions are defined in terms of capacity utilisation and inflation, which are shown in Chart 15.

The effects of the shocks are approximately of the same order of magnitude in the euro area and in the non-euro area countries, in terms of output and inflation alike. The effect of the monetary shock on capacity utilisation ranges between about –0.25 and –0.65 percentage points. The impact of this shock on inflation amounts in all countries to a maximum of about one-quarter percentage point. The lowest point is reached within two to three years.

Most variables return fully to or close to their respective baseline values or to their new equilibrium within the horizon shown in the graphs. This suggests a stable long-term equilibrium that is not too dominant in the short term. The adjustment time depends predominantly on the implicit dynamics in the model.

A key factor in the adjustment dynamics is the monetary policy reaction function. The nominal interest rate reacts to changes in output and inflation but also exerts a substantial influence on these two variables. It is therefore a key variable in the equilibrium mechanism. Monetary policy rules are discussed at great length in the academic literature[40]. The main focus of that discussion is on the past performance of such rules, i.e. the best fit to the data. There are two key reasons why a rule based on past performances is not necessarily suitable for use in macro-econometric models. First, due to the prominent role of the interest rate in the equilibrium mechanism, it is more important to focus on the future performance of such rules in order to bring about stability in the model. Second, since some central banks have a declared monetary strategy, the rule has to be

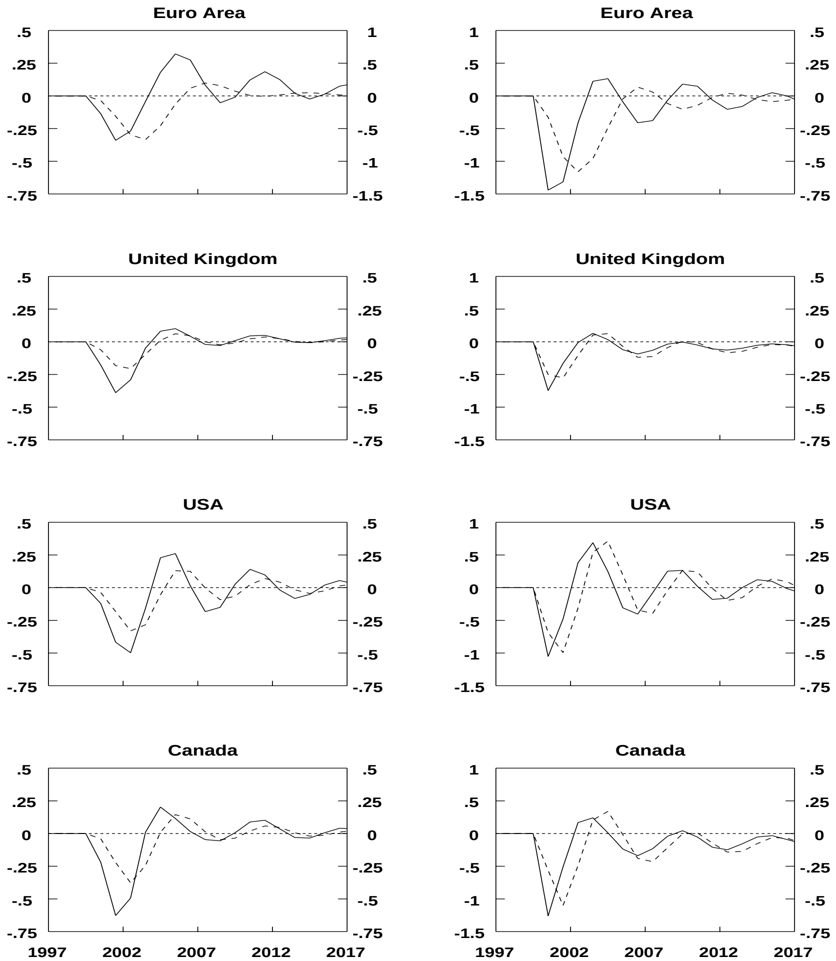
40 There is a whole range of literature on this topic. Standard examples include Clarida, R., Gali, J. and Gertler, M., Monetary policy rules in practice: Some international evidence, European Economic Review, 42, 1998, or Batini, N. and Haldane, A. G., Forward-Looking Rules for Monetary Policy, in Taylor, J. B. (ed.), Monetary Policy Rules, Chicago 1999.

Effects of simultaneous temporary changes of monetary or fiscal policy in all countries on output gap and inflation rate

Chart 15

Deviation from baseline in percentage points
_____ Output gap (left-hand scale)
------ Inflation rate of domestic demand deflator (right-hand scale)

Monetary policy* **Fiscal policy****



* Increase in short-term interest rates by 100 basis points in 2000 and 2001

** Decrease in government expenditure by 1 % of real GDP in 2000 and 2001

Deutsche Bundesbank

Effects of simultaneous temporary changes of monetary or fiscal policy in all countries on output gap and price level

Table 21

Deviation from baseline in percentage points or in per cent

Variable/country	Year						
	1	2	3	4	5	10	15
I. Monetary policy*							
1. Output gap							
Euro area	-0.14	-0.34	-0.27	-0.05	0.17	-0.00	-0.02
UK	-0.18	-0.39	-0.29	-0.05	0.08	0.01	-0.01
USA	-0.12	-0.42	-0.50	-0.16	0.23	0.03	-0.05
Canada	-0.21	-0.64	-0.50	0.01	0.20	0.01	-0.03
Japan	-0.10	-0.43	-0.63	-0.31	0.27	-0.05	-0.16
2. Price level[1]							
Euro area	-0.07	-0.38	-0.98	-1.66	-2.11	-1.69	-1.58
UK	-0.06	-0.24	-0.45	-0.54	-0.53	-0.46	-0.38
USA	-0.04	-0.22	-0.55	-0.83	-0.88	-0.79	-0.71
Canada	-0.04	-0.26	-0.64	-0.88	-0.87	-0.68	-0.57
Japan	-0.02	-0.11	-0.32	-0.55	-0.64	-0.54	-0.42
II. Fiscal policy**							
1. Output gap							
Euro area	-1.43	-1.31	-0.41	0.21	0.24	0.18	-0.02
UK	-0.75	-0.33	-0.01	0.13	0.03	-0.00	-0.05
USA	-1.05	-0.49	0.38	0.68	0.25	0.27	0.12
Canada	-1.24	-0.52	0.17	0.24	0.01	0.04	-0.05
Japan	-1.85	-1.58	0.09	1.15	0.60	0.54	0.24
2. Price level[1]							
Euro area	-0.16	-0.62	-1.20	-1.67	-1.92	-2.00	-2.07
UK	-0.25	-0.52	-0.63	-0.58	-0.52	-0.82	-1.08
USA	-0.34	-0.83	-0.99	-0.72	-0.37	-0.52	-0.57
Canada	-0.28	-0.83	-1.07	-0.97	-0.80	-1.31	-1.73
Japan	-0.31	-0.96	-1.41	-1.39	-1.15	-1.86	-2.36

* Increase in short-term interest rates by 100 basis points in 2000 and 2001
** Decrease in government expenditure by 1 % of real GDP in 2000 and 2001
1 Price deflator of domestic demand

Deutsche Bundesbank

modelled consistently with that strategy, and such a strategy may be inconsistent with a conventional policy rule such as a Taylor monetary rule.

Charts 16 and 17 show the effects of the two shocks on output and prices in a Phillips curve-type representation. The adjustment path describes a semi-circle with fast output losses and slow price reactions in the early stages. In this phase of the transmission process of monetary or fiscal policy shocks, the Phillips curve appears relatively flat. But in later periods output returns to its baseline, whereas the price level distinctly decreases. The charts also highlight the differences in simulation results for the individual euro area countries. One can see that differences in the size of the effect and also the adjustment patterns do indeed exist[41]. However, such differences within the euro area only partly reflect the true structural differences between the euro area economies. Asymmetric specifications in the country models, in particular the German block, are another explanatory factor of the asymmetric response to the two shocks. Although the models for all individual countries but Germany started off with a homogeneous framework, they have all been adjusted to fit each country individually. This implies, for instance, that restrictions have not been imposed equally. The 'true' structural asymmetries should probably result from differences in the estimated coefficients, derived from otherwise homogeneous models.

The charts show that all long-run Phillips curves are approximately vertical between the origin and the end points. Chart 18 further illustrates the Phillips curve effects, here in a comparison between the two shocks for each individual country. The response pattern in the countries outside the euro area is, with the exception of Japan, very similar between the two shocks. The euro area countries show a noticeably higher price effect in the monetary shock. The key results of the simulation analyses are also summarised in Table 21.

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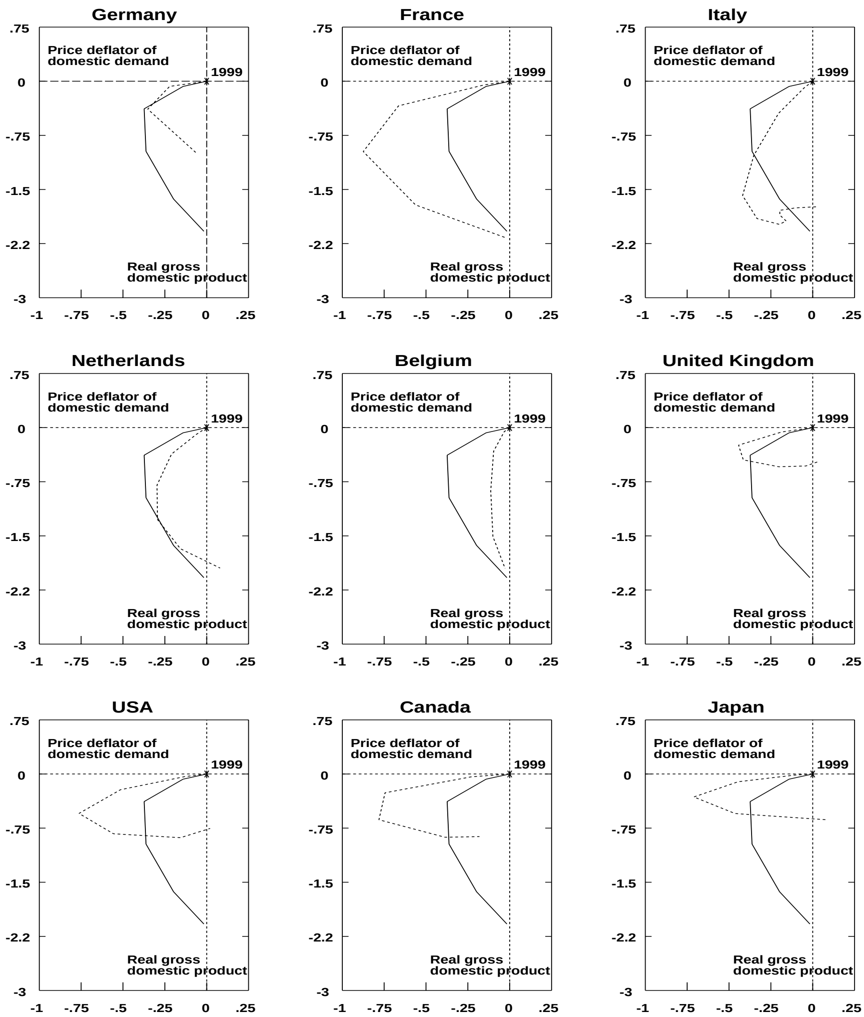
41 Examples of comparisons of the effects of monetary policy in European countries are given in Barran, F., Coudert, V. and Mojon, B., The Transmission of Monetary Policy in the European Countries, in Collignon, S. (ed.), European Monetary Policy, London 1997, Dornbusch, R., Favero, C. A., Giavazzi, F., Immediate Challenges for the European Central Bank: Issues in Formulating a Single Monetary Policy, Economic Policy, 26, 1998, Kieler, M. and Saarenheimo, T., Differences in Monetary Policy Transmission? A Case not Closed, European Commission Economic Papers, No. 132, Bruxelles 1998, Ramaswamy, R. and Sloek, T., The Real Effects of Monetary Policy in the European Union: What Are the Differences? International Monetary Fund Staff Papers, 45, 1998.

Effects of simultaneous temporary changes of monetary policy in all countries on output and price level*

Chart 16

Deviation from baseline in percent
_____ Euro area
------ Single country



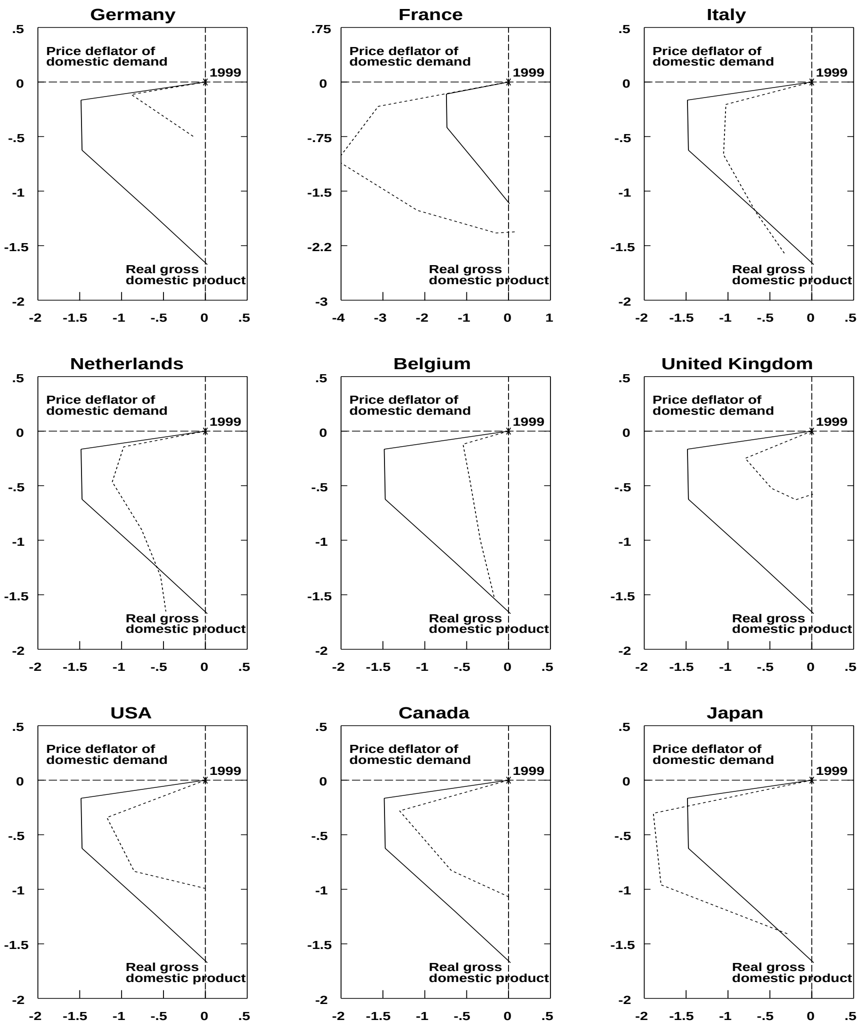
* Increase in short-term interest rates by 100 basis points in 2000 and 2001

Deutsche Bundesbank

Effects of simultaneous temporary changes of fiscal policy in all countries on output and price level*

Chart 17

Deviation from baseline in percent
_____ Euro area
------ Single country



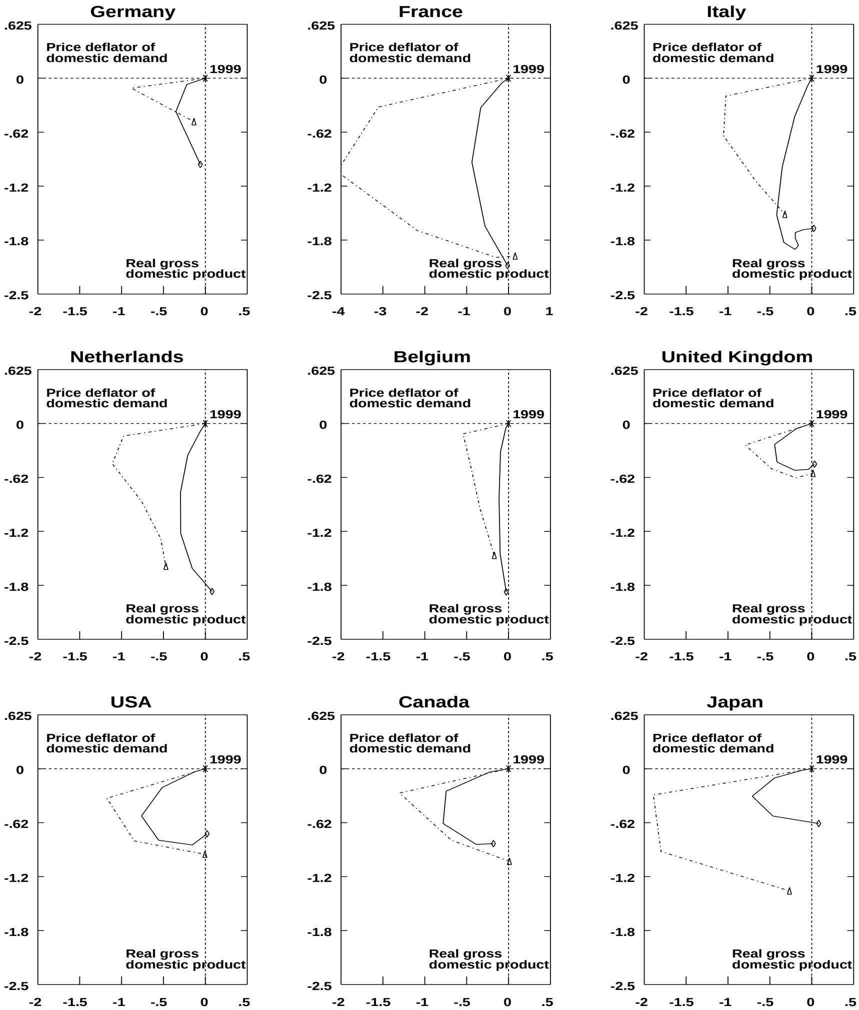
* Decrease in government expenditure by 1 % of real GDP in 2000 and 2001

Deutsche Bundesbank

Effects of simultaneous temporary changes of monetary or fiscal policy in all countries on output and price level

Chart 18

Deviation from baseline in percent
____ Monetary policy* (long-run ◊)
- - - - Fiscal policy ** (long-run Δ)



* Increase in short-term interest rates by 100 basis points in 2000 and 2001
** Decrease in government expenditure by 1 % of real GDP in 2000 and 2001

Deutsche Bundesbank

2. Supply side effects

The shocks affect the investment behaviour and labour demand, and therefore, through various channels, aggregate supply. Neither of the factors of production capital or labour is anchored to a steady-state level. The assumption of a natural rate of unemployment would provide an anchor for labour, given an exogenous population and participation rate.

However, the NAIRU concept is running into increasing criticism in the literature,[42] and alternative concepts along the line of hysteresis and time-varying NAIRUs have taken over. The whole point of the hysteresis idea is precisely the fact that there is no anchor for the rate of unemployment. This idea has been approximated in MEMMOD by using a smoothed unemployment rate[43].

Although the initial effect on investment and labour demand will normally be reversed, there is no mechanism in place that ensures that the initial effect will be offset exactly. The monetary shock, for instance, has a negative impact on investment. One has seen above that the interest rate eventually returns to its baseline value. This also applies to investment behaviour, but there is no mechanism that brings the capital stock back to its baseline level.

This does not contradict, or interfere with, the role of aggregate supply as the real anchor to the model. As the current discussion of equilibrium concepts such as NAIRU demonstrates, equilibrium concepts are often considered to be too stringent. An implication of a flexible supply side is, for example, that policy mistakes, which cause higher unemployment in the short run, will also have a potential impact over the long run.

3. Summary

The nominal anchor in MEMMOD is given by the inflation target, and the real anchor by potential output. There is a difference between the euro area and the other countries regarding the price mechanism. The P-star concept used for the euro area makes the interest rate a more powerful instrument in controlling inflation. There is no difference between the euro area and the other countries in the long term, where a state of equilibrium is reached in inflation and the output

42 See for example Cross, R. (ed.), The Natural Rate of Unemployment: Reflections on 25 Years of the Hypothesis, Cambridge University Press 1995.
43 The exponential smoothing of the unemployment rate is a simple moving average process.

gap. MEMMOD also takes account of potential supply-side effects, which are small, but potentially long-lasting or even permanent.

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Model documentation

I. Model equations

1. USA

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{US\_CPR}{US\_WOBE}\right) = \underset{(0.213)}{-\,0.005} + \underset{(3.856)}{0.267}\ \Delta_4 \ln\left(\frac{100 * US\_YV}{US\_PCP * US\_WOBE}\right)$$
$$- \underset{(2.315)}{0.140} * 0.01 * \left(US\_RL - US\_PCPD\right)$$
$$+ \underset{(9.736)}{0.673}\ \Delta_4 \ln\left(\frac{US\_CPR_{-1}}{US\_WOBE_{-1}}\right)$$
$$- \underset{(0.549)}{0.031}\ \ln\left(\frac{US\_CPR_{-4}}{US\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.775$ DW = 1.671 SER = 0.008

2. Participation rate (labour supply)

$$\ln\left(\frac{US\_EW}{US\_WOBE}\right) = \underset{(3.797)}{-\,0.016} + \underset{(164.615)}{0.975}\ \ln\left(\frac{US\_EW_{-1}}{US\_WOBE_{-1}}\right)$$

$\overline{R}^2 = 0.997$ DW = 1.986 SER = 0.003

3. Population

$$\ln\left(US\_WOBE\right) = \underset{(7672.991)}{5.224} + \underset{(392.707)}{0.244} * 0.01 * T$$

$\overline{R}^2 = 0.999$ DW = 0.039 SER = 0.002

4. Transfers to foreign countries

$$US\_U = \underset{(1.619)}{1.143} - \underset{(2.648)}{2.568}\ Q1 - \underset{(0.084)}{0.082}\ Q2 - \underset{(0.017)}{0.017}\ Q3 + \underset{(14.715)}{0.883}\ US\_U_{-1}$$

$$\bar{R}^2 = 0.708 \quad DW = 2.319 \quad SER = 3.289$$

5. Nominal private consumption

$$US\_CP = 0.01 * US\_CPR * US\_PCP$$

6. Nominal gross private fixed capital investment

$$US\_IAN = 0.01 * US\_IANR * US\_PIAN$$

7. Nominal final demand

$$US\_END = 0.01 * US\_ENDR * US\_PEV$$

8. Real final demand

$$US\_ENDR = US\_CPR + US\_IANR + US\_GR + US\_VR + US\_EXR$$

9. Nominal gross domestic product

$$US\_BIP = 0.01 * [US\_ENDR - US\_EXR] * US\_PINV + 0.01 * US\_EXR * US\_PEX - 0.01 * US\_IMR * US\_PIM + US\_SDN$$

10. Real gross domestic product

$$US\_BIPR = US\_ENDR - US\_IMR + US\_SDR$$

11. National income

$$US\_VE = US\_BIP - US\_TIS - US\_D$$

12. Disposable income of households

$$US\_YV = US\_VE - US\_TDB + US\_SB$$

13. Gross wage income

$$US\_L = 0.01 * 7.690 * US\_LA * US\_E1$$

14. Net lending of households

$$US\_FH = US\_YV - US\_CP$$

15. Current account balance

$$US\_LBS = 0.01 * [US\_EXR * US\_PEX - US\_IMR * US\_PIM] - US\_U$$

II. Aggregate supply

1. Real gross private fixed capital investment

a) $$\ln\left(US\_IANR\right) = -\underset{(8.144)}{1.948} + \underset{(29.963)}{0.984}\ \ln\left(US\_ENDR\right) + US\_IANR\_EC$$

$\bar{R}^2 = 0.904$ DW = 0.083 SER = 0.067

b) $$\begin{aligned}\Delta_4 \ln\left(US\_IANR\right) = &\ \underset{(6.510)}{0.655}\ \Delta_4 \ln\left(US\_ENDR\right)\\ &- \underset{(1.631)}{0.283} * 0.01\,\Delta_4\, US\_RL_{-1}\\ &+ \underset{(13.860)}{0.656}\ \Delta_4 \ln\left(US\_IANR_{-1}\right)\\ &- \underset{(4.887)}{0.195}\ US\_IANR\_EC_{-4}\end{aligned}$$

$\bar{R}^2 = 0.917$ DW = 1.023 SER = 0.024

2. Real inventory investment

$$\frac{US\_VR}{US\_ENDR_{-1}} = \underset{(2.877)}{0.002} + \underset{(7.182)}{0.603}\ \frac{US\_VR_{-1}}{US\_ENDR_{-2}}$$

$\bar{R}^2 = 0.357$ DW = 1.707 SER = 0.004

3. Employment (labour demand)

a) $$\begin{aligned}\ln\left(US\_E1\right) = &-\underset{(10.153)}{1.268} + \underset{(47.569)}{0.816}\ \ln\left(US\_ENDR\right)\\ &+ \underset{(13.874)}{0.716}\ \ln\left(\frac{US\_PEV * \left(100 - US\_TISS\right)}{100 * US\_LA}\right) + US\_E1\_EC\end{aligned}$$

$\bar{R}^2 = 0.996$ DW = 0.316 SER = 0.008

b) $$\Delta_4 \ln(US\_E1) = \underset{(15.226)}{0.389}\ \Delta_4 \ln(US\_ENDR) + \underset{(6.316)}{0.241}\ \Delta_4 \ln\left(\frac{US\_PEV * (100 - US\_TISS)}{100 * US\_LA}\right) + \underset{(11.813)}{0.446}\ \Delta_4 \ln(US\_E1_{-1}) - \underset{(3.801)}{0.211}\ US\_E1\_EC_{-4} + \min\left[0,\ 5 * \ln\left(\frac{0.97\ US\_EW}{US\_E1}\right)\right]$$

$\overline{R}^2 = 0.978$ DW = 1.141 SER = 0.003

4. Real imports of goods and services

a) $$\ln(US\_IMR) = \underset{(143.729)}{-2.201} + 1.0 \ln(US\_ENDR) + \underset{(23.297)}{1.579} \ln\left(\frac{US\_PEV * (1 - 0.01 * US\_TISS)}{US\_PIM}\right) + US\_IMR\_EC$$

$\overline{R}^2 = 0.851$ DW = 0.193 SER = 0.089

b) $$\Delta_4 \ln(US\_IMR) = \underset{(7.588)}{1.131}\ \Delta_4 \ln(US\_ENDR) + \underset{(4.199)}{0.298}\ \Delta_4 \ln\left(\frac{US\_PEV * (1 - 0.01 * US\_TISS)}{US\_PIM}\right) + \underset{(8.360)}{0.474}\ \Delta_4 \ln(US\_IMR_{-1}) - \underset{(2.193)}{0.088}\ US\_IMR\_EC_{-4}$$

$\overline{R}^2 = 0.910$ DW = 1.352 SER = 0.030

5. Depreciation allowances

$$US\_D = \underset{(2.414)}{1.813} + (1 - 0.01 * US\_KAB) * US\_D_{-1} + 0.01 * US\_KAB * 0.01 * US\_IANR_{-1} * US\_PINV_{-1}$$

$\overline{R}^2 = 0.000$ DW = 2.655 SER = 7.203

6. Potential gross domestic product

$$US\_BIPQ = 0.922 * \exp\left\{ \begin{array}{l} \underset{(211.033)}{0.986} + \underset{(32.552)}{0.138} * 0.01 * T \\ + 0.630 \ln\left[US\_E1 + 0.01 * (US\_ARLQ - US\_ARLQN) * US\_EW\right] \\ + (1 - 0.630) \ln\left[US\_KRP_{-1}\right] \end{array} \right\}$$

$\bar{R}^2 = 0.914$ DW = 0.261 SER = 0.012

7. Nominal inventory investment

$$US\_V = 0.01 * US\_PINV * (US\_VR + US\_CPR + US\_IANR + US\_GR) - US\_CP - US\_IAN - US\_G$$

8. Private real stock of capital

$$US\_KRP = (1 - 0.01 * US\_KAB)\, US\_KRP_{-1} + US\_IANR$$

9. Capacity utilisation

$$US\_GAPQ = 100 * \frac{US\_BIPR}{US\_BIPQ}$$

10. Unemployment

$$US\_ARL = US\_EW - US\_E1$$

11. Unemployment rate

$$US\_ARLQ = 100 * \frac{US\_ARL}{US\_EW}$$

12. "Smoothed" unemployment rate

$$US\_ARLQN = 0.9 * US\_ARLQN_{-1} + 0.1 * US\_ARLQ$$

13. Net lending of firms

$$US\_FU = US\_D - US\_IAN - US\_V - US\_U - US\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$
\begin{aligned}
\Delta_4 \ln(US\_LA) = {} & \underset{(1.296)}{0.001} + (1 - 0.830)\,\Delta_4 \ln(US\_PCP) \\
& - \underset{(3.076)}{0.154}\ \Delta_4 (US\_ARLQ - US\_ARLQN) * 0.01 \\
& - 0.154\,(US\_ARLQ_{-4} - US\_ARLQN_{-4}) * 0.01 \\
& + \underset{(15.577)}{0.830}\ \Delta_4 \ln(US\_LA_{-1})
\end{aligned}
$$

$\overline{R}^2 = 0.743 \quad DW = 1.635 \quad SER = 0.005$

2. Deflator of domestic demand

a)
$$
\begin{aligned}
0.01 * US\_INF = {} & 0.03\,\Delta_4^2 \ln\left(\frac{US\_COSI_{-1}}{1 - 0.01 * US\_TISS_{-1}}\right) \\
& + 0.01 * \left[(1 - 0.307) * US\_INF_{-1} + \underset{(7.118)}{0.307} * \begin{pmatrix}(1 - 0.4) * US\_INF_{+1} \\ + 0.4 * US\_INFT\end{pmatrix}\right] \\
& + 0.1 \ln(0.01 * US\_GAPQ)
\end{aligned}
$$

$\overline{R}^2 = 0.379 \quad DW = 1.713 \quad SER = 0.003$

b) $\ln(US\_PINV) = \ln(US\_PINV_{-4}) + 0.01 * US\_INF$

3. Deflator of private consumption

$$
\begin{aligned}
\Delta_4 \ln(US\_PCP) = {} & (1 - 0.479)\, 0.01 * US\_INF \\
& + \underset{(8.119)}{0.479}\ \Delta_4 \ln(US\_PCP_{-1})
\end{aligned}
$$

$\overline{R}^2 = 0.420 \quad DW = 0.526 \quad SER = 0.003$

4. Deflator of government demand

$$\Delta_4 \ln(US\_PG) = (1-0.611)\ 0.01 * US\_INF + \underset{(14.148)}{0.611}\ \Delta_4 \ln(US\_PG_{-1})$$

$\overline{R}^2 = 0.687$ DW = 1.483 SER = 0.004

5. Deflator of private fixed capital investment

$$\Delta_4 \ln(US\_PIAN) = (1-0.880)\ 0.01 * US\_INF + \underset{(23.319)}{0.880}\ \Delta_4 \ln(US\_PIAN_{-1})$$

$\overline{R}^2 = 0.857$ DW = 0.533 SER = 0.007

6. Deflator of exports

$$\Delta_4 \ln(US\_PEX) = (1-0.945)\ \Delta_4 \begin{bmatrix} (1-0.116) * \ln(US\_PINV_{-1}) \\ + 0.116\ US\_LPAC_{-1} \end{bmatrix} + \underset{(22.432)}{0.945}\ \Delta_4 \ln(US\_PEX_{-1})$$

$\overline{R}^2 = 0.866$ DW = 0.815 SER = 0.012

7. Production costs

$$US\_COSI = \frac{100}{99.999} * US\_LA^{0.847} * US\_PIM^{1-0.847}$$

8. Deflator of final demand

$$US\_PEV = \frac{(US\_ENDR - US\_EXR) * US\_PINV + US\_EXR * US\_PEX}{US\_ENDR}$$

9. Deflator of gross domestic product

$$US\_PBIP = 100 * \frac{US\_BIP}{US\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$US\_PCPD = 0.9 * US\_PCPD_{-1} + 0.1\ \Delta_4 \ln(PCP_{-1}) * 100$$

11. Adaptive expectation on inflation rate of final demand

$$US\_PEVD = 0.9 * US\_PEVD_{-1} + 0.1\, \Delta_4 \ln\left(PEV_{-1}\right) * 100$$

IV. Government

1. Direct tax rate

$$\underset{(0.440)}{US\_TDBS = 0.510} + \underset{(23.847)}{0.983}\ US\_TDBS_{-1}$$

$$\overline{R}^2 = 0.862 \qquad DW = 2.016 \qquad SER = 0.336$$

2. Indirect tax rate

$$US\_TISS = \underset{(2.299)}{0.448} + \underset{(0.262)}{0.007}\ Q1 + \underset{(0.538)}{0.015}\ Q2 + \underset{(0.488)}{0.014}\ Q3 + \underset{(32.293)}{0.930}\ US\_TISS_{-1}$$

$$\overline{R}^2 = 0.920 \qquad DW = 1.835 \qquad SER = 0.095$$

3. Real government demand

$$\begin{aligned}\Delta_4 \ln\left(US\_GR\right) = {} & \underset{(19.675)}{0.860}\ \Delta_4 \ln\left(US\_GR_{-1}\right) \\ & + \left(1 - 0.860\right) \Delta_4 \ln\left(US\_BIPR\right) \\ & - \underset{(0.708)}{0.041} \ln\left(0.01 * US\_GAPQ\right)\end{aligned}$$

$$\overline{R}^2 = 0.849 \qquad DW = 2.195 \qquad SER = 0.011$$

4. Government transfers to households

$$\ln \frac{US\_SB}{US\_BIP} = -\underset{(1.006)}{0.036} + \underset{(3.940)}{0.569} * 0.01 * \left(US\_ARLQ - US\_ARLQN\right) + \underset{(58.155)}{0.982} \ln \frac{US\_SB_{-1}}{US\_BIP_{-1}}$$

$$\overline{R}^2 = 0.974 \qquad DW = 0.677 \qquad SER = 0.015$$

5. Direct taxes and social contributions

$$US\_TDB = 0.01 * US\_TDBS * US\_VE$$

6. Indirect taxes (excluding subsidies)

$$US\_TIS = 0.01 * US\_TISS * US\_ENDR * 0.01 * US\_PEV$$

7. Nominal government demand

$$US\_G = 0.01 * US\_GR * US\_PG$$

8. Net lending of government

$$US\_FS = US\_TDB + US\_TIS - US\_G - US\_SB$$

V. Money and interest rates

1. Real stock of money

a)

$$\ln\left(\frac{US\_M2}{US\_PINV}\right) = \underset{(8.298)}{-1.720} + \underset{(25.952)}{0.715} \ln\left(US\_BIPR\right) - \underset{(1.267)}{0.292} * 0.01 * US\_RL + US\_M2\_EC$$

$\bar{R}^2 = 0.898 \quad DW = 0.053 \quad SER = 0.046$

b)

$$\Delta_4 \ln\left(\frac{US\_M2}{US\_PINV}\right) = \underset{(1.971)}{0.094}\ \Delta_4 \ln\left(US\_BIPR\right) - \underset{(4.698)}{0.426}\ \Delta_4\ 0.01 * US\_RL + \underset{(15.700)}{0.809}\ \Delta_4 \ln\left(\frac{US\_M2_{-1}}{US\_PINV_{-1}}\right) - \underset{(4.544)}{0.120}\ US\_M2\_EC_{-4}$$

$\bar{R}^2 = 0.899 \quad DW = 1.366 \quad SER = 0.011$

2. Monetary policy rule: Money market interest rate for three-month funds

$$US\_RS = 0.75 * US\_RS_{-1} + (1 - 0.75)\, US\_RSST + 0.50 * \left(\frac{1}{4}\sum_{i=1}^{4} US\_INF_{+i} - US\_INFT_{+i}\right) + 0.50 * 100 * \ln\left(0.01 * \frac{1}{4} * \sum_{i=0}^{3} US\_GAPQ_{-i}\right)$$

3. Yield on government bonds

$$1+0.01\,US\_RL=\left(1+0.01\,US\_RL_{-1}\right)^{(1-0.492)} * \left(1+0.01\,US\_RL_{+1}\right)^{\underset{(12.110)}{0.492}} * \left(\frac{1+0.01\,US\_RS}{1+0.01\,US\_RSST}\right)^{\frac{1}{40}}$$

$\overline{R}^2 = 1.000 \quad DW = 2.645 \quad SER = 0.004$

4. Short-term interest rate (long-run)

$$US\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} US\_BIPQ_{-i}\right) + US\_INFT$$

5. Long-term interest rate (long-run)

$$US\_RLST = US\_RSST + US\_TERM$$

2. Japan

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{JP\_CPR}{JP\_WOBE}\right) = -\underset{(1.152)}{0.058}$$
$$+ \underset{(4.583)}{0.357}\ \Delta_4 \ln\left(\frac{JP\_YV}{0.01 * JP\_PCP * JP\_WOBE}\right)$$
$$- \underset{(1.970)}{0.131} * 0.01 * \left(JP\_RL - JP\_PCPD\right)$$
$$+ \underset{(7.353)}{0.551} * \Delta_4 \ln\left(\frac{JP\_CPR_{-1}}{JP\_WOBE_{-1}}\right)$$
$$- \underset{(1.273)}{0.124} * \ln\left(\frac{JP\_CPR_{-4}}{JP\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.467$ DW = 1.862 SER = 0.012

2. Participation rate (labour supply)

$$\ln\left(\frac{JP\_EW}{JP\_WOBE}\right) = -\underset{(2.435)}{0.066} + \underset{(29.114)}{0.923}\ \ln\left(\frac{JP\_EW_{-1}}{JP\_WOBE_{-1}}\right) + \underset{(2.657)}{0.0001} * T$$

$\overline{R}^2 = 0.995$ DW = 2.189 SER = 0.003

3. Population

$$\ln\left(JP\_WOBE\right) = \underset{(1360.425)}{4.648} + \underset{(42.991)}{0.134} * 0.01 * T$$

$\overline{R}^2 = 0.953$ DW = 0.007 SER = 0.008

4. Transfers to foreign countries

$$JP\_U = -\underset{(0.943)}{0.052} + \underset{(0.376)}{0.027}\ Q1 - \underset{(0.198)}{0.014}\ Q2 - \underset{(0.748)}{0.054}\ Q3 + \underset{(17.598)}{0.887}\ JP\_U_{-1}$$

$\overline{R}^2 = 0.772$ DW = 2.354 SER = 0.244

5. Nominal private consumption

$$JP\_CP = 0.01 * JP\_CPR * JP\_PCP$$

6. Nominal gross private fixed capital investment

$$JP\_IAN = 0.01 * JP\_IANR * JP\_PIAN$$

7. Nominal final demand

$$JP\_END = 0.01 * JP\_ENDR * JP\_PEV$$

8. Real final demand

$$JP\_ENDR = JP\_CPR + JP\_IANR + JP\_GR + JP\_VR + JP\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} JP\_BIP = {} & 0.01 * [JP\_ENDR - JP\_EXR] * JP\_PINV \\ & + 0.01 * JP\_EXR * JP\_PEX \\ & - 0.01 * JP\_IMR * JP\_PIM \\ & + JP\_SDN \end{aligned}$$

10. Real gross domestic product

$$JP\_BIPR = JP\_ENDR - JP\_IMR + JP\_SDR$$

11. National income

$$JP\_VE = JP\_BIP - JP\_TIS - JP\_D$$

12. Disposable income of households

$$JP\_YV = JP\_VE - JP\_TDB + JP\_SB$$

13. Gross wage income

$$JP\_L = 0.01 * 0.919 * JP\_LA * JP\_E1$$

14. Net lending of households

$$JP\_FH = JP\_YV - JP\_CP$$

15. Current account balance

$$JP\_LBS = 0.01 * [JP\_EXR * JP\_PEX - JP\_IMR * JP\_PIM] - JP\_U$$

II. Aggregate supply

1. Real gross private fixed capital investment

a) $$\ln(JP\_IANR) = -\underset{(55.413)}{1.525} + 1.0 \ln(JP\_ENDR) - \underset{(4.707)}{1.969} * 0.01 * JP\_RL + JP\_IANR\_EC$$

$\bar{R}^2 = 0.182$ DW = 0.073 SER = 0.080

b) $$\Delta_4 \ln(JP\_IANR) = \underset{(5.852)}{0.555}\ \Delta_4 \ln(JP\_ENDR) - \underset{(1.082)}{0.101}\ \Delta_4 * 0.01\ (JP\_RL_{-1} - JP\_PEVD_{-1}) + \underset{(13.071)}{0.674}\ \Delta_4 \ln(JP\_IANR_{-1}) - \underset{(3.536)}{0.111}\ JP\_IANR\_EC_{-4}$$

$\bar{R}^2 = 0.895$ DW = 1.565 SER = 0.023

2. Real inventory investment

$$JP\_VR = \underset{(1.349)}{0.059} + \underset{(5.820)}{0.491}\ JP\_VR_{-1} + \underset{(3.841)}{0.042}\ \Delta_4\ JP\_ENDR$$

$\bar{R}^2 = 0.449$ DW = 2.303 SER = 0.204

3. Employment (labour demand)

a) $$\ln(JP\_E1) = \underset{(192.770)}{2.702} + \underset{(97.963)}{0.301}\ \ln(JP\_ENDR) + JP\_E1\_EC$$

$\bar{R}^2 = 0.990$ DW = 0.254 SER = 0.008

b) $$\Delta_4 \ln(JP\_E1) = \underset{(5.648)}{0.090}\, \Delta_4 \ln(JP\_ENDR) + \underset{(11.133)}{0.639}\, \Delta_4 \ln(JP\_E1_{-1}) - \underset{(3.944)}{0.218}\, JP\_E1\_EC_{-4} + \min\left[0, \ln\left(\frac{0.97\, JP\_EW}{JP\_E1}\right)\right]$$

$\bar{R}^2 = 0.915$ DW = 2.120   SER = 0.003

4. Real imports of goods and services

a) $$\ln(JP\_IMR) = -\underset{(197.586)}{2.458} + 1.00 \ln(JP\_ENDR) + \underset{(8.067)}{0.300} \ln\left(\frac{JP\_PEV * (1 - 0.01 * JP\_TISS)}{JP\_PIM}\right) + JP\_IMR\_EC$$

$\bar{R}^2 = 0.403$ DW = 0.083   SER = 0.102

b) $$\Delta_4 \ln(JP\_IMR) = \underset{(2.865)}{0.383}\, \Delta_4 \ln(JP\_ENDR) + \underset{(1.781)}{0.055}\, \Delta_4 \ln\left(\frac{JP\_PEV * (1 - 0.01 * JP\_TISS)}{JP\_PIM}\right) + \underset{(11.115)}{0.702}\, \Delta_4 \ln(JP\_IMR_{-1}) - \underset{(4.126)}{0.197}\, JP\_IMR\_EC_{-4}$$

$\bar{R}^2 = 0.855$ DW = 1.550   SER = 0.036

5. Depreciation allowances

$$JP\_D = \underset{(0.723)}{0.171} - \underset{(0.404)}{0.135}\, Q1 - \underset{(0.164)}{0.055}\, Q2 - \underset{(0.383)}{0.128}\, Q3 + (1 - 0.01 * JP\_KAB) * JP\_D_{-1} + 0.01 * JP\_KAB * 0.01 * JP\_IANR_{-1} * JP\_PINV_{-1}$$

$\bar{R}^2 = -0.032$ DW = 3.377   SER = 1.135

6. Potential gross domestic product

$$JP\_BIPQ = 0.999 * \exp\left\{\begin{array}{l} -\underset{(85.165)}{0.715} + \underset{(16.138)}{0.123} * 0.01 * T \\ + 0.588 \ln\left[JP\_E1 + 0.01 * (JP\_ARLQ - JP\_ARLQN) * JP\_EW\right] \\ + (1 - 0.588) \ln\left[JP\_KRP_{-1}\right] \end{array}\right\}$$

$\overline{R}^2 = 0.724 \quad DW = 0.136 \quad SER = 0.022$

7. Nominal inventory investment

$$JP\_V = 0.01 * JP\_PINV * (JP\_VR + JP\_CPR + JP\_IANR + JP\_GR) - JP\_CP - JP\_IAN - JP\_G$$

8. Private real stock of capital

$$JP\_KRP = (1 - 0.01 * JP\_KAB)\, JP\_KRP_{-1} + JP\_IANR$$

9. Capacity utilisation

$$JP\_GAPQ = 100 * \frac{JP\_BIPR}{JP\_BIPQ}$$

10. Unemployment

$$JP\_ARL = JP\_EW - JP\_E1$$

11. Unemployment rate

$$JP\_ARLQ = 100 * \frac{JP\_ARL}{JP\_EW}$$

12. "Smoothed" unemployment rate

$$JP\_ARLQN = 0.9 * JP\_ARLQN_{-1} + 0.1 * JP\_ARLQ$$

13. Net lending of firms

$$JP\_FU = JP\_D - JP\_IAN - JP\_V - JP\_U - JP\_SDN$$

III. Factor costs and price deflators

1. Gross wage income per employee

$$\Delta_4 \ln(JP\_LA) = \underset{(10.285)}{0.637}\ \Delta_4 \ln(JP\_LAS) + \underset{(5.364)}{0.305}\ \Delta_4 \ln(JP\_LA_{-1}) + \underset{(7.413)}{0.519}\ \ln\left(\frac{JP\_LAS_{-4}}{JP\_LA_{-4}}\right)$$

$\bar{R}^2 = 0.975 \quad DW = 1.666 \quad SER = 0.010$

2. Deflator of domestic demand

a) $$0.01 * JP\_INF = \underset{(2.138)}{0.033}\ \Delta_4^2 \ln\left(\frac{JP\_COSI}{1 - 0.01 * JP\_TISS}\right) + 0.01 * \left[(1 - 0.221) * JP\_INF_{-1} + \underset{(4.627)}{0.221} * \begin{pmatrix}(1 - 0.4) * JP\_INF_{+1} \\ + 0.4 * JP\_INFT\end{pmatrix}\right] + 0.05 \ln(0.01 * JP\_GAPQ)$$

$\bar{R}^2 = 0.295 \quad DW = 1.236 \quad SER=0.006$

b) $$\ln(JP\_PINV) = \ln(JP\_PINV_{-4}) + 0.01 * JP\_INF$$

3. Deflator of private consumption

$$\Delta_4 \ln(JP\_PCP) = (1 - 0.542)\ 0.01 * JP\_INF + \underset{(18.167)}{0.542}\ \Delta_4 \ln(JP\_PCP_{-1})$$

$\bar{R}^2 = 0.784 \quad DW = 1.389 \quad SER = 0.005$

4. Deflator of government demand

$$\Delta_4 \ln(JP\_PG) = (1 - 0.276)\ 0.01 * JP\_INF + \underset{(5.066)}{0.276}\ \Delta_4 \ln(JP\_PG_{-1})$$

$\bar{R}^2 = 0.220 \quad DW = 1.526 \quad SER = 0.011$

5. Deflator of private fixed capital investment

$$\Delta_4 \ln\left(JP\_PIAN\right) = \left(1 - 0.669\right) 0.01 * JP\_INF + \underset{(9.340)}{0.669}\ \Delta_4 \ln\left(JP\_PIAN_{-1}\right)$$

$\bar{R}^2 = 0.489$ DW = 0.502 SER = 0.013

6. Deflator of exports

$$\Delta_4 \ln\left(JP\_PEX\right) = \left(1 - 0.888\right) \Delta_4 \begin{bmatrix} \left(1 - 0.122\right) \ln\left(JP\_PINV_{-1}\right) \\ + 0.122\ JP\_LPAC_{-1} \end{bmatrix} + \underset{(12.174)}{0.888}\ \Delta_4 \ln\left(JP\_PEX_{-1}\right)$$

$\bar{R}^2 = 0.655$ DW = 1.337 SER = 0.034

7. Production costs

$$JP\_COSI = \frac{100}{99.966} * JP\_LA^{0.844} * JP\_PIM^{1-0.844}$$

8. Deflator of final demand

$$JP\_PEV = \frac{\left(JP\_ENDR - JP\_EXR\right) * JP\_PINV + JP\_EXR * JP\_PEX}{JP\_ENDR}$$

9. Deflator of gross domestic product

$$JP\_PBIP = 100 * \frac{JP\_BIP}{JP\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$JP\_PCPD = 0.9 * JP\_PCPD_{-1} + 0.1\,\Delta_4 \ln\left(PCP_{-1}\right) * 100$$

11. Adaptive expectation on inflation rate of final demand

$$JP\_PEVD = 0.9 * JP\_PEVD_{-1} + 0.1\,\Delta_4 \ln\left(PEV_{-1}\right) * 100$$

12. Long-term gross wage income per employee

$$JP\_LAS = \frac{1}{1.54} * JP\_PCP * JP\_BPR^{0.8} * \left(1 - 0.01 * JP\_ARLQ\right)^{0.8}$$

13. Labour productivity

$$JP\_BPR = 0.9 * JP\_BPR_{-1} + 0.1 \frac{JP\_ENDR}{JP\_E1}$$

IV. Government

1. Direct tax rate

$$JP\_TDBS = \underset{(1.412)}{0.984} + \underset{(35.634)}{0.963}\ JP\_TDBS_{-1}$$

$\overline{R}^2 = 0.933 \quad DW = 2.629 \quad SER = 0.606$

2. Indirect tax rate

$$JP\_TISS = \underset{(1.554)}{0.427} + \underset{(5.445)}{0.444}\ JP\_TISS_{-1} + \underset{(6.114)}{0.494}\ JP\_TISS_{-4}$$

$\overline{R}^2 = 0.819 \quad DW = 2.469 \quad SER = 0.356$

3. Real government demand

$$\begin{aligned}\Delta_4 \ln(JP\_GR) = & \underset{(12.284)}{0.813}\ \Delta_4 \ln(JP\_GR_{-1}) \\ & + (1 - 0.813)\ \Delta_4 \ln(JP\_BIPR) \\ & - \underset{(0.845)}{0.114}\ \ln(0.01 * JP\_GAPQ)\end{aligned}$$

$\overline{R}^2 = 0.650 \quad DW = 1.584 \quad SER = 0.026$

4. Government transfers to households

$$\begin{aligned}\ln(JP\_SB) = & \underset{(18.908)}{0.073} + \underset{(3.952)}{1.918}\ \Delta_4\ 0.01 * (JP\_ARLQ - JP\_ARLQN) \\ & + \underset{(556.335)}{0.976}\ \ln(JP\_SB_{-1})\end{aligned}$$

$\overline{R}^2 = 0.997 \quad DW = 0.303 \quad SER = 0.009$

5. Direct taxes and social contributions

$$JP\_TDB = 0.01 * JP\_TDBS * JP\_VE$$

6. Indirect taxes (excluding subsidies)

$$JP\_TIS = 0.01 * JP\_TISS * 0.01 * JP\_ENDR * JP\_PEV$$

7. Nominal government demand

$$JP\_G = 0.01 * JP\_GR * JP\_PG$$

8. Net lending of government

$$JP\_FS = JP\_TDB + JP\_TIS - JP\_G - JP\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

a)
$$\ln\left(\frac{JP\_M}{JP\_PINV}\right) = \underset{(67.767)}{-\ 5.755} + \underset{(101.498)}{1.678}\ \ln(JP\_BIPR) - \underset{(5.283)}{1.096} * 0.01 * JP\_RL + JP\_M\_EC$$

$\bar{R}^2 = 0.997 \quad DW = 0.468 \quad SER = 0.022$

b)
$$\Delta_4 \ln\left(\frac{JP\_M}{JP\_PINV}\right) = \underset{(4.797)}{0.493}\ \Delta_4 \ln(JP\_BIPR) - \underset{(2.778)}{0.355}\ \Delta_4\ 0.01 * JP\_RL + \underset{(12.218)}{0.710}\ \Delta_4 \ln\left(\frac{JP\_M_{-1}}{JP\_PINV_{-1}}\right) - \underset{(4.110)}{0.287}\ JP\_M\_EC_{-4}$$

$\bar{R}^2 = 0.964 \quad DW = 0.832 \quad SER = 0.012$

2. Monetary policy rule: Money market interest rate for three-month funds

$$JP\_RS = 0.75\ JP\_RS_{-1} + (1 - 0.75)\ JP\_RSST + 0.50 * \frac{1}{4}\sum_{i=1}^{4}(JP\_INF_{+i} - JP\_INFT_{+i}) + 0.50 * \frac{1}{4}\sum_{i=0}^{3} 100 * \ln(0.01\ JP\_GAPQ_{-i})$$

3. Yield on government bonds

$$
\begin{aligned}
1+0.01\,JP\_RL = {} & \left(1+0.01\,JP\_RL_{-1}\right)^{(1-0.492)} \\
& *\left(1+0.01\,JP\_RL_{+1}\right)^{\underset{(8.665)}{0.492}} \\
& *\left(\frac{1+0.01\,JP\_RS}{1+0.01\,JP\_RSST}\right)^{\frac{1}{40}} \\
& *\left(\frac{1+0.01\,JP\_RL_{-4}}{1+0.01\,JP\_RLST}\right)^{-0.02}
\end{aligned}
$$

$\overline{R}^2 = 1.000$ DW = 2.909 SER = 0.004

4. Short-term interest rate (long-run)

$$
JP\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} JP\_BIPQ_{-i}\right) + JP\_INFT
$$

5. Long-term interest rate (long-run)

$$
JP\_RLST = JP\_RSST + JP\_TERM
$$

6. Exchange rate of the Yen against the US-Dollar

$$
\begin{aligned}
\ln\left(JP\_ER\right) = {} & \underset{(1.282)}{0.161} + \left(1-0.965\right)\ln\left(\frac{JP\_PCP_{+1}}{US\_PCP_{+1}}\right) \\
& -1.0 * 0.01 * \left(JP\_RS - US\_RS\right) \\
& +0.965 * 0.01 * \left(JP\_RS_{-1} - US\_RS_{-1}\right) \\
& + \underset{(37.988)}{0.965} \ln\left(JP\_ER_{-1}\right)
\end{aligned}
$$

$\overline{R}^2 = 0.941$ DW = 1.239 SER = 0.057

3. Germany

I. Aggregate demand

1. Real private per capita consumption

a)

$$\ln\left(\frac{GY\_CPR}{GY\_WOBE}\right) = \underset{(566.878)}{5.044} - \underset{(0.471)}{0.002}\ Q1 + \underset{(9.989)}{0.044}\ Q2 + \underset{(10.061)}{0.047}\ Q3$$

$$+ \underset{(93.238)}{0.732}\ \ln\left(\frac{GY\_LN + GY\_TRN}{GY\_PCP * GY\_WOBE}\right)$$

$$+ (1 - 0.732)\ \ln\left(\frac{GY\_GNEH - GY\_VERR - 0.25 * 0.4 * GY\_PCPD * GY\_NGVH_{-1}}{GY\_PCP * GY\_WOBE}\right)$$

$$+ GY\_CPR\_EC$$

$\overline{R}^2 = 0.992$ DW = 0.605 SER = 0.015

b)

$$\Delta_4 \ln\left(\frac{GY\_CPR}{GY\_WOBE}\right) = \underset{(7.986)}{0.027}$$

$$+ \underset{(13.414)}{0.491}\ \Delta_4 \ln\left(\frac{GY\_LN + GY\_TRN}{GY\_PCP * GY\_WOBE}\right)$$

$$+ \underset{(12.761)}{0.225}\ \Delta_4 \ln\left(\frac{GY\_GNEH - GY\_VERR - 0.25 * 0.4 * GY\_PCPD * GY\_NGVH_{-1}}{GY\_PCP * GY\_WOBE}\right)$$

$$- \underset{(7.773)}{0.588}\ (0.01 * GY\_RL - GY\_PCPD)$$

$$+ \underset{(0.873)}{0.041}\ \Delta_4 \ln\left(\frac{GY\_CPR_{-1}}{GY\_WOBE_{-1}}\right)$$

$$- \underset{(7.428)}{0.507}\ GY\_CPR\_EC_{-4}$$

$\overline{R}^2 = 0.893$ DW = 1.634 SER = 0.008

2. Participation rate of employees (labour supply)

$$\begin{aligned}\ln\left(GY\_EQU\right) = &-\underset{(6.975)}{0.005}\ Q1 - \underset{(6.475)}{0.005}\ Q2 - \underset{(0.202)}{0.0001}\ Q3 + \underset{(21.085)}{0.049}\ \Delta_1\ GY\_DWU \\ &+ \underset{(6.124)}{0.101}\ \ln\left(\frac{GY\_WOBA}{GY\_WOBE}\right) \\ &+ \underset{(7.878)}{0.015}\ \ln\left(\frac{GY\_LN}{GY\_B1 * GY\_PCP}\right) \\ &+ \underset{(38.107)}{0.938}\ \ln\left(GY\_EQU_{-1}\right) \\ &- \underset{(1.489)}{0.032}\ \ln\left(GY\_EQU_{-4}\right)\end{aligned}$$

$\overline{R}^2 = 1.000 \quad DW = 2.005 \quad SER = 0.002$

3. Withdrawn profits and property income

$$\begin{aligned}\ln\left(GY\_GNEH\right) = &\underset{(2.739)}{0.115} - \underset{(2.383)}{0.067}\ Q1 - \underset{(4.003)}{0.094}\ Q2 - \underset{(4.152)}{0.102}\ Q3 \\ &+ \underset{(1.918)}{0.092}\ \ln\left(GY\_GU_{-1} - GY\_TDSO_{-1}\right) \\ &+ \underset{(3.615)}{0.276}\ \ln\left(GY\_GNEH_{-1}\right) \\ &+ \underset{(10.489)}{0.633}\ \ln\left(GY\_GNEH_{-4}\right)\end{aligned}$$

$\overline{R}^2 = 0.993 \quad DW = 1.449 \quad SER = 0.041$

4. Transfers of households to foreign countries

$$\begin{aligned}GY\_VERR = &\underset{(3.905)}{1.097} - \underset{(1.438)}{0.120}\ Q1 + \underset{(1.936)}{0.179}\ Q2 + \underset{(5.122)}{0.445}\ Q3 \\ &- \underset{(11.480)}{3.312}\ \Delta_1\ GY\_DWU + \underset{(3.072)}{1.394}\ \Delta_1 GY\_DWU_{-1} + \underset{(1.623)}{0.276}\ GY\_DWU \\ &+ \underset{(3.325)}{0.191} * 0.01 * GY\_YV \\ &+ \underset{(3.613)}{0.356}\ GY\_VERR_{-1}\end{aligned}$$

$\overline{R}^2 = 0.872 \quad DW = 1.903 \quad SER = 0.266$

5. Balance of capital transfer payments of households

$$GY\_SVPH = -\underset{(0.005)}{0.002} + \underset{(0.651)}{0.170}\ Q1 - \underset{(0.882)}{0.188}\ Q2 + \underset{(3.106)}{0.668}\ Q3 - \underset{(2.378)}{1.120}\ GY\_DWU$$
$$+ \underset{(3.867)}{1.158} * 0.01 * GY\_YV_{-1}$$
$$+ \underset{(6.997)}{0.613}\ GY\_SVPH_{-1}$$

$\overline{R}^2 = 0.945$ DW = 2.563 SER = 0.714

6. Transfers of firms to foreign countries

$$GY\_ARSF = -\underset{(0.975)}{0.953} + \underset{(1.131)}{0.923}\ Q1 - \underset{(0.003)}{0.002}\ Q2 - \underset{(1.763)}{1.414}\ Q3 + \underset{(4.282)}{11.940}\ \Delta_1 GY\_DWU_{-2}$$
$$+ \underset{(9.964)}{1.110} * 0.01\, GY\_END$$

$\overline{R}^2 = 0.589$ DW = 2.339 SER = 2.717

7. Nominal private consumption

GY_CP = 0.01 * GY_CPR * GY_PCP

8. Nominal domestic demand

GY_INLV = 0.01 * GY_INVR * GY_PINV

9. Real domestic demand

GY_INVR = GY_CPR + GY_CSR + GY_IAUR + GY_IASR + GY_IBUR + GY_IBSR
+ GY_IWR + GY_VR

10. Nominal final demand

GY_END = GY_INLV + GY_EX

11. Real final demand

GY_ENDR = GY_INVR + GY_EXR

12. Nominal gross domestic product

GY_BIP = GY_END - GY_IM

13. Real gross domestic product

GY_BIPR = GY_ENDR - GY_IMR

14. Nominal gross national product

GY_BSP = GY_BIP + GY_SEVE

15. Average relation of nominal final demand to nominal gross domestic product

$$GY\_EBQQ = 0.7\,GY\_EBQQ_{-1} + 0.3\left(\frac{GY\_END - GY\_TBSP + GY\_SUBV}{GY\_BIP - GY\_TBSP + GY\_SUBV}\right)$$

16. Gross wage income

$$GY\_L = GY\_LAST * GY\_AVBI * \frac{GY\_B1}{GY\_BI} * \frac{1}{3.232}$$

17. Gross wage income, excluding employers' social contributions

GY_LG = GY_L - GY_SZAF

18. Net wage income

GY_LN = GY_LG - GY_LOST - GY_SOZN

19. Gross profit income

GY_GW = GY_BSP - GY_L - GY_TBSP + GY_SUBV - GY_D

20. Gross profit income of firms

GY_GU = GY_GW - GY_GST + GY_ZINS

21. Disposable income of households

$$GY\_YV = GY\_LN + GY\_GNEH + GY\_TRN - GY\_VERR$$

22. Net lending of households

$$GY\_FH = GY\_YV - GY\_CP - GY\_SVPH$$

23. Net financial wealth of households

$$GY\_NGVH = GY\_NGVH_{-1} + GY\_FH + \Delta_1 GY\_DWU * 316.35$$

24. Total labour force

GY_EW = GY_EQU * GY_WOBE + GY_SELB

25. Population between 15 and 65 years

GY_WOBA = GY_WOBE - GY_WOBS

26. Net lending of foreign countries

GY_FA = - (GY_EX - GY_IM) + GY_ARSF + GY_VERR - GY_SEVE

27. Net financial wealth of foreign countries

$$GY\_NGVA = GY\_NGVA_{-1} + GY\_FA + \Delta_1\, GY\_DWU * 71.43$$

28. Current account balance

GY_LBS = - GY_FA + GY_DLBS

II. Aggregate supply

1. Real machinery and equipment investment of firms

a)
$$\ln\left(GY\_IAUR\right) = -\underset{(14.677)}{4.706} + \underset{(26.582)}{1.299}\ \ln\left(GY\_ENDR\right) + GY\_IAUR\_EC$$

$\bar{R}^2 = 0.881 \quad DW = 2.014 \quad SER = 0.102$

b)
$$\begin{aligned}\Delta_4 \ln\left(GY\_IAUR\right) = & \underset{(6.969)}{1.209}\ \Delta_4 \ln\left(GY\_ENDR\right) \\ & - \underset{(3.054)}{0.411} * 0.01 * \left(GY\_RL - GY\_PEVD\right) \\ & + \underset{(7.465)}{0.491}\ \Delta_4 \left(GY\_IAUR_{-1}\right) \\ & - \underset{(2.696)}{0.102}\ GY\_IAUR\_EC_{-4}\end{aligned}$$

$\bar{R}^2 = 0.835 \quad DW = 1.798 \quad SER = 0.036$

2. Real construction investment of firms

$$\begin{aligned}\ln\left(GY\_IBUR\right) = & \underset{(2.303)}{0.417} - \underset{(2.502)}{0.053}\ Q1 + \underset{(9.393)}{0.202}\ Q2 + \underset{(6.772)}{0.131}\ Q3 \\ & + \underset{(3.659)}{0.113}\ GY\_DWU - \underset{(1.408)}{0.047}\ \Delta_4\ GY\_DWU \\ & + \underset{(4.897)}{0.321}\ \ln\left(GY\_IAUR\right) \\ & + \underset{(4.895)}{0.441}\ \ln\left(GY\_IBUR_{-1}\right)\end{aligned}$$

$\bar{R}^2 = 0.959 \quad DW = 2.148 \quad SER = 0.053$

3. Real residential construction investment

a)
$$\begin{aligned}\ln\left(\frac{GY\_IWR}{GY\_WOBE}\right) = & -\underset{(6.889)}{0.931} - \underset{(6.560)}{0.147}\ Q1 + \underset{(4.107)}{0.087}\ Q2 + \underset{(3.314)}{0.070}\ Q3 \\ & + \underset{(5.941)}{0.124}\ GY\_DWU - \underset{(4.602)}{0.175}\ \Delta_4\ GY\_DWU \\ & + \underset{(2.249)}{0.193}\ \ln\left(\frac{GY\_CPR}{GY\_WOBE}\right) \\ & + GY\_IWR\_EC\end{aligned}$$

$\bar{R}^2 = 0.741 \quad DW = 0.788 \quad SER = 0.071$

b) $$\Delta_4 \ln\left(\frac{GY\_IWR}{GY\_WOBE}\right) = \underset{(3.095)}{0.517}\ \Delta_4 \ln\left(\frac{GY\_CPR}{GY\_WOBE}\right) + \underset{(7.142)}{0.497}\ \Delta_4 \ln\left(\frac{GY\_IWR_{-1}}{GY\_WOBE_{-1}}\right) - \underset{(4.632)}{0.343}\ GY\_IWR\_EC_{-4}$$

$\overline{R}^2 = 0.586$ DW = 1.869 SER = 0.045

4. Real inventory investment

$$GY\_VR = -\underset{(16.086)}{24.749} + \underset{(13.125)}{47.341}\ Q1 + \underset{(12.985)}{17.417}\ Q2 + \underset{(19.392)}{37.003}\ Q3 + \underset{(2.613)}{0.048}\ \Delta_4\ GY\_ENDR + \underset{(2.914)}{0.300}\ GY\_VR_{-1}$$

$\overline{R}^2 = 0.923$ DW = 2.095 SER = 4.254

5. Firms capital consumption in machinery and equipment

$$GY\_KBAU = \underset{(7.686)}{0.034}\ GY\_IAUR_{-1} + (1 - 0.034)\ GY\_KBAU_{-1}$$

$\overline{R}^2 = 0.394$ DW = 2.201 SER = 0.671

6. Firms capital consumption in construction

$$GY\_KBBU = \underset{(1.334)}{0.007}\ GY\_IBUR_{-1} + (1 - 0.007)\ GY\_KBBU_{-1}$$

$\overline{R}^2 = 0.019$ DW = 2.020 SER = 1.014

7. Employment (total hours)

a)

$$
\begin{aligned}
\ln\left(GY\_AVBI\right) = &- \underset{(3.163)}{0.991} - \underset{(9.906)}{0.091}\ Q1 - \underset{(13.079)}{0.083}\ Q2 - \underset{(13.864)}{0.110}\ Q3 \\
&- \underset{(0.669)}{0.007}\ Q1 * GY\_DWU_{-2} - \underset{(1.278)}{0.014}\ Q2 * GY\_DWU_{-2} \\
&+ \underset{(3.007)}{0.041}\ Q3 * GY\_DWU_{-2} \\
&+ \underset{(9.937)}{0.122}\ GY\_DWU \\
&+ \underset{(10.777)}{0.523}\ \ln\left(GY\_ENDR\right) \\
&+ \underset{(13.395)}{0.716}\ \ln\left(\frac{GY\_PEV * GY\_TIPS}{GY\_LAST}\right) \\
&+ GY\_AVBI\_EC
\end{aligned}
$$

$\overline{R}^2 = 0.978$ DW = 0.408 SER = 0.018

b)

$$
\begin{aligned}
\Delta_4 \ln\left(GY\_AVBI\right) = &\ \underset{(7.030)}{0.075}\ \Delta_4\ GY\_DWU \\
&+ \underset{(5.582)}{0.408}\ \Delta_4 \ln\left(GY\_ENDR\right) \\
&- \underset{(1.501)}{0.153}\ \Delta_4 \ln\left(GY\_ENDR_{-1}\right) \\
&- \underset{(0.921)}{0.081}\ \Delta_4 \ln\left(GY\_ENDR_{-2}\right) \\
&+ \underset{(22.252)}{0.843}\ \Delta_4 \ln\left(\frac{GY\_PEV * GY\_TIPS}{GY\_LAST}\right) \\
&- \underset{(5.044)}{0.470}\ \Delta_4 \ln\left(\frac{GY\_PEV_{-1} * GY\_TIPS_{-1}}{GY\_LAST_{-1}}\right) \\
&- \underset{(1.443)}{0.131}\ \Delta_4 \ln\left(\frac{GY\_PEV_{-2} * GY\_TIPS_{-2}}{GY\_LAST_{-2}}\right) \\
&+ \underset{(4.448)}{0.435}\ \Delta_4 \ln\left(GY\_AVBI_{-1}\right) \\
&+ \underset{(1.335)}{0.118}\ \Delta_4 \ln\left(GY\_AVBI_{-2}\right) \\
&- \underset{(3.854)}{0.288}\ GY\_AVBI\_EC_{-4}
\end{aligned}
$$

$\overline{R}^2 = 0.970$ DW = 1.504 SER = 0.010

8. Effective average hours worked per employee

a)
$$\ln(GY\_ARST) = \underset{(10.136)}{0.042} + \underset{(2.373)}{0.014}\ Q1 - \underset{(14.714)}{0.086}\ Q2 - \underset{(31.673)}{0.185}\ Q3$$
$$- \underset{(0.290)}{0.003}\ Q1 * GY\_DWU_{-2} + \underset{(2.588)}{0.027}\ Q2 * GY\_DWU_{-2}$$
$$+ \underset{(17.733)}{0.188}\ Q3 * GY\_DWU_{-2}$$
$$- \underset{(9.917)}{0.074}\ GY\_DWU_{-2}$$
$$+ 1.00 \ln(GY\_TA)$$
$$+ GY\_ARST\_EC$$

$\overline{R}^2 = 0.946$ DW = 1.723 SER = 0.017

b)
$$\Delta_4 \ln\left(\frac{GY\_ARST}{GY\_TA}\right) = - \underset{(5.078)}{0.031}\ \Delta_4\ GY\_DWU_{-2}$$
$$- \underset{(9.692)}{0.114}\ \Delta_1\ GY\_DWU$$
$$+ \underset{(18.864)}{0.180}\ \Delta_1\ GY\_DWU_{-4}$$
$$+ \underset{(3.949)}{0.173}\ \Delta_4 \ln(GY\_GAPQ)$$
$$+ \underset{(10.487)}{0.553}\ \Delta_4 \ln\left(\frac{GY\_LTGW}{GY\_TA * GY\_LAST}\right)$$
$$- \underset{(9.762)}{0.477}\ \Delta_4 \ln\left(\frac{GY\_LTGW_{-1}}{GY\_TA_{-1} * GY\_LAST_{-1}}\right)$$
$$+ \underset{(5.203)}{0.328}\ \Delta_4 \ln\left(\frac{GY\_ARST_{-1}}{GY\_TA_{-1}}\right)$$
$$- \underset{(4.896)}{0.348}\ GY\_ARST\_EC_{-4}$$

$\overline{R}^2 = 0.910$ DW = 2.276 SER = 0.008

9. Commuters

$$GY\_PEND = - \underset{(3.465)}{0.016} + \underset{(0.152)}{0.001}\ Q1 + \underset{(4.571)}{0.016}\ Q2 + \underset{(2.903)}{0.010}\ Q3 + \underset{(2.775)}{0.014}\ GY\_DWU$$
$$+ \underset{(20.012)}{0.893}\ GY\_PEND_{-1}$$

$\overline{R}^2 = 0.955$ DW = 2.239 SER = 0.012

10. Real imports of goods and services

a)
$$\underset{}{\ln\left(GY\_IMR\right)} = \underset{(5.307)}{-1.835} + \underset{(2.291)}{0.047}\ Q1 + \underset{(2.740)}{0.056}\ Q2 + \underset{(2.731)}{0.055}\ Q3 - \underset{(2.036)}{0.074}\ GY\_DWU$$
$$+ \underset{(18.956)}{1.044}\ \ln\left(\frac{GY\_ENDR * GY\_PEV * GY\_TIPS}{GY\_PIM}\right)$$
$$+ GY\_IMR\_EC$$

$\bar{R}^2 = 0.946$ DW = 0.163 SER = 0.070

b)
$$\Delta_4 \ln\left(GY\_IMR\right) = \underset{(1.127)}{0.020}\ \Delta_4 GY\_DWU$$
$$+ \underset{(5.025)}{0.326}\ \Delta_4 \ln\left(\frac{GY\_ENDR * GY\_PEV * GY\_TIPS}{GY\_PIM}\right)$$
$$+ \underset{(9.530)}{0.587}\ \Delta_4 \ln\left(GY\_IMR_{-1}\right)$$
$$- \underset{(4.193)}{0.209}\ GY\_IMR\_EC_{-4}$$

$\bar{R}^2 = 0.783$ DW = 1.952 SER = 0.031

11. Potential gross domestic product

$$\ln\left(GY\_BIPQ\right) = -\underset{(163.320)}{2.944} - \underset{(7.696)}{0.058}\ Q1 - \underset{(4.137)}{0.031}\ Q2 - \underset{(3.171)}{0.024}\ Q3 - \underset{(2.566)}{0.170}\ GY\_DWU$$
$$+ \underset{(12.240)}{0.911} * 0.0025 * T + \underset{(2.049)}{0.405} * 0.0025 * T * GY\_DWU$$
$$+ 0.491 * GY\_EBQQ_{-1} * \ln\left[\left(\begin{array}{l} GY\_BI + GY\_SELB + GY\_EW \\ * 0.01\left(GY\_ARLQ - GY\_ARLQN\right)\end{array}\right) * GY\_TA\right]$$
$$+ \left(1 - 0.491 * GY\_EBQQ_{-1}\right) \ln\left(GY\_KRAD + GY\_KRBD\right)$$

$\bar{R}^2 = 0.833$ DW = 0.273 SER = 0.026

12. Capacity utilisation

$$GY\_GAPQ = 100 * \frac{GY\_BIPR}{GY\_BIPQ}$$

13. Nominal machinery and equipment investment

GY_IAU = 0.01 * GY_IAUR * GY_PIAU

14. Real machinery and equipment investment of government

$$GY\_IASR = 100 * \frac{GY\_IAS}{GY\_PIAS}$$

15. Nominal construction investment of firms

GY_IBU = 0.01 * GY_IBUR * GY_PIBU

16. Real construction investment of government

$$GY\_IBSR = 100 * \frac{GY\_IBS}{GY\_PIBS}$$

17. Nominal residential construction investment

GY_IW = 0.01 * GY_IWR * GY_PIW

18. Nominal inventory investment

GY_V = GY_INLV - GY_CP - GY_CS - GY_IAU - GY_IAS - GY_IBU - GY_IW - GY_IBS

19. Real capital stock of firms' machinery and equipment

$$GY\_KRAU = GY\_KRAU_{-1} + GY\_IAUR - GY\_KBAU + \Delta_1 GY\_DWU * 144.96$$

20. Average real capital stock of firms' machinery and equipment

$$GY\_KRAD = 0.5\left(GY\_KRAU + GY\_KRAU_{-1}\right)$$

21. Real capital stock of firms' construction

$$GY\_KRBU = GY\_KRBU_{-1} + GY\_IBUR - GY\_KBBU + \Delta_1 GY\_DWU * 432.11$$

22. Average real capital stock of firms' construction

$$GY\_KRBD = 0.5\left(GY\_KRBU + GY\_KRBU_{-1}\right)$$

23. Depreciation allowances

$$GY\_D = 0.01 * \begin{pmatrix} 0.25 * 0.075 * GY\_KRAU * GY\_PIAU + 0.25 * 0.015 \\ * GY\_KRBU * GY\_PIBU \end{pmatrix} + GY\_DSW$$

24. Net lending of firms

GY_FU = - GY_FH- GY_FS - GY_FA

25. Net financial wealth of firms

$$GY\_NGVU = GY\_NGVU_{-1} + GY\_FU - \Delta_1 GY\_DWU * 429.23$$

26. Employment (domestic concept)

$$GY\_BI = 1000 * \frac{GY\_AVBI}{GY\_ARST}$$

27. Employment (residence concept)

GY_B1 = GY_BI - GY_PEND

28. Unemployment

$$GY\_ARL = GY\_EW - GY\_B1 - GY\_SELB$$

29. Unemployment rate

$$GY\_ARLQ = 100 * \frac{GY\_ARL}{GY\_EW}$$

30. "Smoothed" unemployment rate

$$GY\_ARLQN = 0.9 * GY\_ARLQN_{-1} + 0.1 * GY\_ARLQ$$

31. Negotiated working time per employee

$$GY\_TA = (GY\_KATA - GY\_TJU) * \frac{GY\_WOST}{5}$$

III. Factor costs and deflators

1. Negotiated wage and salary level in Western Germany

$$\begin{aligned}\Delta_4 \ln(GY\_LTGW) = & -\underset{(3.505)}{0.314} * 0.01 * \Delta_4 (GY\_ARLQ - GY\_ARLQN) \\ & + (1 - 0.911)\, GY\_PCPD \\ & + \underset{(25.479)}{0.911}\ \Delta_4 \ln(GY\_LTGW_{-1}) \\ & - \underset{(3.325)}{0.171} * \frac{1}{4} * 0.01 * \sum_{i=1}^{4} (GY\_ARLQ_{-i} - GY\_ARLQN_{-i})\end{aligned}$$

$\bar{R}^2 = 0.886$ DW = 1.743 SER = 0.006

2. Gross wage and salary income per hour worked (wage rate)

a)

$$\begin{aligned}\ln(GY\_LAST) = & \underset{(341.286)}{6.257} + \underset{(2.525)}{0.017}\ Q1 + \underset{(23.825)}{0.163}\ Q2 + \underset{(21.987)}{0.143}\ Q3 \\ & + \underset{(1.985)}{0.022}\ Q1 * GY\_DWU_{-2} - \underset{(1.980)}{0.023}\ Q2 * GY\_DWU_{-2} \\ & - \underset{(13.956)}{0.156}\ Q3 * GY\_DWU_{-2} \\ & - \underset{(13.078)}{0.124}\ GY\_DWU \\ & + \underset{(110.268)}{1.099}\ \ln\left(\frac{0.95 * GY\_LTGW + 0.05 * GY\_LTGO}{GY\_TA}\right) \\ & + GY\_LAST\_EC\end{aligned}$$

$\bar{R}^2 = 0.997$ DW = 1.854 SER = 0.019

b) $$\Delta_4 \ln(GY\_LAST) = -\underset{(28.225)}{0.184}\ \Delta_4\ GY\_DWU + \underset{(47.314)}{1.006}\ \Delta_4 \ln\left(\frac{0.95 * GY\_LTGW + 0.05 * GY\_LTGO}{GY\_ARST}\right) - \underset{(2.713)}{0.194}\ GY\_LAST\_EC_{-4}$$

$\overline{R}^2 = 0.965 \quad DW = 1.504 \quad SER = 0.012$

3. Deflator of domestic demand

a) $$0.01 * GY\_INF + \Delta_4 \ln(GY\_TIPS) = 0.03\ \Delta_4^2 \ln(GY\_PIM) + 0.03\,\Delta_4^2 \ln(GY\_LAST) + \underset{(43.225)}{0.945} * \left\{ \begin{array}{l} (1-0.245) + \left(\begin{array}{l} 0.01\,GY\_INF_{-1} \\ + \Delta_4 \ln(GY\_TIPS_{-1}) \end{array}\right) \\ + \underset{(2.314)}{0.245} + \left[\begin{array}{l} (1-0.4) \\ * \left(\begin{array}{l} 0.01\,GY\_INF_{+1} \\ + \Delta_4 \ln(GY\_TIPS_{+1}) \end{array}\right) \\ + 0.4 * GY\_INFT \end{array}\right] \end{array} \right\} + 0.03 \ln(0.01\,GY\_GAPQ) + (1-0.945)\,\Delta_4 \ln(GY\_PSM3) + 0.1 * \ln\left(\frac{GY\_PSM3_{-4}}{GY\_PINV_{-4}}\right)$$

$\overline{R}^2 = 0.963 \quad DW = 1.880 \quad SER = 0.007$

b) $$\ln(GY\_PINV) = \ln(GY\_PINV_{-4}) + 0.01 * GY\_INF$$

4. Deflator of private consumption

$$\Delta_4 \ln(GY\_PCP) = \underset{(8.841)}{0.444}\ \Delta_4 \ln(GY\_PINV) + \underset{(12.049)}{0.575}\ \Delta_4 \ln(GY\_PCP_{-1}) + \underset{(2.657)}{0.061} \ln\left(\frac{GY\_PINV_{-4}}{GY\_PCP_{-4}}\right)$$

$\overline{R}^2 = 0.987 \quad DW = 1.667 \quad SER = 0.004$

5. Deflator of government consumption

$$\begin{aligned}\Delta_4 \ln\left(GY\_PCS\right) = & -\underset{(1.735)}{0.010}\ \Delta_4\ GY\_DWU \\ & + \underset{(9.219)}{0.800}\ \Delta_4 \ln\left(GY\_PINV\right) \\ & + \underset{(2.921)}{0.218}\ \Delta_4 \ln\left(GY\_PCS_{-1}\right) \\ & + \underset{(1.297)}{0.030} \ln\left(\frac{GY\_PINV_{-4}}{GY\_PCS_{-4}}\right)\end{aligned}$$

$\overline{R}^2 = 0.919$ DW = 1.578 SER = 0.011

6. Deflator of firms' machinery and equipment investment

$$\begin{aligned}\Delta_4 \ln\left(GY\_PIAU\right) = & \underset{(1.990)}{0.015}\ \Delta_4 \ln\left(GY\_CCRA_{-2}\right) \\ & + \left(1 - 0.900\right)\ \Delta_4 \ln\left(GY\_PINV\right) \\ & + \underset{(22.956)}{0.900}\ \Delta_4 \ln\left(GY\_PIAU_{-1}\right)\end{aligned}$$

$\overline{R}^2 = 0.855$ DW = 2.146 SER = 0.006

7. Deflator of government's machinery and equipment investment

$$\begin{aligned}\Delta_4 \ln\left(GY\_PIAS\right) = & -\underset{(3.806)}{0.013}\ GY\_DWU \\ & + \underset{(2.929)}{0.042}\ \Delta_4 \ln\left(GY\_CCRA_{-2}\right) \\ & + \underset{(5.652)}{0.515}\ \Delta_4 \ln\left(GY\_PINV\right) \\ & + \underset{(6.106)}{0.472}\ \Delta_4 \ln\left(GY\_PIAS_{-1}\right) \\ & + \underset{(2.521)}{0.079} \ln\left(\frac{GY\_PINV_{-4}}{GY\_PIAS_{-4}}\right)\end{aligned}$$

$\overline{R}^2 = 0.895$ DW = 2.214 SER = 0.011

8. Deflator of firms' construction investment

$$\Delta_4 \ln(GY\_PIBU) = \underset{(2.424)}{0.061}\ \Delta_4 \ln(GY\_COSI) + \underset{(31.382)}{0.886}\ \Delta_4 \ln(GY\_PIBU_{-1}) + \underset{(3.204)}{0.066}\ \ln\left(\frac{GY\_PINV_{-4}}{GY\_PIBU_{-4}}\right)$$

$\bar{R}^2 = 0.968$ DW = 1.196 SER = 0.008

9. Deflator of government's construction investment

$$\Delta_4 \ln(GY\_PIBS) = \underset{(2.709)}{-0.004} + \underset{(2.106)}{0.056}\ \Delta_4 \ln(GY\_COSI) + \underset{(31.737)}{0.942}\ \Delta_4 \ln(GY\_PIBS_{-1}) + \underset{(5.022)}{0.106}\ \ln\left(\frac{GY\_PINV_{-4}}{GY\_PIBS_{-4}}\right)$$

$\bar{R}^2 = 0.936$ DW = 1.759 SER = 0.008

10. Deflator of residential construction

$$\Delta_4 \ln(GY\_PIW) = \underset{(1.343)}{0.003}\ GY\_DWU + \underset{(2.346)}{0.066}\ \Delta_4 \ln(GY\_COSI) + \underset{(0.739)}{0.064}\ \Delta_4 \ln(GY\_PINV) + \underset{(14.144)}{0.808}\ \Delta_4 \ln(GY\_PIW_{-1}) + \underset{(2.917)}{0.049}\ \ln\left(\frac{GY\_PINV_{-4}}{GY\_PIW_{-4}}\right)$$

$\bar{R}^2 = 0.975$ DW = 1.284 SER = 0.007

11. Deflator of exports of goods and services

$$\Delta_4 \ln(GY\_PEX) = (1-0.958)\,\Delta_4 \begin{bmatrix}(1-0.203)\ln(GY\_PINV_{-1}) \\ +\,0.203\,GY\_LPAC_{-1}\end{bmatrix} + \underset{(26.101)}{0.958}\;\Delta_4 \ln(GY\_PEX_{-1})$$

$\overline{R}^2 = 0.897$ DW $= 0.776$ SER $= 0.007$

12. Deflator of final demand

$$GY\_PEV = 100 * \frac{GY\_END}{GY\_ENDR}$$

13. Deflator of gross domestic product

$$GY\_PBIP = 100 * \frac{GY\_BIP}{GY\_BIPR}$$

14. Adaptive expectation on consumer price inflation

$$GY\_PCPD = 0.9 * GY\_PCPD_{-1} + 0.1 * \Delta_4 \ln(GY\_PCP_{-1}) * 100$$

15. Adaptive expectation on inflation rate of final demand

$$GY\_PEVD = 0.9 * GY\_PEVD_{-1} + 0.1 * \Delta_4 \ln(GY\_PEV_{-1}) * 100$$

16. Present value of depreciation of machinery and equipment

$$GY\_ZAU = \frac{0.2}{(0.01 * GY\_RL + 0.026) * (1 - GY\_TSUD) + 0.2}$$

17. User costs of machinery and equipment

$$GY\_CCRA = \left[(0.01 * GY\_RL + 0.026) * (1 - GY\_TSUD) - GY\_PEVD + 0.075\right] * \frac{1 - GY\_TSUD * GY\_ZAU}{1 - GY\_TSUD} * 0.01 * GY\_PIAU * 662.652$$

18. Index of production costs

$$GY\_COSI = GY\_LAST^{0.491} * GY\_PIM^{0.217} * GY\_CCRA^{(1-0.491-0.217)}$$

IV. Government

1. Average wage tax rate

$$GY\_LST = \underset{(7.582)}{19.528} + \underset{(2.042)}{0.004} * 100 * 0.85 \frac{GY\_LG}{GY\_B1}$$

$$+ \Big[- \underset{(0.886)}{0.082} - \underset{(9.971)}{0.186}\ Q1 - \underset{(4.616)}{0.087}\ Q2 - \underset{(6.327)}{0.119}\ Q3$$

$$- \underset{(2.936)}{0.117}\ \Delta_4\ GY\_DWU_{+2} - \underset{(1.801)}{0.069}\ \Delta_4\ GY\_DWU \Big] * 100 \frac{GY\_B1}{0.85\ GY\_LG}$$

$\overline{R}^2 = 0.829$ DW = 1.409 SER = 0.832

2. Other direct taxes

$$\ln(GY\_TDSO) = - \underset{(0.132)}{0.066} - \underset{(0.388)}{0.014}\ Q1 - \underset{(4.779)}{0.123}\ Q2 + \underset{(0.410)}{0.012}\ Q3$$

$$+ \underset{(3.307)}{0.352} [0.067 \ln(GY\_GU)$$
$$+ 0.116 \ln(GY\_GU_{-1})$$
$$+ 0.150 \ln(GY\_GU_{-2})$$
$$+ 0.167 \ln(GY\_GU_{-3})$$
$$+ 0.167 \ln(GY\_GU_{-4})$$
$$+ 0.150 \ln(GY\_GU_{-5})$$
$$+ 0.116 \ln(GY\_GU_{-6})$$
$$+ 0.067 \ln(GY\_GU_{-7})]$$

$$- \underset{(2.442)}{0.252} [0.107 \ln(GY\_LOST_{-2})$$
$$+ 0.179 \ln(GY\_LOST_{-3})$$
$$+ 0.214 \ln(GY\_LOST_{-4})$$
$$+ 0.214 \ln(GY\_LOST_{-5})$$
$$+ 0.179 \ln(GY\_LOST_{-6})$$
$$+ 0.107 \ln(GY\_LOST_{-7})]$$
$$+ \underset{(2.130)}{0.286} \ln(GY\_TSUD)$$
$$+ \underset{(2.071)}{0.319} \ln(GY\_LST)$$
$$+ \underset{(7.715)}{0.616} \ln(GY\_TDSO_{-1})$$

$\overline{R}^2 = 0.875$ DW = 1.823 SER = 0.073

3. Value-added taxes

$$\ln\left(GY\_UST\right) = -\underset{(0.635)}{0.039} - \underset{(2.307)}{0.052}\ Q1 - \underset{(4.757)}{0.066}\ Q2 - \underset{(6.848)}{0.083}\ Q3$$

$$+ \underset{(6.449)}{0.499}\left(1 + \underset{(3.250)}{0.019}\ GY\_DWU\right)$$

$$* \ln\left[GY\_MWST * \left(GY\_CP + GY\_CS + GY\_IAS + GY\_IBS + GY\_IW\right)\right]$$

$$+ \underset{(5.277)}{0.433}\ \ln\left(GY\_UST_{-1}\right)$$

$\overline{R}^2 = 0.996$ DW = 1.567 SER = 0.028

4. Other indirect taxes

$$\ln\left(GY\_TBSO\right) = -\underset{(7.173)}{2.471} - \underset{(6.508)}{0.112}\ Q1 - \underset{(5.329)}{0.079}\ Q2 - \underset{(3.701)}{0.056}\ Q3$$

$$+ \underset{(9.678)}{0.417}\left[0.48\ \ln\left(GY\_GU\right)\right.$$

$$+ 0.30\ \ln\left(GY\_GU_{-1}\right)$$

$$+ 0.16\ \ln\left(GY\_GU_{-2}\right)$$

$$\left.+ 0.06\ \ln\left(GY\_GU_{-3}\right)\right]$$

$$+ \underset{(7.659)}{0.704}\ \ln\left(GY\_CPR\right)$$

$\overline{R}^2 = 0.983$ DW = 1.619 SER = 0.044

5. Social contributions of employees

$$\Delta_4 \ln\left(\frac{GY\_SOZN}{GY\_B1}\right) = \underset{(8.112)}{0.552}\ \Delta_4 \ln\left(\frac{GY\_LG}{GY\_B1}\right)$$

$$+ \underset{(7.813)}{0.852}\ \Delta_4 \ln\left(GY\_SOZB\right)$$

$$+ \underset{(7.189)}{0.393}\ \Delta_4 \ln\left(\frac{GY\_SOZN_{-1}}{GY\_B1_{-1}}\right)$$

$\overline{R}^2 = 0.930$ DW = 1.433 SER = 0.021

6. Social contributions of employers

$$\Delta_4 \ln\left(\frac{GY\_SZAF}{GY\_B1}\right) = \underset{(17.048)}{0.857} \ \Delta_4 \ln\left(\frac{GY\_LG}{GY\_B1}\right)$$

$$+ \underset{(6.170)}{0.443} \ \Delta_4 \ln\left(GY\_SOZB\right)$$

$$+ \underset{(5.213)}{0.204} \ \Delta_4 \ln\left(\frac{GY\_SZAF_{-1}}{GY\_B1_{-1}}\right)$$

$\overline{R}^2 = 0.951$ DW = 1.366 SER = 0.015

7. Nominal government consumption

$$\Delta_4 \ln\left(GY\_CS\right) = \underset{(0.998)}{0.006} + \underset{(9.408)}{0.110} \ \Delta_4 GY\_DWU - \underset{(4.587)}{0.095} \ \Delta_1 GY\_DWU_{-2}$$

$$+ \underset{(5.436)}{0.914} \ \Delta_4 \ln\left(GY\_LTGW_{-1}\right)$$

$$+ \underset{(3.008)}{0.544} * \frac{1}{4} * \sum_{i=1}^{4} \frac{GY\_FS_{-i} + \Delta_1 GY\_DWU_{-18-i} * 204}{GY\_BSP_{-i}}$$

$$+ \underset{(5.417)}{0.401} \ \Delta_4 \ln\left(GY\_CS_{-1}\right)$$

$$- 0.15 \ln\left(0.01 * 0.25 * \sum_{i=1}^{4} GY\_GAPQ_{-i}\right)$$

$\overline{R}^2 = 0.836$ DW = 2.069 SER = 0.017

8. Transfers to households

$$GY\_TRN = - \underset{(2.502)}{3.346} + \underset{(3.528)}{3.654} \ Q1 - \underset{(1.484)}{1.369} \ Q2 + \underset{(3.242)}{2.389} \ Q3$$

$$+ \underset{(4.567)}{0.099} \ \frac{GY\_LG}{GY\_B1} * GY\_WOBS$$

$$+ \underset{(16.917)}{0.792} \ GY\_TRN_{-1}$$

$\overline{R}^2 = 0.997$ DW = 1.737 SER = 1.845

9. Subsidies to firms

$$\ln\left(GY\_SUBV\right) = -\underset{(5.612)}{2.630} - \underset{(7.018)}{0.367}\ Q1 - \underset{(7.149)}{0.258}\ Q2 - \underset{(6.047)}{0.217}\ Q3$$
$$+ \underset{(6.698)}{0.744}\ \ln\left(GY\_BSP\right)$$
$$+ \underset{(2.170)}{0.233}\ \ln\left(GY\_SUBV_{-1}\right)$$

$\overline{R}^2 = 0.921$ DW = 1.991 SER = 0.121

10. Total gross debt liabilities of government

$$GY\_BVS = \underset{(3.642)}{42.886} + \underset{(18.740)}{0.882}\ GY\_BVS_{-1}$$
$$- \underset{(2.362)}{0.142}\ GY\_NGVS + \underset{(5.279)}{48.542}\ GY\_DWU$$
$$+ \underset{(8.890)}{146.714}\ GY\_DUM951$$

$\overline{R}^2 = 0.999$ DW = 1.788 SER = 14.457

11. Wage taxes

$$GY\_LOST = 0.01 * GY\_LST * 0.85 * GY\_LG$$

12. Real government consumption

$$GY\_CSR = 100 * \frac{GY\_CS}{GY\_PCS}$$

13. Interest payments

$$GY\_ZINS = GY\_BVS * 0.01 * \left(GY\_RZIN - 100 \sum_{i=1}^{3} \frac{GY\_ZINS_{-i}}{GY\_BVS_{-i}}\right)$$

14. Direct taxes

GY_TDIR = GY_LOST + GY_TDSO

15. Indirect taxes

GY_TBSP = GY_UST + GY_TBSO

16. Social contributions

GY_SOZ = GY_SOZN + GY_SZAF

17. Average corporate income tax rate

GY_TSUD = 0.5 * (0.4 * GY_KSTA + 0.6 * GY_KSTN)

18. Average indirect tax rate

$$GY\_TIPS = 1 - 0.333 * GY\_MWST - \frac{GY\_TBSO - GY\_SUBV}{GY\_END}$$

19. Total revenue of government

GY_SEIN = GY_TDIR + GY_TBSP + GY_SOZ + GY_GST

20. Net lending of government

GY_FS = GY_SEIN - (GY_CS + GY_IAS + GY_IBS + GY_TRN + GY_SUBV
+ GY_ZINS + GY_SRSS)

21. Net financial wealth of government

$$GY\_NGVS = GY\_NGVS_{-1} + GY\_FS + \Delta_1 GY\_DWU \ * 41.45$$

V. Money, interest rates and exchange rate

1. Nominal money growth target rate

$$GY\_MTR = 1.394 * 100 * \Delta_4 \ln\left(GY\_BIPQ\right) + GY\_INFT$$

2. Money stock M3

a)
$$\begin{aligned}
\ln\left(\frac{GY_M3}{GY_PINV}\right) = & -\underset{(52.770)}{6.271} + \underset{(9.000)}{0.077}\ Q1 + \underset{(5.051)}{0.043}\ Q2 + \underset{(2.292)}{0.019}\ Q3 \\
& + \underset{(5.028)}{0.151}\ \Delta_1\ GY_DWU_{+1} \\
& + \underset{(81.773)}{1.394}\ \ln\left(GY_BIPR\right) \\
& - \underset{(7.958)}{2.081}\ * 0.01\ GY_RL \\
& + GY_M3_EC
\end{aligned}$$

$\overline{R}^2 = 0.982 \qquad DW = 0.608 \qquad SER = 0.029$

b) $$\Delta_4 \ln\left(\frac{GY\_M3}{GY\_PINV}\right) = \underset{(3.532)}{0.017} + \underset{(15.799)}{0.159}\ \Delta_4\ GY\_DWU_{+1} - \underset{(8.132)}{0.113}\ \Delta_4 GY\_DWU$$
$$+ \underset{(1.351)}{0.125}\ \Delta_4 \ln(GY\_BIPR)$$
$$- \underset{(2.780)}{0.289}\ \Delta_4 \ln(GY\_PINV)$$
$$- \underset{(5.026)}{0.761}\ \Delta_4\ 0.01\ GY\_RL$$
$$+ \underset{(9.392)}{0.633}\ \Delta_4 \ln\left(\frac{GY\_M3_{-1}}{GY\_PINV_{-1}}\right)$$
$$- \underset{(3.837)}{0.223}\ GY\_M3\_EC_{-4}$$

$\overline{R}^2 = 0.889$ DW = 1.538 SER = 0.013

c) $0.01 * GY\_MGR = \Delta_4 \ln(GY\_M3)$

3. Long-term price level (P-Star)

$$GY\_PSM3 = (1 - GY\_EMU) * \frac{1}{0.979} * \exp\left[\begin{array}{l} \ln GY\_M3 + 6.271 - 0.077\ Q1 - 0.043\ Q2 \\ - 0.019\ Q3 - 0.151\ \Delta_1\ GY\_DWU_{+1} \\ - 1.394 \ln GY\_BIPQ \\ + 2.081 * 0.01 * GY\_RL \end{array}\right]$$
$$+ GY\_EMU * EMU\_PSM3$$

4. Money market interest rate for three-month funds

$$\Delta_1\ GY\_RS = (1 - GY\_EMU) * \left[\begin{array}{l} \underset{(13.891)}{0.957}\ \Delta_1\ GY\_RPEN \\ + \underset{(4.408)}{0.175}\ \Delta_1\ US\_RS \\ + \underset{(2.018)}{0.040} * 100\ \Delta_4 \ln(GY\_PEV) \\ + \underset{(2.841)}{0.325}\ (GY\_RPEN_{-1} - GY\_RS_{-1}) \end{array}\right]$$
$$+ GY\_EMU * [EMU\_RS - GY\_RS_{-1}]$$

$\overline{R}^2 = 0.779$ DW = 1.983 SER = 0.343

5. Yield on government bonds

$$
\begin{aligned}
1+0.01\,GY\_RL = {} & (1-GY\_EMU) * (1+0.01\,GY\_RL_{-1})^{(1-0.499)} \\
& * (1+0.01\,GY\_RL_{+1})^{\underset{(13.168)}{0.499}} \\
& * \left(\frac{1+0.01\,GY\_RS}{1+0.01\,GY\_RSST}\right)^{\frac{1}{40}} \\
& + GY\_EMU * (1+0.01\,EMU\_RL)
\end{aligned}
$$

$\bar{R}^2 = 1.000 \quad DW = 2.089 \quad SER = 0.002$

6. Short-term interest rate (long-run)

$$
GY\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} GY\_BIPQ_{-i}\right) + EMU\_INFT
$$

7. Long-term interest rate (long-run)

$$
GY\_RLST = GY\_RSST + EMU\_TERM
$$

8. Average interest rate on government debt

$$
\begin{aligned}
GY\_RZIN = {} & -\underset{(2.353)}{0.043} + \underset{(4.103)}{0.308}\ \Delta_4\ GY\_DWU_{-6} \\
& + (1-0.970) * \frac{1}{5} * \sum_{i=3}^{7} GY\_RL_{-i} \\
& + \underset{(72.800)}{0.970}\ GY\_RZIN_{-1}
\end{aligned}
$$

$\bar{R}^2 = 0.983 \quad DW = 1.914 \quad SER = 0.146$

9. Exchange rate of the D-Mark against the US-Dollar

$$\ln(GY\_ER) = (1 - GY\_EMU) * \begin{bmatrix} \underset{(1.228)}{0.022} + (1 - 0.948)\ln\left(\frac{GY\_PCP_{+1}}{US\_PCP_{+1}}\right) \\ - 1.0 * 0.01 * (GY\_RS - US\_RS) \\ + 0.948 * 0.01 * (GY\_RS_{-1} - US\_RS_{-1}) \\ + \underset{(28.229)}{0.948} \ln(GY\_ER_{-1}) \end{bmatrix}$$

$$+ GY\_EMU * \ln\left(\frac{1.95583}{EMU\_ER}\right)$$

$\overline{R}^2 = 0.992$ DW = 1.298 SER = 0.051

10. Monetary policy rule: repurchase rate

$$GY\_RPEN = (1 - GY\_EMU) * \begin{bmatrix} 0.75 * GY\_RPEN_{-1} \\ + (1 - 0.75)\, GY\_RSST \\ + 0.35 * (GY\_MGR_{+4} - GY\_MTR_{+4}) \\ + 3 * \Delta_1\, GY\_DWU_{+4} \\ + 4 * \Delta_1\, GY\_DWU_{+3} \\ + 4 * \Delta_1\, GY\_DWU_{+2} \\ + 8 * \Delta_1\, GY\_DWU_{+1} \end{bmatrix}$$

$$+ GY\_EMU * EMU\_RS$$

4. United Kingdom

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{UK\_CPR}{UK\_WOBE}\right) = \underset{(2.306)}{-\,0.043} + \underset{(4.202)}{0.313}\ \Delta_4 \ln\left(\frac{100 * UK\_YV}{UK\_PCP * UK\_WOBE}\right)$$
$$- \underset{(3.354)}{0.343} * 0.01 * \left(0.8 * UK\_RL + 0.2 * UK\_RS\right)$$
$$+ \underset{(6.655)}{0.483}\ \Delta_4 \ln\left(\frac{UK\_CPR_{-1}}{UK\_WOBE_{-1}}\right)$$
$$- \underset{(3.310)}{0.176}\ \ln\left(\frac{UK\_CPR_{-4}}{UK\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.700$ DW = 2.135 SER = 0.014

2. Participation rate (labour supply)

$$\ln\left(\frac{UK\_EW}{UK\_WOBE}\right) = \underset{(1.985)}{-\,0.019} + \underset{(74.686)}{0.973}\ \ln\left(\frac{UK\_EW_{-1}}{UK\_WOBE_{-1}}\right)$$

$\overline{R}^2 = 0.984$ DW = 1.380 SER = 0.003

3. Population

$$\ln\left(UK\_WOBE\right) = \underset{(1967.682)}{3.983} + \underset{(31.868)}{0.059} * 0.01 * T$$

$\overline{R}^2 = 0.918$ DW = 0.007 SER = 0.005

4. Transfers to foreign countries

$$UK\_U = \underset{(0.982)}{-\,0.118} + \underset{(0.411)}{0.069}\ Q1 + \underset{(1.915)}{0.324}\ Q2 + \underset{(0.917)}{0.154}\ Q3 + \underset{(7.200)}{0.625}\ UK\_U_{-1}$$

$\overline{R}^2 = 0.357$ DW = 2.265 SER = 0.571

5. Nominal private consumption

$$UK\_CP = 0.01 * UK\_CPR * UK\_PCP$$

6. Nominal gross private fixed capital investment

$$UK\_IAN = 0.01 * UK\_IANR * UK\_PIAN$$

7. Nominal final demand

$$UK\_END = 0.01 * UK\_ENDR * UK\_PEV$$

8. Real final demand

$$UK\_ENDR = UK\_CPR + UK\_IANR + UK\_GR + UK\_VR + UK\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} UK\_BIP = {} & 0.01 * [UK\_ENDR - UK\_EXR] * UK\_PINV \\ & + 0.01 * UK\_EXR * UK\_PEX \\ & - 0.01 * UK\_IMR * UK\_PIM \\ & + UK\_SDN \end{aligned}$$

10. Real gross domestic product

$$UK\_BIPR = UK\_ENDR - UK\_IMR + UK\_SDR$$

11. National income

$$UK\_VE = UK\_BIP - UK\_TIS - UK\_D$$

12. Disposable income of households

$$UK\_YV = UK\_VE - UK\_TDB + UK\_SB$$

13. Gross wage income

$$UK\_L = 0.01 * 3.688 * UK\_LA * UK\_E1$$

14. Net lending of households

$$UK\_FH = UK\_YV - UK\_CP$$

15. Current account balance

$$UK\_LBS = 0.01 * [UK\_EXR * UK\_PEX - UK\_IMR * UK\_PIM] - UK\_U$$

II. Aggregate supply

1. Real gross private fixed capital investment

a) $$\ln\left(UK\_IANR\right) = -\underset{(13.446)}{2.312} + \underset{(31.491)}{1.041}\ \ln\left(UK\_ENDR\right) - 0.3 * 0.01 * \left(0.8\ UK\_RL + 0.2\ UK\_RS\right) + UK\_IANR\_EC$$

$\bar{R}^2 = 0.916$ DW = 0.267 SER = 0.057

b) $$\Delta_4 \ln\left(UK\_IANR\right) = \underset{(5.422)}{0.731}\ \Delta_4 \ln\left(UK\_ENDR\right) - \underset{(0.567)}{0.150} * 0.01 * \Delta_4\ UK\_RL + \underset{(7.549)}{0.513}\ \Delta_4 \ln\left(UK\_IANR_{-1}\right) - \underset{(4.443)}{0.286}\ UK\_IANR\_EC_{-4}$$

$\bar{R}^2 = 0.795$ DW = 1.824 SER = 0.033

2. Real inventory investment

$$UK\_VR = -\underset{(3.039)}{0.384} + \underset{(2.720)}{0.256}\ UK\_VR_{-1} + \underset{(5.476)}{0.119}\ \Delta_4\ UK\_ENDR$$

$\bar{R}^2 = 0.469$ DW = 2.128 SER = 0.824

3. Employment (labour demand)

a) $$\ln\left(UK\_E1\right) = \underset{(7.506)}{1.131} + \underset{(13.849)}{0.400}\ \ln\left(UK\_ENDR\right) + 0.400 \ln\left(\frac{UK\_PEV * \left(1 - 0.01 * UK\_TISS\right)}{UK\_LA}\right) + UK\_E1\_EC$$

$\bar{R}^2 = 0.668$ DW = 0.095 SER = 0.020

b) $$\Delta_4 \ln(UK\_E1) = \underset{(7.434)}{0.107}\ \Delta_4 \ln(UK\_ENDR) + \underset{(5.740)}{0.079}\ \Delta_4 \ln\left(\frac{UK\_PEV * (1 - 0.01 * UK\_TISS)}{UK\_LA}\right) + \underset{(27.696)}{0.800}\ \Delta_4 \ln(UK\_E1_{-1}) - \underset{(3.791)}{0.098}\ UK\_E1\_EC_{-4} + \min\left[0\ ,\ \ln\left(\frac{0.97\ UK\_EW}{UK\_E1}\right)\right]$$

$\bar{R}^2 = 0.957$ DW = 1.089 SER = 0.004

4. Real imports of goods and services

$$\Delta_4 \ln(UK\_IMR) = -\underset{(3.592)}{0.350} + \underset{(10.043)}{1.581}\ \Delta_4 \ln(UK\_ENDR) + \underset{(4.787)}{0.288}\ \Delta_4 \ln(UK\_IMR_{-1}) + \underset{(3.820)}{0.242}\ \ln(UK\_ENDR_{-4} - UK\_IMR_{-4}) + \underset{(5.080)}{0.272}\ \ln\left(\frac{UK\_PEV_{-4} * (1 - 0.01 * UK\_TISS_{-4})}{UK\_PIM_{-4}}\right) - \underset{(1.162)}{0.074}\ \ln\left(\frac{UK\_IMR_{-4}}{UK\_EXR_{-4}}\right)$$

$\bar{R}^2 = 0.816$ DW = 1.545 SER = 0.029

5. Depreciation allowances

$$UK\_D = \underset{(1.039)}{0.170} + (1 - 0.01 * UK\_KAB) * UK\_D_{-1} + 0.01 * UK\_KAB * UK\_IANR_{-1} * 0.01 * UK\_PINV_{-1}$$

$\bar{R}^2 = 0.000$ DW = 2.788 SER = 1.569

6. Potential gross domestic product

$$UK\_BIPQ = 0.998 * \exp\left\{\begin{array}{l} \underset{(5.416)}{0.048} + \underset{(39.962)}{0.322} * 0.01 * T \\ + 0.655 \ln\left[UK\_E1 + 0.01 * \left(UK\_ARLQ - UK\_ARLQN\right) * UK\_EW\right] \\ + \left(1 - 0.655\right) \ln\left[UK\_KRP_{-1}\right] \end{array}\right\}$$

$\overline{R}^2 = 0.942 \quad DW = 0.181 \quad SER = 0.023$

7. Nominal inventory investment

$$UK\_V = 0.01 * UK\_PINV * \left(UK\_CPR + UK\_IANR + UK\_GR + UK\_VR\right) - UK\_CP - UK\_IAN - UK\_G$$

8. Private real stock of capital

$$UK\_KRP = \left(1 - 0.01 * UK\_KAB\right) UK\_KRP_{-1} + UK\_IANR$$

9. Capacity utilisation

$$UK\_GAPQ = 100 * \frac{UK\_BIPR}{UK\_BIPQ}$$

10. Unemployment

$$UK\_ARL = UK\_EW - UK\_E1$$

11. Unemployment rate

$$UK\_ARLQ = 100 * \frac{UK\_ARL}{UK\_EW}$$

12. "Smoothed" unemployment rate

$$UK\_ARLQN = 0.9 * UK\_ARLQN_{-1} + 0.1 * UK\_ARLQ$$

13. Net lending of firms

$$UK\_FU = UK\_D - UK\_IAN - UK\_V - UK\_U - UK\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$\Delta_4 \ln\left(UK\_LA\right) = \underset{(0.952)}{0.002} + \left(1-0.795\right)\Delta_4 \ln\left(UK\_PCP\right)$$
$$+ \underset{(10.524)}{0.795}\ \Delta_4 \ln\left(UK\_LA_{-1}\right)$$
$$- \underset{(2.552)}{0.414}\ \Delta_4\ 0.01\left(UK\_ARLQ - UK\_ARLQN\right)$$
$$- \underset{(1.862)}{0.204} * 0.01\left(UK\_ARLQ_{-4} - UK\_ARLQN_{-4}\right)$$

$\overline{R}^2 = 0.559 \quad DW = 1.224 \quad SER = 0.015$

2. Deflator of domestic demand

a) $$0.01 * UK\_INF = \underset{(0.869)}{0.022}\ \Delta_4^2 \ln\left(\frac{UK\_COSI}{1-0.01*UK\_TISS}\right)$$
$$+ 0.01*\left[\left(1-0.398\right)*UK\_INF_{-1} + \underset{(7.761)}{0.398} * \begin{pmatrix}\left(1-0.4\right)*UK\_INF_{+1} \\ + 0.4 * UK\_INFT\end{pmatrix}\right]$$
$$+ 0.1 * \ln\left(UK\_GAPQ\right)$$

$\overline{R}^2 = 0.452 \quad DW = 2.532 \quad SER = 0.007$

b) $$\ln\left(UK\_PINV\right) = \ln\left(UK\_PINV_{-4}\right) + 0.01 * UK\_INF$$

3. Deflator of private consumption

$$\Delta_4 \ln\left(UK\_PCP\right) = \left(1-0.384\right) * 0.01 * UK\_INF$$
$$+ \underset{(7.211)}{0.384}\ \Delta_4 \ln\left(UK\_PCP_{-1}\right)$$

$\overline{R}^2 = 0.364 \quad DW = 1.040 \quad SER = 0.007$

4. Deflator of government demand

$$\Delta_4 \ln\left(UK\_PG\right) = \left(1 - 0.511\right) * 0.01 * UK\_INF + \underset{(7.405)}{0.511}\ \Delta_4 \ln\left(UK\_PG_{-1}\right)$$

$\bar{R}^2 = 0.376$ DW = 1.542 SER = 0.016

5. Deflator of private fixed capital investment

$$\Delta_4 \ln\left(UK\_PIAN\right) = \left(1 - 0.783\right) * 0.01 * UK\_INF + \underset{(11.896)}{0.783}\ \Delta_4 \ln\left(UK\_PIAN_{-1}\right)$$

$\bar{R}^2 = 0.609$ DW = 1.801 SER = 0.016

6. Deflator of exports

$$\Delta_4 \ln\left(UK\_PEX\right) = \left(1 - 0.773\right) \Delta_4 \begin{bmatrix}\left(1 - 0.236\right) \ln\left(UK\_PINV_{-1}\right) \\ + 0.236\ UK\_LPAC_{-1}\end{bmatrix} + \underset{(10.408)}{0.773}\ \Delta_4 \ln\left(UK\_PEX_{-1}\right)$$

$\bar{R}^2 = 0.581$ DW = 1.015 SER = 0.024

7. Production costs

$$UK\_COSI = \frac{100}{99.987} * UK\_LA^{0.678} * UK\_PIM^{1-0.678}$$

8. Deflator of final demand

$$UK\_PEV = \frac{\left(UK\_ENDR - UK\_EXR\right) * UK\_PINV + UK\_EXR * UK\_PEX}{UK\_ENDR}$$

9. Deflator of gross domestic product

$$UK\_PBIP = 100 * \frac{UK\_BIP}{UK\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$UK\_PCPD = 0.9 * UK\_PCPD_{-1} + 0.1\ \Delta_4 \ln\left(PCP_{-1}\right) * 100$$

11. Adaptive expectation on inflation rate of final demand

$$UK\_PEVD = 0.9 * UK\_PEVD_{-1} + 0.1\, \Delta_4 \ln\left(PEV_{-1}\right) * 100$$

IV. Government

1. Direct tax rate

$$UK\_TDBS = \underset{(1.064)}{1.947} + \underset{(6.966)}{0.516}\; UK\_TDBS_{-1} + \underset{(5.385)}{0.406}\; UK\_TDBS_{-4}$$

$\overline{R}^2 = 0.650$ DW = 1.726 SER = 0.966

2. Indirect tax rate

$$UK\_TISS = \underset{(2.973)}{0.877} + \underset{(32.726)}{0.920}\; UK\_TISS_{-1}$$

$\overline{R}^2 = 0.922$ DW = 2.233 SER = 0.343

3. Real government demand

$$\Delta_4 \ln\left(UK\_GR\right) = \Delta_4 \ln\left(UK\_BIPR\right) - \underset{(3.575)}{0.407}\; \ln\left(0.01 * UK\_GAPQ\right)$$

$\overline{R}^2 = 0.123$ DW = 0.398 SER = 0.033

4. Government transfers to households

$$\ln\left(\frac{UK\_SB}{UK\_BIP}\right) = -\underset{(2.105)}{0.066} + \underset{(3.254)}{0.441} * 0.01\left(UK\_ARLQ - UK\_ARLQN\right) + \underset{(62.859)}{0.967}\; \ln\left(\frac{UK\_SB_{-1}}{UK\_BIP_{-1}}\right)$$

$\overline{R}^2 = 0.978$ DW = 1.406 SER = 0.021

5. Direct taxes and social contributions

$$UK\_TDB = 0.01 * UK\_TDBS * UK\_VE$$

6. Indirect taxes (excluding subsidies)

$$UK\_TIS = 0.01 * UK\_TISS * UK\_END$$

7. Nominal government demand

$$UK\_G = 0.01 * UK\_GR * UK\_PG$$

8. Net lending of government

$$UK\_FS = UK\_TDB + UK\_TIS - UK\_G - UK\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

$$\begin{aligned} \ln\left(\frac{UK\_M4}{UK\_PINV}\right) = & -\underset{(2.663)}{0.723} + \underset{(2.998)}{0.175} \ln\left(UK\_BIPR\right) \\ & - \underset{(2.188)}{0.324} * 0.01 * UK\_RL \\ & + \underset{(43.283)}{0.923} \ln\left(\frac{UK\_M4_{-1}}{UK\_PINV_{-1}}\right) \end{aligned}$$

$\overline{R}^2 = 0.998$ $DW = 1.099$ $SER = 0.015$

2. Monetary policy rule: Money market interest rate for three-month funds

$$\begin{aligned} UK\_RS = & \ 0.75\ UK\_RS_{-1} + \left(1 - 0.75\right) UK\_RSST \\ & + 0.80 * \frac{1}{4}\sum_{i=1}^{4}\left(UK\_INF_{+i} - UK\_INFT_{+i}\right) \\ & + 0.80 * \frac{1}{4}\sum_{i=0}^{3} 100 * \ln\left(0.01\ UK\_GAPQ_{-i}\right) \end{aligned}$$

3. Yield on government bonds

$$1 + 0.01\,UK\_RL = \left(1 + 0.01\,UK\_RL_{-1}\right)^{(1-0.518)} * \left(1 + 0.01\,UK\_RL_{+1}\right)^{\underset{(12.011)}{0.518}} * \left(\frac{1 + 0.01\,UK\_RS}{1 + 0.01\,UK\_RSST}\right)^{\frac{1}{40}} * \left(\frac{1 + 0.01\,UK\_RL_{-4}}{1 + 0.01\,UK\_RLST_{-4}}\right)^{-0.02}$$

$\overline{R}^2 = 1.000 \quad DW = 2.565 \quad SER = 0.004$

4. Short-term interest rate (long-run)

$$UK\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} UK\_BIPQ_{-i}\right) + UK\_INFT$$

5. Long-term interest rate (long-run)

$$UK\_RLST = UK\_RSST + UK\_TERM$$

6. Exchange rate of the Pound against the US-Dollar

$$\ln(UK\_ER) = \underset{(1.706)}{0.302} + (1 - 0.930)\ln\left(\frac{UK\_PCP_{+1}}{US\_PCP_{+1}}\right) - 1.0 * 0.01 * (UK\_RS - US\_RS) + 0.930 * 0.01 * (UK\_RS_{-1} - US\_RS_{-1}) + \underset{(22.572)}{0.930}\ \ln(UK\_ER_{-1})$$

$\overline{R}^2 = 0.848 \quad DW = 1.585 \quad SER = 0.055$

5. France

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{FR\_CPR}{FR\_WOBE}\right) = \underset{(5.908)}{-\ 0.155} + \underset{(6.465)}{0.463}\ \Delta_4 \ln\left(\frac{FR\_BIPR}{FR\_WOBE}\right)$$
$$- \underset{(2.031)}{0.116} * 0.01 * \left(FR\_RL_{-1} - FR\_PCPD_{-1}\right)$$
$$+ \underset{(4.695)}{0.353}\ \Delta_4 \ln\left(\frac{FR\_CPR_{-1}}{FR\_WOBE_{-1}}\right)$$
$$- \underset{(6.079)}{0.312}\ \ln\left(\frac{FR\_CPR_{-4}}{FR\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.710$ DW = 1.528 SER = 0.007

2. Participation rate (labour supply)

$$\ln\left(\frac{FR\_EW}{FR\_WOBE}\right) = \underset{(4.229)}{-\ 0.039} + \underset{(87.657)}{0.953}\ \ln\left(\frac{FR\_EW_{-1}}{FR\_WOBE_{-1}}\right)$$

$\overline{R}^2 = 0.988$ DW = 0.955 SER = 0.001

3. Population

$$\Delta_4 \ln\left(FR\_WOBE\right) = \underset{(2.292)}{0.0004} + \underset{(20.810)}{0.894}\ \Delta_4 \ln\left(FR\_WOBE_{-1}\right)$$

$\overline{R}^2 = 0.826$ DW = 0.371 SER = 0.0006

4. Transfers to foreign countries

$$FR\_U = \underset{(2.051)}{1.649} + \underset{(15.729)}{0.854}\ FR\_U_{-1}$$

$\overline{R}^2 = 0.730$ DW = 2.816 SER = 5.573

5. Nominal private consumption

$$FR\_CP = 0.01 * FR\_CPR * FR\_PCP$$

6. Nominal gross private fixed capital investment

$$FR\_IAN = 0.01 * FR\_IANR * FR\_PIAN$$

7. Nominal final demand

$$FR\_END = 0.01 * FR\_ENDR * FR\_PEV$$

8. Real final demand

$$FR\_ENDR = FR\_CPR + FR\_IANR + FR\_GR + FR\_VR + FR\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} FR\_BIP = {} & 0.01 * [FR\_ENDR - FR\_EXR] * FR\_PINV \\ & + 0.01 * FR\_EXR * FR\_PEX \\ & - 0.01 * FR\_IMR * FR\_PIM \\ & + FR\_SDN \end{aligned}$$

10. Real gross domestic product

$$FR\_BIPR = FR\_ENDR - FR\_IMR + FR\_SDR$$

11. National income

$$FR\_VE = FR\_BIP - FR\_TIS - FR\_D$$

12. Disposable income of households

$$FR\_YV = FR\_VE - FR\_TDB + FR\_SB$$

13. Gross wage income

$$FR\_L = 0.01 * 18.372 * FR\_LA * FR\_E1$$

14. Net lending of households

$$FR\_FH = FR\_YV - FR\_CP$$

15. Current account balance

$$FR\_LBS = 0.01 * [FR\_EXR * FR\_PEX - FR\_IMR * FR\_PIM] - FR\_U$$

16. Nominal domestic demand

$$FR\_INLV = FR\_CP + FR\_G + FR\_IAN + FR\_V$$

17. Real domestic demand

$$FR\_INVR = FR\_CPR + FR\_GR + FR\_IANR + FR\_VR$$

II. Aggregate supply

1. Real gross private fixed capital investment

a)
$$\ln\left(FR\_IANR\right) = -\underset{(89.660)}{1.626} + 1.0 \ln\left(FR\_BIPR\right) - \underset{(4.406)}{0.018} * 0.01 * \left(FR\_RL - FR\_PEVD\right) + FR\_IANR\_EC$$

$\overline{R}^2 = 0.162$ DW = 0.061 SER = 0.083

b)
$$\Delta_4 \ln\left(FR\_IANR\right) = \underset{(5.566)}{0.494}\ \Delta_4 \ln\left(FR\_ENDR\right) - \underset{(3.605)}{0.196}\left(0.01 * FR\_RL - FR\_PEVD\right) + \underset{(13.261)}{0.668}\ \Delta_4 \ln\left(FR\_IANR_{-1}\right) - \underset{(3.957)}{0.094}\ FR\_IANR\_EC_{-4}$$

$\overline{R}^2 = 0.873$ DW = 1.597 SER = 0.017

2. Real inventory investment

$$FR\_VR = -\underset{(2.829)}{1.852} + \underset{(8.204)}{0.552}\ FR\_VR_{-1} + \underset{(6.296)}{0.136}\ \Delta_4\ FR\_ENDR$$

$\overline{R}^2 = 0.623$ DW = 2.231 SER = 4.178

3. Employment (labour demand)

a)
$$\ln\left(FR\_E1\right) = \underset{(12.382)}{1.792} + \underset{(8.681)}{0.189} \ln\left(FR\_ENDR\right) + \underset{(4.630)}{0.129} \ln\left(\frac{FR\_PEV * \left(1 - 0.01 * FR\_TISS\right)}{FR\_LA}\right) + FR\_E1\_EC$$

$\overline{R}^2 = 0.851$ DW = 0.077 SER = 0.007

b) $$\Delta_4 \ln(FR\_E1) = \underset{(7.247)}{0.390}\ \Delta_4 \ln(FR\_E1_{-4}) + \underset{(12.640)}{0.188}\ \Delta_4 \ln(FR\_ENDR) + \underset{(6.817)}{0.126}\ \Delta_4 \ln\left(\frac{FR\_PEV * (1-0.01 * FR\_TISS)}{FR\_LA}\right) - \underset{(5.913)}{0.352}\ FR\_E1\_EC_{-4} + \min\left[0\ ,\ \ln\left(\frac{0.97\ FR\_EW}{FR\_E1}\right)\right]$$

$\overline{R}^2 = 0.747$ DW = 0.346 SER = 0.004

4. Real imports of goods and services

$$\Delta_4 \ln(FR\_IMR) = \underset{(2.059)}{0.149}\ \Delta_4 \ln\left(\frac{FR\_PEV * (1-0.01 * FR\_TISS)}{FR\_PIM}\right) + \underset{(11.364)}{0.713}\ \Delta_4 \ln(FR\_IMR_{-1}) + \underset{(0.090)}{0.003}\ \ln\left(\frac{FR\_PEV_{-4} * (1-0.01 * FR\_TISS_{-4})}{FR\_PIM_{-4}}\right) + (1-0.713) * \Delta_4 \ln(FR\_EXR)$$

$\overline{R}^2 = 0.599$ DW = 1.468 SER = 0.035

5. Depreciation allowances

$$FR\_D = \underset{(1.080)}{0.899} + (1-0.01 * FR\_KAB) * FR\_D_{-1} + 0.01 * FR\_KAB * FR\_IANR_{-1} * 0.01 * FR\_PINV_{-1}$$

$\overline{R}^2 = 0.000$ DW = 2.280 SER = 7.985

6. Potential gross domestic product

$$FR\_BIPQ = 0.929 * \exp \left\{ \begin{array}{l} \underset{(355.325)}{1.226} + \underset{(69.721)}{0.228} * 0.01 * T \\ + 0.615 \ln \left[FR\_E1 + 0.01 * (FR\_ARLQ - FR\_ARLQN) * FR\_EW \right] \\ + (1 - 0.615) \ln \left[FR\_KRP_{-1} \right] \end{array} \right\}$$

$\bar{R}^2 = 0.978$ DW = 0.389 SER = 0.011

7. Nominal inventory investment

$$FR\_V = 0.01 * FR\_PINV * (FR\_CPR + FR\_IANR + FR\_GR + FR\_VR) - FR\_CP - FR\_IAN - FR\_G$$

8. Private real stock of capital

$$FR\_KRP = (1 - 0.01 * FR\_KAB)\, FR\_KRP_{-1} + FR\_IANR$$

9. Capacity utilisation

$$FR\_GAPQ = 100 * \frac{FR\_BIPR}{FR\_BIPQ}$$

10. Unemployment

$$FR\_ARL = FR\_EW - FR\_E1$$

11. Unemployment rate

$$FR\_ARLQ = 100 * \frac{FR\_ARL}{FR\_EW}$$

12. "Smoothed" unemployment rate

$$FR\_ARLQN = 0.9 * FR\_ARLQN_{-1} + 0.1 * FR\_ARLQ$$

13. Net lending of firms

$$FR\_FU = FR\_D - FR\_IAN - FR\_V - FR\_U - FR\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$\Delta_4 \ln(FR\_LA) = \underset{(16.328)}{0.749}\ \Delta_4 \ln(FR\_LA_{-1})$$
$$+ (1-0.749)\, \Delta_4 \ln(FR\_PCP)$$
$$+ (1-0.749) * 0.713 * \Delta_4 \ln(FR\_BIPQ)$$
$$- \underset{(0.629)}{0.013} * 0.01 * \left(\sum_{i=1}^{4} (FR\_ARLQ_{-i} - FR\_ARLQN_{-i}) \right)$$

$\overline{R}^2 = 0.765$ DW = 1.683 SER = 0.007

2. Deflator of domestic demand

a) $$0.01 * FR\_INF = 0.03\ \Delta_4^2 \ln\left(\frac{FR\_COSI}{1-0.01*FR\_TISS}\right)$$
$$+ \underset{(41.939)}{0.965} * 0.01 * \left[\begin{array}{l} (1-0.359) * FR\_INF_{-1} \\ + \underset{(4.591)}{0.359} * \left(\begin{array}{l} (1-0.4) * FR\_INF_{+1} \\ + 0.4 * EMU\_INFT \end{array} \right) \end{array} \right]$$
$$+ 0.03 \ln(0.01 * FR\_GAPQ)$$
$$+ (1-0.965)\, \Delta_4 \ln(FR\_PSM3)$$
$$+ 0.10 \ln\left(\frac{FR\_PSM3_{-4}}{FR\_PINV_{-4}}\right)$$

$\overline{R}^2 = 0.990$ DW = 0.710 SER=0.006

b) $$\ln(FR\_PINV) = \ln(FR\_PINV_{-4}) + 0.01 * FR\_INF$$

3. Deflator of private consumption

$$\Delta_4 \ln(FR\_PCP) = (1-0.409) * 0.01 * FR\_INF$$
$$+ \underset{(6.276)}{0.409}\ \Delta_4 \ln(FR\_PCP_{-1})$$

$\overline{R}^2 = 0.302$ DW = 0.961 SER = 0.004

4. Deflator of government demand

$$\Delta_4 \ln(FR\_PG) = (1 - 0.447) * 0.01 * FR\_INF + \underset{(7.694)}{0.447} \; \Delta_4 \ln(FR\_PG_{-1})$$

$\overline{R}^2 = 0.394$ DW = 1.880 SER = 0.009

5. Deflator of private fixed capital investment

$$\Delta_4 \ln(FR\_PIAN) = (1 - 0.577) * 0.01 * FR\_INF + \underset{(10.390)}{0.577} \; \Delta_4 \ln(FR\_PIAN_{-1})$$

$\overline{R}^2 = 0.543$ DW = 0.834 SER = 0.008

6. Deflator of exports

$$\Delta_4 \ln(FR\_PEX) = (1 - 0.834)\Delta_4 \begin{bmatrix} (1 - 0.253)\ln(FR\_PINV_{-1}) \\ + 0.253\; FR\_LPAC_{-1} \end{bmatrix} + \underset{(11.896)}{0.834} \; \Delta_4 \ln(FR\_PEX_{-1})$$

$\overline{R}^2 = 0.645$ DW = 1.214 SER = 0.013

7. Production costs

$$FR\_COSI = \frac{100}{100.01} * FR\_LA^{0.713} * FR\_PIM^{1-0.713}$$

8. Deflator of final demand

$$FR\_PEV = \frac{(FR\_ENDR - FR\_EXR) * FR\_PINV + FR\_EXR * FR\_PEX}{FR\_ENDR}$$

9. Deflator of gross domestic product

$$FR\_PBIP = 100 * \frac{FR\_BIP}{FR\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$FR\_PCPD = 0.9 * FR\_PCPD_{-1} + 0.1\,\Delta_4 \ln(PCP_{-1})$$

11. Adaptive expectation on inflation rate of final demand

$$FR\_PEVD = 0.9 * FR\_PEVD_{-1} + 0.1 \Delta_4 \ln(PEV_{-1})$$

IV. Government

1. Direct tax rate

$$\underset{(2.971)}{FR\_TDBS = 1.502} - \underset{(1.077)}{0.116}\ Q1 - \underset{(2.524)}{0.271}\ Q2 - \underset{(0.835)}{0.090}\ Q3 + \underset{(69.102)}{0.964}\ FR\_TDBS_{-1}$$

$\bar{R}^2 = 0.981$ DW = 1.875 SER = 0.365

2. Indirect tax rate

$$FR\_TISS = \underset{(5.266)}{4.393} - \underset{(1.696)}{0.106}\ Q1 + \underset{(0.386)}{0.024}\ Q2 - \underset{(0.825)}{0.052}\ Q3 + \underset{(7.185)}{0.579}\ FR\_TISS_{-1}$$

$\bar{R}^2 = 0.361$ DW = 1.846 SER = 0.213

3. Real government demand

$$\Delta_4 \ln(FR\_GR) = \underset{(20.617)}{0.943}\ \Delta_4 \ln(FR\_GR_{-1}) + (1 - 0.943)\Delta_4 \ln(FR\_BIPR)$$
$$- \underset{(0.833)}{0.051} \ln\left(0.01 * \frac{1}{4}\sum_{i=1}^{4} FR\_GAPQ_{-i}\right)$$

$\bar{R}^2 = 0.851$ DW = 1.291 SER = 0.008

4. Government transfers to households

$$\ln\left(\frac{FR\_SB}{FR\_BIP}\right) = \underset{(2.736)}{-0.043} + \underset{(0.865)}{0.151} * 0.01\,(FR\_ARLQ - FR\_ARLQN)$$
$$+ \underset{(92.884)}{0.971} \ln\left(\frac{FR\_SB_{-1}}{FR\_BIP_{-1}}\right)$$

$\bar{R}^2 = 0.991$ DW = 0.931 SER = 0.009

5. Direct taxes and social contributions

$$FR\_TDB = 0.01 * FR\_TDBS * FR\_VE$$

6. Indirect taxes (excluding subsidies)

$$FR\_TIS = 0.01 * FR\_TISS * FR\_END$$

7. Nominal government demand

$$FR\_G = 0.01 * FR\_GR * FR\_PG$$

8. Net lending of government

$$FR\_FS = FR\_TDB + FR\_TIS - FR\_G - FR\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

$$\text{a) } \ln\left(\frac{FR\_M3}{FR\_PINV}\right) = \underset{(8.970)}{-4.674} + \underset{(15.738)}{1.166} \ln(FR\_BIPR) \underset{(1.860)}{-0.534} * 0.01 * FR\_RL + FR\_M3\_EC$$

$\bar{R}^2 = 0.915$ $DW = 0.168$ $SER = 0.048$

$$\text{b) } \Delta_1 \ln\left(\frac{FR\_M3}{FR\_PINV}\right) = \underset{(1.483)}{0.445}\, \Delta_1 \ln(FR\_BIPR) \underset{(0.561)}{-0.208}\, \Delta_1\, 0.01 * FR\_RL \underset{(0.878)}{-0.109}\, \Delta_1 \ln\left(\frac{FR\_M3_{-1}}{FR\_PINV_{-1}}\right) \underset{(1.428)}{-0.072}\, FR\_M3\_EC_{-1}$$

$\bar{R}^2 = 0.030$ $DW = 1.942$ $SER = 0.019$

2. Money market interest rate for three-month funds

$$FR\_RS = (1 - FR\_EMU) * \left\{ \begin{array}{l} (1 - FR\_EWS) * FR\_RS_{-1} \\ + FR\_EWS * \left[GY\_RS + 100 * \ln\left(\frac{FR\_ERDM}{FR\_ERDM_{-4}}\right) + FR\_RRS \right] \end{array} \right\} + FR\_EMU * EMU\_RS$$

3. Yield on government bonds

$$1 + 0.01\,FR\_RL = (1 - FR\_EMU) * (1 + 0.01\,FR\_RL_{-1})^{(1-0.524)}$$
$$* (1 + 0.01\,FR\_RL_{+1})^{\underset{(13.639)}{0.524}}$$
$$* \left(\frac{1 + 0.01\,FR\_RS}{1 + 0.01\,FR\_RSST}\right)^{\frac{1}{40}}$$
$$+ FR\_EMU * (1 + 0.01\,EMU\_RL)$$

$\bar{R}^2 = 1.000$ DW = 1.860 SER = 0.003

4. Short-term interest rate (long-run)

$$FR\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} FR\_BIPQ_{-i}\right) + EMU\_INFT$$

5. Long-term interest rate (long-run)

$$FR\_RLST = FR\_RSST + EMU\_TERM$$

6. Exchange rate of the Franc against the US-Dollar

$$\ln(FR\_ER) = (1 - FR\_EMU) * \left\{ \begin{array}{l} FR\_EWS * \ln(FR\_ERDM * GY\_ER) \\ + (1 - FR\_EWS) * \left[\begin{array}{l} \underset{(1.546)}{0.062} + (1 - 0.946)\ln\left(\frac{FR\_PCP_{+1}}{US\_PCP_{+1}}\right) \\ - 1.0 * 0.01 * (FR\_RS - US\_RS) \\ + 0.946 * 0.01 * (FR\_RS_{-1} - US\_RS_{-1}) \\ + \underset{(26.984)}{0.946} \ln(FR\_ER_{-1}) \end{array} \right] \end{array} \right\}$$
$$+ FR\_EMU * \ln\left(\frac{6.55957}{EMU\_ER}\right)$$

$\bar{R}^2 = 0.998$ DW = 1.104 SER = 0.054

7. Long-term price level (P-Star)

$$FR\_PSM3 = (1 - FR\_EMU) * \frac{1}{0.996} * \exp\begin{Bmatrix} \ln(FR\_M3) + 4.674 \\ - 1.166 \ln(FR\_BIPQ) \\ + 0.534 * 0.01 * FR\_RL \end{Bmatrix}$$
$$+ FR\_EMU * EMU\_PSM3 * \frac{1}{0.574}$$

8. Risk premium

$$\underset{(8.368)}{FR\_RRS = \ 0.655} \ FR\_RRS_{-1}$$

$\bar{R}^2 = 0.435$ DW = 2.053   SER = 3. 246

9. Exchange rate of the Franc against the D-Mark

$$FR\_ERDM = (1 - FR\_EMU) * \begin{Bmatrix} FR\_EWS * FR\_ERDM_{-1} \\ + (1 - FR\_EWS) * \left(\frac{FR\_ER}{GY\_ER}\right) \end{Bmatrix} + FR\_EMU * 3.35386$$

6. Italy

I. Aggregate demand

1. Real private consumption

$$\Delta_4 \ln\left(\frac{IT\_CPR}{IT\_WOBE}\right) = -\underset{(12.174)}{0.019}$$
$$+ \underset{(3.532)}{0.154}\ \Delta_4 \ln\left(\frac{IT\_YV_{-1}}{0.01 * IT\_PCP_{-1} * IT\_WOBE_{-1}}\right)$$
$$- \underset{(2.325)}{0.070} * 0.01 * \left(IT\_RL - IT\_PCPD\right)$$
$$+ \underset{(13.059)}{0.728}\ \Delta_4 \ln\left(\frac{IT\_CPR_{-1}}{IT\_WOBE_{-1}}\right)$$
$$- 0.05 \ln\left(\frac{IT\_CPR_{-4}}{IT\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.857$ DW = 0.534 SER = 0.008

2. Participation rate (labour supply)

$$\ln\left(\frac{IT\_EW}{IT\_WOBE}\right) = -\underset{(1.857)}{0.043} + \underset{(38.034)}{0.953}\ \ln\left(\frac{IT\_EW_{-1}}{IT\_WOBE_{-1}}\right)$$

$\overline{R}^2 = 0.941$ DW = 2.120 SER = 0.008

3. Population

$$\ln\left(IT\_WOBE\right) = \underset{(3552.404)}{3.980} + \underset{(52.734)}{0.063} * 0.01 * T - \underset{(30.422)}{0.021}\ IT\_D11$$

$\overline{R}^2 = 0.972$ DW = 0.954 SER = 0.002

4. Transfers to foreign countries

$$IT\_U = -\underset{(0.906)}{0.297} + \underset{(1.412)}{0.647}\,Q1 + \underset{(0.988)}{0.452}\,Q2 + \underset{(0.858)}{0.393}\,Q3 + \underset{(15.915)}{0.869}\,IT\_U_{-1}$$

$\overline{R}^2 = 0.734$ $DW = 2.558$ $SER = 1.552$

5. Nominal private consumption

$$IT\_CP = 0.01 * IT\_CPR * IT\_PCP$$

6. Nominal gross private fixed capital investment

$$IT\_IAN = 0.01 * IT\_IANR * IT\_PIAN$$

7. Nominal final demand

$$IT\_END = 0.01 * IT\_ENDR * IT\_PEV$$

8. Real final demand

$$IT\_ENDR = IT\_CPR + IT\_IANR + IT\_GR + IT\_VR + IT\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} IT\_BIP = {} & 0.01 * [IT\_ENDR - IT\_EXR] * IT\_PINV \\ & + 0.01 * IT\_EXR * IT\_PEX \\ & - 0.01 * IT\_IMR * IT\_PIM \\ & + IT\_SDN \end{aligned}$$

10. Real gross domestic product

$$IT\_BIPR = IT\_ENDR - IT\_IMR + IT\_SDR$$

11. National income

$$IT\_VE = IT\_BIP - IT\_TIS - IT\_D$$

12. Disposable income of households

$$IT\_YV = IT\_VE - IT\_TDB + IT\_SB$$

13. Gross wage income

$$IT\_L = 0.01 * 6.951 * IT\_LA * IT\_E1$$

14. Net lending of households

$$IT\_FH = IT\_YV - IT\_CP$$

15. Current account balance

$$IT\_LBS = 0.01 * [IT\_EXR * IT\_PEX - IT\_IMR * IT\_PIM] - IT\_U$$

16. Nominal domestic demand

$$IT\_INLV = IT\_CP + IT\_G + IT\_IAN + IT\_V$$

17. Real domestic demand

$$IT\_INVR = IT\_CPR + IT\_GR + IT\_IANR + IT\_VR$$

II. Aggregate supply

1. Real gross private fixed capital investment

a)

$$\ln\left(IT\_IANR\right) = \underset{(7.094)}{1.365} + \underset{(13.995)}{0.443} \ln\left(IT\_ENDR\right) - \underset{(3.045)}{0.545}\ 0.01 * IT\_RL_{-1} + IT\_IANR\_EC$$

$\overline{R}^2 = 0.730$ DW = 0.113 SER = 0.053

b)

$$\Delta_4 \ln\left(IT\_IANR\right) = \underset{(4.880)}{0.337}\ \Delta_4 \ln\left(IT\_ENDR\right) - \underset{(0.647)}{0.067}\ \Delta_4\ 0.01 * IT\_RL_{-1} + \underset{(14.563)}{0.682}\ \Delta_4 \ln\left(IT\_IANR_{-1}\right) - \underset{(4.437)}{0.231}\ IT\_IANR\_EC_{-4}$$

$\overline{R}^2 = 0.876$ DW = 0.869 SER = 0.021

2. Real inventory investment

$$IT\_VR = \underset{(1.813)}{0.458} + \underset{(2.520)}{0.219}\ IT\_VR_{-1} + \underset{(6.800)}{0.156}\ \Delta_4\ IT\_ENDR$$

$\overline{R}^2 = 0.500$ DW = 1.848 SER = 1.637

3. Employment (labour demand)

a)
$$\ln(IT\_E1) = \underset{(4.636)}{1.802} + \underset{(3.145)}{0.208}\ \ln(IT\_ENDR) + \underset{(2.015)}{0.175}\ \ln\left(\frac{IT\_PEV * (1 - IT\_TISS)}{IT\_LA}\right) + IT\_E1\_EC$$

$\bar{R}^2 = 0.285$ DW = 0.076 SER = 0.023

b)
$$\Delta_4 \ln(IT\_E1) = \underset{(4.580)}{0.435}\ \Delta_4 \ln(IT\_E1_{-4}) + \underset{(4.735)}{0.195}\ \Delta_4 \ln(IT\_ENDR) + \underset{(2.095)}{0.127}\ \Delta_4 \ln\left(\frac{IT\_PEV * (1 - IT\_TISS)}{IT\_LA}\right) - \underset{(4.135)}{0.240}\ IT\_E1\_EC_{-4} + \min\left[0, \ln\left(\frac{0.97\ IT\_EW}{IT\_E1}\right)\right]$$

$\bar{R}^2 = 0.335$ DW = 0.714 SER = 0.012

4. Real imports of goods and services

a)
$$\ln(IT\_IMR) = -\underset{(14.306)}{5.234} + \underset{(25.969)}{1.573} * \ln(IT\_ENDR) + \underset{(3.820)}{0.220} * \ln\left(\frac{IT\_PEV * (1 - 0.01 * IT\_TISS)}{IT\_PIM}\right) + IT\_IMR\_EC$$

$\bar{R}^2 = 0.981$ DW = 0. 438 SER = 0. 046

b) $$\Delta_4 \ln\left(IT\_IMR\right) = \underset{(11.225)}{1.734}\ \Delta_4 \ln\left(IT\_ENDR\right) + \underset{(1.046)}{0.070}\ \Delta_4 \ln\left(IT\_IMR_{-1}\right) + \underset{(0.841)}{0.047}\ \Delta_4 \ln\left(\frac{IT\_PEV_{-1} * \left(1 - 0.01 * IT\_TISS_{-1}\right)}{IT\_PIM_{-1}}\right) - \underset{(5.588)}{0.522}\ IT\_IMR\_EC_{-4}$$

$\bar{R}^2 = 0.864$ DW = 0.996 SER = 0.032

5. Depreciation allowances

$$IT\_D = \underset{(2.949)}{0.688} + \left(1 - 0.01 * IT\_KAB\right) * IT\_D_{-1} + 0.01 * IT\_KAB * IT\_IANR_{-1} * 0.01 * IT\_PINV_{-1}$$

$\bar{R}^2 = 0.000$ DW = 1.283 SER = 2.236

6. Potential gross domestic product

$$IT\_BIPQ = 0.864 * \exp\left\{ \begin{array}{l} \underset{(24.085)}{0.168} + \underset{(22.835)}{0.164} * 0.01 * T - \underset{(3.380)}{0.016}\ IT\_D09 \\ + 0.495 \ln\left[IT\_E1 + 0.01 * \left(IT\_ARLQ - IT\_ARLQN\right) * IT\_EW\right] \\ + \left(1 - 0.495\right) \ln\left(IT\_KRP_{-1}\right) \end{array} \right\}$$

$\bar{R}^2 = 0.903$ DW = 0.371 SER = 0.014

7. Nominal inventory investment

$$IT\_V = 0.01 * IT\_PINV * \left(IT\_CPR + IT\_IANR + IT\_GR + IT\_VR\right) - IT\_CP - IT\_IAN - IT\_G$$

8. Private real stock of capital

$$IT\_KRP = \left(1 - 0.01 * IT\_KAB\right) IT\_KRP_{-1} + IT\_IANR$$

9. Capacity utilisation

$$IT\_GAPQ = 100 * \frac{IT\_BIPR}{IT\_BIPQ}$$

10. Unemployment

$$IT\_ARL = IT\_EW - IT\_E1$$

11. Unemployment rate

$$IT\_ARLQ = 100 * \frac{IT\_ARL}{IT\_EW}$$

12. "Smoothed" unemployment rate

$$IT\_ARLQN = 0.9 * IT\_ARLQN_{-1} + 0.1 * IT\_ARLQ$$

13. Net lending of firms

$$IT\_FU = IT\_D - IT\_IAN - IT\_V - IT\_U - IT\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$\begin{aligned}\Delta_4 \ln(IT\_LA) = & \underset{(3.199)}{0.214}\ \Delta_4 \ln(IT\_LAS) \\ & + \underset{(11.740)}{0.767}\ \Delta_4 \ln(IT\_LA_{-1}) \\ & + \underset{(1.260)}{0.049}\ \ln\left(\frac{IT\_LAS_{-4}}{IT\_LA_{-4}}\right)\end{aligned}$$

$\overline{R}^2 = 0.987 \quad DW = 1.554 \quad SER = 0.014$

2. Deflator of domestic demand

a)
$$\begin{aligned}0.01 * IT\_INF = & \underset{(0.994)}{0.039}\ \Delta_4^2 \ln\left(\frac{IT\_COSI}{1 - 0.01 * IT\_TISS}\right) \\ & + \underset{(24.848)}{0.919} * 0.01 * \left[\begin{array}{l}(1 - 0.459) * IT\_INF_{-1} + \underset{(3.473)}{0.459} \\ * \left(\begin{array}{l}(1 - 0.4) * IT\_INF_{+1} \\ + 0.4 * EMU\_INFT\end{array}\right)\end{array}\right] \\ & + 0.03 * \ln(0.01 * IT\_GAPQ) \\ & + (1 - 0.919) * \Delta_4 \ln(IT\_PSM3) \\ & + 0.10 * \ln\left(\frac{IT\_PSM3_{-4}}{IT\_PINV_{-4}}\right)\end{aligned}$$

$\overline{R}^2 = 0.988 \quad DW = 0.181 \quad SER = 0.016$

b) $\ln(IT\_PINV) = \ln(IT\_PINV_{-4}) + 0.01 * IT\_INF$

3. Deflator of private consumption

$$\Delta_4 \ln\left(IT\_PCP\right) = \left(1 - 0.531\right) * 0.01 * IT\_INF + \underset{(18.178)}{0.531} \; \Delta_4 \ln\left(IT\_PCP_{-1}\right)$$

$\bar{R}^2 = 0.784$ DW = 0.655 SER = 0.005

4. Deflator of government demand

$$\Delta_4 \ln\left(IT\_PG\right) = \left(1 - 0.760\right) * 0.01 * IT\_INF + \underset{(13.187)}{0.760} \; \Delta_4 \ln\left(IT\_PG_{-1}\right)$$

$\bar{R}^2 = 0.656$ DW = 1.478 SER = 0.016

5. Deflator of private fixed capital investment

$$\Delta_4 \ln\left(IT\_PIAN\right) = \left(1 - 0.440\right) * 0.01 * IT\_INF + \underset{(8.097)}{0.440} \; \Delta_4 \ln\left(IT\_PIAN_{-1}\right)$$

$\bar{R}^2 = 0.419$ DW = 0.792 SER = 0.013

6. Deflator of exports

$$\Delta_4 \ln\left(IT\_PEX\right) = \left(1 - 0.806\right) \Delta_4 \left[\begin{array}{l} \left(1 - 0.21\right) \ln\left(IT\_PINV_{-1}\right) \\ + 0.21 \; IT\_LPAC_{-1} \end{array}\right] + \underset{(9.872)}{0.806} \; \Delta_4 \ln\left(IT\_PEX_{-1}\right)$$

$\bar{R}^2 = 0.555$ DW = 0.942 SER = 0.026

7. Production costs

$$IT\_COSI = \frac{100}{99.989} * IT\_LA^{0.687} * IT\_PIM^{1-0.687}$$

8. Deflator of final demand

$$IT\_PEV = \frac{(IT\_ENDR - IT\_EXR) * IT\_PINV + IT\_EXR * IT\_PEX}{IT\_ENDR}$$

9. Deflator of gross domestic product

$$IT\_PBIP = 100 * \frac{IT\_BIP}{IT\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$IT\_PCPD = 0.9 * IT\_PCPD_{-1} + 0.1\,\Delta_4 \ln(PCP_{-1})$$

11. Adaptive expectation on inflation rate of final demand

$$IT\_PEVD = 0.9 * IT\_PEVD_{-1} + 0.1\,\Delta_4 \ln(PEV_{-1})$$

12. Long-term gross wage income per employee

$$IT\_LAS = \frac{1}{9.891} * IT\_PCP * IT\_BPR^{0.84} * (1 - 0.01 * IT\_ARLQ)^{0.84}$$

13. Labour productivity

$$IT\_BPR = 0.9 * IT\_BPR_{-1} + 0.1 \frac{IT\_ENDR}{IT\_E1}$$

IV. Government

1. Direct tax rate

$$\underset{(0.876)}{IT\_TDBS = 0.070} + \underset{(1.433)}{0.161}\ Q1 + \underset{(0.534)}{0.060}\ Q2 + \underset{(1.618)}{0.181}\ Q3 + 1.0\ IT\_TDBS_{-1}$$

$\bar{R}^2 = 0.005$ DW = 0.744 SER = 0.380

2. Indirect tax rate

$$\underset{(1.927)}{IT\_TISS = 0.065} - \underset{(0.661)}{0.032}\ Q1 - \underset{(0.588)}{0.028}\ Q2 - \underset{(0.088)}{0.004}\ Q3 + 1.0\ IT\_TISS_{-1}$$

$\bar{R}^2 = -0.026$ DW = 0.572 SER = 0.162

3. Real government demand

$$\Delta_4 \ln\left(IT\_GR\right) = \Delta_4 \ln\left(IT\_BIPR\right) - \underset{(5.623)}{0.608} \ln\left(0.01 * IT\_GAPQ\right)$$

$\overline{R}^2 = 0.258$ DW = 0.235   SER = 0.023

4. Government transfers to households

$$\ln\left(\frac{IT\_SB}{IT\_BIP_{-1}}\right) = -\underset{(2.022)}{0.059} + \underset{(0.674)}{0.239} \Delta_1 0.01\left(IT\_ARLQ - IT\_ARLQN\right) + \underset{(58.159)}{0.964} \ln\left(\frac{IT\_SB_{-1}}{IT\_BIP_{-2}}\right)$$

$\overline{R}^2 = 0.974$ DW = 0.580   SER = 0.017

5. Direct taxes and social contributions

$$IT\_TDB = 0.01 * IT\_TDBS * IT\_VE$$

6. Indirect taxes (excluding subsidies)

$$IT\_TIS = 0.01 * IT\_TISS * IT\_END$$

7. Nominal government demand

$$IT\_G = 0.01 * IT\_GR * IT\_PG$$

8. Net lending of government

$$IT\_FS = IT\_TDB + IT\_TIS - IT\_G - IT\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

a) $$\ln\left(\frac{IT\_M3}{IT\_PINV}\right) = -3.78 + 1.0 * \ln\left(IT\_BIPR\right) + IT\_M3\_EC$$

$$\text{b)} \quad \Delta_4 \ln\left(\frac{IT\_M3}{IT\_PINV}\right) = -\underset{(2.033)}{0.169} * 0.01 * \Delta_4\, IT\_RL$$
$$+ \underset{(21.214)}{0.938}\ \Delta_4 \ln\left(IT\_M3_{-1}\right)$$
$$- \underset{(19.316)}{0.918}\ \Delta_4 \ln\left(IT\_PINV\right)$$
$$- 0.05\ IT\_M3\_EC_{-4}$$

$\overline{R}^2 = 0.875 \qquad DW = 1.405 \qquad SER = 0.016$

2. Money market interest rate for three-month funds

$$IT\_RS = \left(1 - IT\_EMU\right) * \left\{ \begin{array}{l} \left(1 - IT\_EWS\right) * IT\_RS_{-1} \\ + IT\_EWS * \left[GY\_RS + 100 * \ln\left(\frac{IT\_ERDM}{IT\_ERDM_{-4}}\right) + IT\_RRS \right] \end{array} \right\}$$
$$+ IT\_EMU * EMU\_RS$$

3. Yield on government bonds

$$1 + 0.01\, IT\_RL = \left(1 - IT\_EMU\right)$$
$$* \left(1 + 0.01\, IT\_RL_{-1}\right)^{(1-0.519)}$$
$$* \left(1 + 0.01\, IT\_RL_{+1}\right)^{0.519}_{(13.619)}$$
$$* \left(\frac{1 + 0.01\, IT\_RS}{1 + 0.01\, IT\_RSST}\right)^{\frac{1}{40}}$$
$$+ IT\_EMU \left(1 + 0.01\, EMU\_RL\right)$$

$\overline{R}^2 = 1.000 \qquad DW = 1.781 \qquad SER = 0.005$

4. Short-term interest rate (long-run)

$$IT\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} IT\_BIPQ_{-i}\right) + EMU\_INFT$$

5. Long-term interest rate (long-run)

$$IT\_RLST = IT\_RSST + EMU\_TERM$$

6. Exchange rate of the Lira against the US-Dollar

$$\ln(IT\_ER) = (1 - IT\_EMU) * \left\{ \begin{array}{l} IT\_EWS * \ln(IT\_ERDM * GY\_ER) \\ + (1 - IT\_EWS) * \left[\begin{array}{l} \underset{(0.669)}{0.116} + (1 - 0.978)\ln\left(\frac{IT\_PCP_{+1}}{US\_PCP_{+1}}\right) \\ - 1.0 * 0.01 * (IT\_RS - US\_RS) \\ + 0.978 * 0.01 * (IT\_RS_{-1} - US\_RS_{-1}) \\ + \underset{(28.701)}{0.978} \ln(IT\_ER_{-1}) \end{array} \right] \end{array} \right\}$$

$$+ IT\_EMU * \ln\left(\frac{1936.27}{EMU\_ER}\right)$$

$\bar{R}^2 = 1.000$ DW = 1.142   SER = 0.051

7. Long-term price level (P-Star)

$$IT\_PSM3 = (1 - IT\_EMU) * \frac{1}{0.952} * \exp\{\ln(IT\_M3) + 3.78 - 1.0 * \ln(IT\_BIPQ)\}$$
$$+ IT\_EMU * EMU\_PSM3 * \frac{1}{0.990}$$

8. Risk premium

$$IT\_RRS = \underset{(13.676)}{0.845}\ IT\_RRS_{-1}$$

$\bar{R}^2 = 0.714$ DW = 1.447   SER = 3.845

9. Exchange rate of the Lira against the D-Mark

$$IT\_ERDM = (1 - IT\_EMU) * \left\{ \begin{array}{l} IT\_EWS * IT\_ERDM_{-1} \\ + (1 - IT\_EWS) * \left(\frac{IT\_ER}{GY\_ER}\right) \end{array} \right\} + IT\_EMU * 990.002$$

7. Canada

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{CA\_CPR}{CA\_WOBE}\right) = -\underset{(2.388)}{0.112} + \underset{(1.200)}{0.069} * \Delta_4 \ln\left(100 * \frac{CA\_YV}{CA\_PCP * CA\_WOBE}\right)$$
$$- \underset{(3.190)}{0.235} * 0.01 * \left(CA\_RL - CA\_PCPD\right)$$
$$+ \underset{(10.829)}{0.732}\ \Delta_4 \ln\left(\frac{CA\_CPR_{-1}}{CA\_WOBE_{-1}}\right)$$
$$- \underset{(2.631)}{0.230} \ln\left(\frac{CA\_CPR_{-4}}{CA\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.699$ DW = 1.899 SER = 0.011

2. Participation rate (labour supply)

$$\ln\left(\frac{CA\_EW}{CA\_WOBE}\right) = -\underset{(5.393)}{0.032} + \underset{(112.380)}{0.951} \ln\left(\frac{CA\_EW_{-1}}{CA\_WOBE_{-1}}\right)$$

$\overline{R}^2 = 0.993$ DW = 2.131 SER = 0.004

3. Population

$$\ln\left(CA\_WOBE\right) = \underset{(1837.137)}{2.953} + \underset{(203.491)}{0.298} * 0.01 * T$$

$\overline{R}^2 = 0.998$ DW = 0.023 SER = 0.004

4. Transfers to foreign countries

$$CA\_U = \underset{(0.501)}{0.162} + \underset{(9.308)}{3.010}\ Q1 - \underset{(1.328)}{0.446}\ Q2 - \underset{(0.823)}{0.264}\ Q3$$
$$+ \underset{(15.489)}{0.856}\ CA\_U_{-1} - \underset{(0.115)}{0.128}\ CA\_D881$$

$\overline{R}^2 = 0.771$ DW = 2.553 SER = 1.076

5. Nominal private consumption

$$CA\_CP = 0.01 * CA\_CPR * CA\_PCP$$

6. Nominal gross private fixed capital investment

$$CA\_IAN = 0.01 * CA\_IANR * CA\_PIAN$$

7. Nominal final demand

$$CA\_END = 0.01 * CA\_ENDR * CA\_PEV$$

8. Real final demand

$$CA\_ENDR = CA\_CPR + CA\_IANR + CA\_GR + CA\_VR + CA\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} CA\_BIP = 0.01 * [CA\_ENDR - CA\_EXR] * CA\_PINV \\ + 0.01 * CA\_EXR * CA\_PEX \\ - 0.01 * CA\_IMR * CA\_PIM \\ + CA\_SDN \end{aligned}$$

10. Real gross domestic product

$$CA\_BIPR = CA\_ENDR - CA\_IMR + CA\_SDR$$

11. National income

$$CA\_VE = CA\_BIP - CA\_TIS - CA\_D$$

12. Disposable income of households

$$CA\_YV = CA\_VE - CA\_TDB + CA\_SB$$

13. Gross wage income

$$CA\_L = 0.01 * 7.550 * CA\_LA * CA\_E1$$

14. Net lending of households

$$CA\_FH = CA\_YV - CA\_CP$$

15. Current account balance

$$CA\_LBS = 0.01 * [CA\_EXR * CA\_PEX - CA\_IMR * CA\_PIM] - CA\_U$$

II. Aggregate supply

1. Real gross private fixed capital investment

a)
$$\ln(CA\_IANR) = -\underset{(14.537)}{2.932} + \underset{(30.218)}{1.166} * \ln(CA\_ENDR) + CA\_IANR\_EC - 1.00 * 0.01(CA\_RL - CA\_PEVD)$$

$\bar{R}^2 = 0.906 \quad DW = 0.085 \quad SER = 0.086$

b)
$$\begin{aligned}\Delta_4 \ln(CA\_IANR) = \; & \underset{(3.529)}{0.451} \; \Delta_4 \ln(CA\_ENDR) \\ & - \underset{(2.520)}{0.827} \; \Delta_4 \; 0.01 * (CA\_RL - CA\_PEVD) \\ & + \underset{(10.196)}{0.730} \; \Delta_4 \ln(CA\_IANR_{-1}) \\ & - \underset{(3.293)}{0.154} \; CA\_IANR\_EC_{-4}\end{aligned}$$

$\bar{R}^2 = 0.833 \quad DW = 1.261 \quad SER = 0.036$

2. Real inventory investment

$$\frac{CA\_VR}{CA\_ENDR_{-1}} = \underset{(0.809)}{0.0001} + \underset{(9.820)}{0.696} \frac{CA\_VR_{-1}}{CA\_ENDR_{-2}}$$

$\bar{R}^2 = 0.512 \quad DW = 2.010 \quad SER = 0.005$

3. Employment (labour demand)

a)
$$\begin{aligned}\ln(CA\_E1) = \; & -\underset{(5.820)}{0.723} + \underset{(25.879)}{0.609} \ln(CA\_ENDR) \\ & + \underset{(3.552)}{0.231} \ln\left(\frac{CA\_PEV * (1 - 0.01 * CA\_TISS)}{CA\_LA}\right) \\ & + CA\_E1\_EC\end{aligned}$$

$\bar{R}^2 = 0.962 \quad DW = 0.052 \quad SER = 0.024$

b) $$\Delta_4 \ln(CA\_E1) = \underset{(8.655)}{0.259}\ \Delta_4 \ln(CA\_ENDR) + \underset{(3.001)}{0.090}\ \Delta_4 \ln\left(\frac{CA\_PEV * (1 - 0.01 * CA\_TISS)}{CA\_LA}\right) + \underset{(11.648)}{0.587}\ \Delta_4 \ln(CA\_E1_{-1}) - \underset{(1.992)}{0.071}\ CA\_E1\_EC_{-4} + \min\left[0, \ln\left(\frac{0.97\ CA\_EW}{CA\_E1}\right)\right]$$

$\overline{R}^2 = 0.937$ DW = 1.431 SER = 0.007

4. Real imports of goods and services

a) $$\ln(CA\_IMR) = -\underset{(209.216)}{1.520} + 1.00 \ln(CA\_ENDR) + 1.00 \ln\left(\frac{CA\_PEV * (1 - 0.01 * CA\_TISS)}{CA\_PIM}\right) + \underset{(15.475)}{0.225}\ CA\_D921 + CA\_IMR\_EC$$

$\overline{R}^2 = 0.715$ DW = 0.287 SER = 0.062

b) $$\Delta_4 \ln(CA\_IMR) = \underset{(2.115)}{0.480}\ \Delta_4 \ln(CA\_ENDR_{-1}) + \underset{(5.866)}{0.679}\ \Delta_4 \ln\left(\frac{CA\_PEV * (1 - 0.01 * CA\_TISS)}{CA\_PIM}\right) + \underset{(5.999)}{0.602}\ \Delta_4 \ln(CA\_IMR_{-1}) - \underset{(4.895)}{0.365}\ CA\_IMR\_EC_{-4}$$

$\overline{R}^2 = 0.850$ DW = 1.206 SER = 0.038

5. Depreciation allowances

$$CA\_D = \underset{(3.588)}{0.394} + (1 - 0.01 * CA\_KAB) * CA\_D_{-1}$$
$$+ 0.01 * CA\_KAB * CA\_IANR_{-1} * 0.01 * CA\_PINV_{-1}$$

$\overline{R}^2 = 0.000$ DW = 2.007 SER = 1.053

6. Potential gross domestic product

$$CA\_BIPQ = 0.917 * \exp \left\{ \begin{array}{l} \underset{(334.841)}{0.986} + 0.05 * 0.01 * T \\ + 0.61 \ln [CA\_E1 + 0.01 * (CA\_ARLQ - CA\_ARLQN) * CA\_EW] \\ + (1 - 0.61) \ln [CA\_KRP_{-1}] \end{array} \right\}$$

$\overline{R}^2 = 0.000$ DW = 0.052 SER = 0.029

7. Nominal inventory investment

$$CA\_V = 0.01 * CA\_PINV * (CA\_VR + CA\_CPR + CA\_IANR + CA\_GR) - CA\_CP - CA\_IAN - CA\_G$$

8. Private real stock of capital

$$CA\_KRP = (1 - 0.01 * CA\_KAB)\ CA\_KRP_{-1} + CA\_IANR$$

9. Capacity utilisation

$$CA\_GAPQ = 100 * \frac{CA\_BIPR}{CA\_BIPQ}$$

10. Unemployment

$$CA\_ARL = CA\_EW - CA\_E1$$

11. Unemployment rate

$$CA\_ARLQ = 100 * \frac{CA\_ARL}{CA\_EW}$$

12. "Smoothed" unemployment rate

$$CA\_ARLQN = 0.9 * CA\_ARLQN_{-1} + 0.1 * CA\_ARLQ$$

13. Net lending of firms

$$CA\_FU = CA\_D - CA\_IAN - CA\_V - CA\_U - CA\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$\Delta_4 \ln(CA\_LA) = \underset{(0.746)}{0.001} + (1 - 0.739)\,\Delta_4 \ln(CA\_PCP)$$
$$+ \underset{(12.131)}{0.739}\ \Delta_4 \ln(CA\_LA_{-1})$$
$$- 0.326\ \Delta_4\ 0.01 * (CA\_ARLQ - CA\_ARLQN)$$
$$- \underset{(3.647)}{0.326} * 0.01 * (CA\_ARLQ_{-4} - CA\_ARLQN_{-4})$$

$\bar{R}^2 = 0.647$ DW = 2.396 SER = 0.010

2. Deflator of domestic demand

a) $$0.01 * CA\_INF = 0.05\ \Delta_4^2 \ln\left(\frac{CA\_COSI}{1 - 0.01 * CA\_TISS}\right)$$
$$+ 0.01 * \left[(1 - 0.4) * CA\_INF_{-1} + 0.4 * \begin{pmatrix}(1 - 0.4) * CA\_INF_{+1} \\ + 0.4 * CA\_INFT\end{pmatrix}\right]$$
$$+ 0.1 * \ln\left(0.01 * \frac{1}{4} * \sum_{t=0}^{3} CA\_GAPQ_{-t}\right)$$

b) $$\ln(CA\_PINV) = \ln(CA\_PINV_{-4}) + 0.01 + CA\_INF$$

3. Deflator of private consumption

$$\Delta_4 \ln(CA\_PCP) = (1 - 0.655)\ 0.01 * CA\_INF$$
$$+ \underset{(12.830)}{0.655}\ \Delta_4 \ln(CA\_PCP_{-1})$$

$\bar{R}^2 = 0.644$ DW = 1.237 SER = 0.005

4. Deflator of government demand

$$\Delta_4 \ln(CA\_PG) = (1 - 0.432)\ 0.01 * CA\_INF$$
$$+ \underset{(6.343)}{0.432}\ \Delta_4 \ln(CA\_PG_{-1})$$

$\bar{R}^2 = 0.307$ DW = 2.326 SER = 0.011

5. Deflator of private fixed capital investment

$$\Delta_4 \ln\left(CA\_PIAN\right) = \left(1 - 0.931\right) 0.01 * CA\_INF + \underset{(21.615)}{0.931} \; \Delta_4 \ln\left(CA\_PIAN_{-1}\right)$$

$\overline{R}^2 = 0.837 \quad DW = 1.348 \quad SER = 0.012$

6. Deflator of exports

$$\Delta_4 \ln\left(CA\_PEX\right) = \left(1 - 0.927\right) \Delta_4 \begin{bmatrix} \left(1 - 0.272\right) \ln\left(CA\_PINV_{-1}\right) \\ + 0.272\ CA\_LPAC_{-1} \end{bmatrix} + \underset{(18.231)}{0.927} \; \Delta_4 \ln\left(CA\_PEX_{-1}\right)$$

$\overline{R}^2 = 0.810 \quad DW = 1.167 \quad SER = 0.020$

7. Production costs

$$CA\_COSI = \frac{100}{99.994} * CA\_LA^{0.662} * CA\_PIM^{1-0.662}$$

8. Deflator of final demand

$$CA\_PEV = \frac{\left(CA\_ENDR - CA\_EXR\right) * CA\_PINV + CA\_EXR * CA\_PEX}{CA\_ENDR}$$

9. Deflator of gross domestic product

$$CA\_PBIP = 100 * \frac{CA\_BIP}{CA\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$CA\_PCPD = 0.9 * CA\_PCPD_{-1} + 0.1\, \Delta_4 \ln\left(PCP_{-1}\right)$$

11. Adaptive expectation on inflation rate of final demand

$$CA\_PEVD = 0.9 * CA\_PEVD_{-1} + 0.1\, \Delta_4 \ln\left(PEV_{-1}\right)$$

IV. Government

1. Direct tax rate

$$CA\_TDBS = \underset{(0.303)}{0.356} + \underset{(8.431)}{0.890}\ CA\_TDBS_{-1} + \underset{(0.881)}{0.098}\ CA\_TDBS_{-2}$$

$\overline{R}^2 = 0.864$ DW = 1.921 SER = 0.545

2. Indirect tax rate

$$CA\_TISS = \underset{(1.647)}{0.528} + \underset{(27.039)}{0.943}\ CA\_TISS_{-1}$$

$\overline{R}^2 = 0.889$ DW = 2.173 SER = 0.310

3. Real government demand

$$\begin{aligned}\Delta_4 \ln(CA\_GR) = {} & \underset{(22.768)}{0.885}\ \Delta_4 \ln(CA\_GR_{-1}) \\ & + (1 - 0.885)\ \Delta_4 \ln(CA\_BIPR) \\ & - 0.1 \ln(0.01 * CA\_GAPQ)\end{aligned}$$

$\overline{R}^2 = 0.851$ DW = 1.804 SER=0.013

4. Government transfers to households

$$\begin{aligned}\ln\left(\frac{CA\_SB}{CA\_BIP}\right) = {} & -\underset{(1.088)}{0.024} + \underset{(3.951)}{0.597} * 0.01\,(CA\_ARLQ - CA\_ARLQN) \\ & + \underset{(100.176)}{0.988}\ \ln\left(\frac{CA\_SB_{-1}}{CA\_BIP_{-1}}\right)\end{aligned}$$

$\overline{R}^2 = 0.991$ DW = 0.457 SER = 0.017

5. Direct taxes and social contributions

$CA\_TDB = 0.01 * CA\_TDBS * CA\_VE$

6. Indirect taxes (excluding subsidies)

$CA\_TIS = 0.01 * CA\_TISS * CA\_END$

7. Nominal government demand

$$CA\_G = 0.01 * CA\_GR * CA\_PG$$

8. Net lending of government

$$CA\_FS = CA\_TDB + CA\_TIS - CA\_G - CA\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

a)

$$\ln\left(\frac{CA\_M}{CA\_PINV}\right) = \underset{(46.862)}{-\ 8.230} + \underset{(55.434)}{1.901} \ln(CA\_BIPR) \underset{(0.223)}{-\ 0.092} * 0.01 * CA\_RLD + CA\_M\_EC$$

$\bar{R}^2 = 0.970$ DW = 0.092 SER = 0.061

b)

$$\Delta_4 \ln\left(\frac{CA\_M}{CA\_PINV}\right) = \underset{(2.674)}{0.106} \Delta_4 \ln(CA\_BIPR) + \underset{(34.637)}{0.923} \Delta_4 \ln\left(\frac{CA\_M_{-1}}{CA\_PINV_{-1}}\right) \underset{(2.498)}{-\ 0.047} CA\_M\_EC_{-4}$$

$\bar{R}^2 = 0.970$ DW = 1.490 SER = 0.010

2. Monetary policy rule: Money market interest rate for three-month funds

$$CA\_RS = 0.75\ CA\_RS_{-1} + (1 - 0.75)\ CA\_RSST + 0.50 * \frac{1}{4}\sum_{i=1}^{4}(CA\_INF_{+i} - CA\_INFT_{+i}) + 0.50 * \frac{1}{4}\sum_{i=0}^{3} 100 * \ln(0.01\ CA\_GAPQ_{-i})$$

3. Yield on government bonds

$$
\begin{aligned}
1+0.01\,CA\_RL = {} & (1+0.01\,CA\_RL_{-1})^{(1-0.476)} \\
& * (1+0.01\,CA\_RL_{+1})^{\underset{(10.986)}{0.476}} \\
& * \left(\frac{1+0.01\,CA\_RS}{1+0.01\,CA\_RSST}\right)^{\frac{1}{40}} \\
& * \left(\frac{1+0.01\,CA\_RL_{-4}}{1+0.01\,CA\_RLST}\right)^{-0.02}
\end{aligned}
$$

$\overline{R}^2 = 1.000 \quad DW = 2.816 \quad SER = 0.004$

4. Short-term interest rate (long-run)

$$
CA\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} CA\_BIPQ_{-i}\right) + CA\_INFT
$$

5. Long-term interest rate (long-run)

$$
CA\_RLST = CA\_RSST + CA\_TERM
$$

6. Exchange rate of the Can. Dollar against the US-Dollar

$$
\begin{aligned}
\ln(CA\_ER) = {} & \underset{(2.366)}{0.017} + (1-0.945)\ln\left(\frac{CA\_PCP_{+1}}{US\_PCP_{+1}}\right) \\
& - 1.0 * 0.01 * (CA\_RS - US\_RS) \\
& + 0.945 * 0.01 * (CA\_RS_{-1} - US\_RS_{-1}) \\
& + 0.945 \ln (CA\_ER_{-1}) \\
& (33.240)
\end{aligned}
$$

$\overline{R}^2 = 0.924 \quad DW = 1.824 \quad SER = 0.020$

7. "Smoothed" long-term interest rate

$$
CA\_RLD = 0.9 * CA\_RLD_{-1} + 0.1 * 0.01 * CA\_RL
$$

8. Netherlands

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{NL\_CPR}{NL\_WOBE}\right) = -\underset{(3.183)}{0.081} + \underset{(2.824)}{0.151}\ \Delta_4 \ln\left(\frac{100 * NL\_YV}{NL\_PCP * NL\_WOBE}\right)$$

$$- \underset{(0.896)}{0.081} * 0.01 * \left(NL\_RL - NL\_PCPD\right)$$

$$+ \underset{(6.642)}{0.540} * \Delta_4 \ln\left(\frac{NL\_CPR_{-1}}{NL\_WOBE_{-1}}\right)$$

$$- \underset{(3.429)}{0.179}\ \ln\left(\frac{NL\_CPR_{-4}}{NL\_BIPR_{-4}}\right)$$

$\bar{R}^2 = 0.692$ DW = 2.343 SER = 0.010

2. Participation rate (labour supply)

$$\ln\left(\frac{NL\_EW}{NL\_WOBE}\right) = -\underset{(2.938)}{0.096} + \underset{(26.597)}{0.898}\ \ln\left(\frac{NL\_EW_{-1}}{NL\_WOBE_{-1}}\right) + \underset{(2.632)}{0.014}\ NL\_D09$$

$\bar{R}^2 = 0.980$ DW = 1.865 SER = 0.011

3. Population

$$\Delta_4 \ln\left(NL\_WOBE\right) = \underset{(1868.624)}{2.523} + \underset{(127.065)}{0.149} * 0.01 * T$$

$\bar{R}^2 = 0.995$ DW = 0.024 SER = 0.002

4. Transfers to foreign countries

$$NL\_U = \underset{(0.959)}{0.267} + \underset{(5.904)}{0.578}\ NL\_U_{-1}$$

$$+ \underset{(1.136)}{0.400}\,Q1 + \underset{(0.544)}{0.188}\ Q2 + \underset{(1.297)}{0.448}\ Q3$$

$\bar{R}^2 = 0.289$ DW = 2.378 SER = 1.109

5. Nominal private consumption

$$NL\_CP = 0.01 * NL\_CPR * NL\_PCP$$

6. Nominal gross private fixed capital investment

$$NL\_IAN = 0.01 * NL\_IANR * NL\_PIAN$$

7. Nominal final demand

$$NL\_END = 0.01 * NL\_ENDR * NL\_PEV$$

8. Real final demand

$$NL\_ENDR = NL\_CPR + NL\_IANR + NL\_GR + NL\_VR + NL\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} NL\_BIP = 0.01 * & \left[NL\_ENDR - NL\_EXR\right] * NL\_PINV \\ & + 0.01 * NL\_EXR * NL\_PEX \\ & - 0.01 * NL\_IMR * NL\_PIM \\ & + NL\_SDN \end{aligned}$$

10. Real gross domestic product

$$NL\_BIPR = NL\_ENDR - NL\_IMR + NL\_SDR$$

11. National income

$$NL\_VE = NL\_BIP - NL\_TIS - NL\_D$$

12. Disposable income of households

$$NL\_YV = NL\_VE - NL\_TDB + NL\_SB$$

13. Gross wage income

$$NL\_L = 0.01 * 10.946 * NL\_LA * NL\_E1$$

14. Net lending of households

$$NL\_FH = NL\_YV - NL\_CP$$

15. Current account balance

$$NL\_LBS = 0.01 * \left[NL\_EXR * NL\_PEX - NL\_IMR * NL\_PIM\right] - NL\_U$$

16. Nominal domestic demand

$$NL\_INLV = NL\_CP + NL\_G + NL\_IAN + NL\_V$$

17. Real domestic demand

$$NL\_INVR = NL\_CPR + NL\_GR + NL\_IANR + NL\_VR$$

II. Aggregate supply

1. Real gross private fixed capital investment

a)
$$\ln(NL\_IANR) = \underset{(246.301)}{-\ 1.798} + 1.00 \ln(NL\_BIPR) + NL\_IANR\_EC$$

$\overline{R}^2 = 0.000$ DW = 1.087 SER = 0.067

b)
$$\Delta_4 \ln(NL\_IANR) = 1.00\ \Delta_4 \ln(NL\_ENDR) + 0.5\ \Delta_4 \ln(NL\_IANR_{-1}) - \underset{(5.554)}{0.711}\ NL\_IANR\_EC_{-4}$$

$\overline{R}^2 = 0.291$ DW = 2.419 SER = 0.076

2. Real inventory investment

$$NL\_VR = \underset{(1.359)}{0.308} + \underset{(2.258)}{0.244}\ NL\_VR_{-1} + \underset{(1.156)}{0.037}\ \Delta_4\ NL\_ENDR$$

$\overline{R}^2 = 0.055$ DW = 2.055 SER = 1.237

3. Employment (labour demand)

a)
$$\ln(NL\_E1) = \underset{(8.800)}{-\ 0.784} + \underset{(26.413)}{0.470} \ln(NL\_ENDR) + \underset{(5.009)}{0.120} \ln\left(\frac{NL\_PEV * (1 - 0.01 * NL\_TISS)}{NL\_LA}\right) + \underset{(19.556)}{0.116} * NL\_D09 + NL\_E1\_EC$$

$\overline{R}^2 = 0.993$ DW = 0.461 SER = 0.011

b) $\Delta_4 \ln(NL\_E1) = \underset{(7.622)}{0.279}\ \Delta_4 \ln(NL\_ENDR)$

$$+ \underset{(2.719)}{0.123}\ \Delta_4 \ln(NL\_E1_{-1})$$

$$+ \underset{(19.015)}{0.135}\ \Delta_4\ NL\_D09$$

$$- \underset{(7.389)}{0.831} * NL\_E1\_EC_{-4}$$

$\bar{R}^2 = 0.932$ DW = 0.688 SER = 0.010

4. Real imports of goods and services

a) $\ln(NL\_IMR) = -\underset{(135.900)}{1.110} + 1.00 * \ln(NL\_ENDR)$

$$+ \underset{(16.711)}{0.665} * \ln\left(\frac{NL\_PEV * (1 - 0.01 * NL\_TISS)}{NL\_PIM}\right)$$

$$+ NL\_IMR\_EC$$

$\bar{R}^2 = 0.779$ DW = 0.263 SER = 0.030

b) $\Delta_4 \ln(NL\_IMR) = \underset{(14.832)}{1.310}\ \Delta_4 \ln(NL\_ENDR)$

$$+ \underset{(1.632)}{0.093}\ \Delta_4 \ln(NL\_IMR_{-1})$$

$$+ \underset{(4.275)}{0.199}\ \Delta_4 \ln\left(\frac{NL\_PEV * (1 - 0.01 * NL\_TISS)}{NL\_PIM}\right)$$

$$- \underset{(6.111)}{0.392} * NL\_IMR\_EC_{-4}$$

$\bar{R}^2 = 0.935$ DW = 1.228 SER = 0.014

5. Depreciation allowances

$NL\_D = \underset{(5.016)}{0.595} + (1 - 0.01 * NL\_KAB) * NL\_D_{-1}$

$$+ 0.01 * NL\_KAB * NL\_IANR_{-1} * 0.01 * NL\_PINV_{-1}$$

$\bar{R}^2 = 0.000$ DW = 1.973 SER = 1.080

6. Potential gross domestic product

$$NL\_BIPQ = 0.927 * \exp\left\{\begin{array}{l} 1.050 + \ 0.142 * 0.01 * T - 0.058\ NL\_D09 \\ (60.623)\ (7.733) \qquad\qquad (6.460) \\ + 0.595\ \ln\left[NL\_E1 + 0.01 * (NL\_ARLQ - NL\_ARLQN) * NL\_EW\right] \\ + (1 - 0.595) \ln(NL\_KRP_{-1}) \end{array}\right\}$$

$\overline{R}^2 = 0.411$ DW = 0.257 SER = 0.020

7. Nominal inventory investment

$$NL\_V = 0.01 * NL\_PINV * [NL\_CPR + NL\_IANR + NL\_GR + NL\_VR] - NL\_CP - NL\_IAN - NL\_G$$

8. Private real stock of capital

$$NL\_KRP = (1 - 0.01 * NL\_KAB) * NL\_KRP_{-1} + NL\_IANR$$

9. Capacity utilisation

$$NL\_GAPQ = 100 * \frac{NL\_BIPR}{NL\_BIPQ}$$

10. Unemployment

$$NL\_ARL = NL\_EW - NL\_E1$$

11. Unemployment rate

$$NL\_ARLQ = 100 * \frac{NL\_ARL}{NL\_EW}$$

12. "Smoothed" unemployment rate

$$NL\_ARLQN = 0.9 * NL\_ARLQN_{-1} + 0.1 * NL\_ARLQ$$

13. Net lending of firms

$$NL\_FU = NL\_D - NL\_IAN - NL\_V - NL\_U - NL\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$
\begin{aligned}
\Delta_4 \ln(NL\_LA) = {} & (1-0.442)\,\Delta_4 \ln(NL\_PCP) \\
& + \underset{(7.125)}{0.442}\ \Delta_4 \ln(NL\_LA_{-1}) \\
& - \underset{(4.534)}{0.407} * 0.01\,(NL\_ARLQ_{-4} - NL\_ARLQN_{-4}) \\
& - \underset{(8.907)}{0.089}\ \Delta_4 \ln(NL\_D09)
\end{aligned}
$$

$\overline{R}^2 = 0.810 \quad DW = 0.926 \quad SER = 0.016$

2. Deflator of domestic demand

a)

$$
\begin{aligned}
0.01 * NL\_INF = {} & \underset{(0.444)}{0.022} * \Delta_4^2 \ln\left[\frac{NL\_COSI}{1-0.01*NL\_TISS}\right] \\
& + \underset{(14.831)}{0.885} * 0.01 * \left[\begin{array}{l}\left(1-\underset{(2.607)}{0.372}\right) * NL\_INF_{-4} + \underset{(2.607)}{0.372} \\ * \left(\begin{array}{l}(1-0.4) * NL\_INF_{+4} \\ + 0.4 * EMU\_INFT\end{array}\right)\end{array}\right] \\
& + 0.03 \ln(0.01 * NL\_GAPQ) \\
& + (1-0.885)\,\Delta_4 \ln(NL\_PSM3) \\
& + 0.1 \ln\left(\frac{NL\_PSM3_{-4}}{NL\_PINV_{-4}}\right)
\end{aligned}
$$

$\overline{R}^2 = 0.550 \quad DW = 2.004 \quad SER = 0.016$

b) $\ln(NL\_PINV) = \ln(NL\_PINV_{-4}) + 0.01 * NL\_INF$

3. Deflator of private consumption

$$
\begin{aligned}
\Delta_4 \ln(NL\_PCP) = {} & (1-0.823)\ 0.01\, NL\_INF \\
& + \underset{(13.275)}{0.823}\ \Delta_4 \ln(NL\_PCP_{-1})
\end{aligned}
$$

$\overline{R}^2 = 0.693 \quad DW = 2.383 \quad SER = 0.006$

4. Deflator of government demand

$$\Delta_4 \ln(NL\_PG) = (1-0.906)\, 0.01\, NL\_INF + \underset{(12.858)}{0.906}\, \Delta_4 \ln(NL\_PG_{-1})$$

$\overline{R}^2 = 0.679$ DW = 2.369 SER = 0.010

5. Deflator of private fixed capital investment

$$\Delta_4 \ln(NL\_PIAN) = 0.01 * NL\_INF$$

6. Deflator of exports

$$\Delta_4 \ln(NL\_PEX) = (1-0.771)\, \Delta_4 \begin{bmatrix} (1-0.374) \ln(NL\_PINV_{-1}) \\ +\, 0.374\, NL\_LPAC_{-1} \end{bmatrix} + \underset{(10.988)}{0.771}\, \Delta_4 \ln(NL\_PEX_{-1})$$

$\overline{R}^2 = 0.608$ DW = 1.211 SER = 0.031

7. Production costs

$$NL\_COSI = \frac{100}{101.36} * NL\_LA^{0.524} * NL\_PIM^{1-0.524}$$

8. Deflator of final demand

$$NL\_PEV = \frac{(NL\_ENDR - NL\_EXR) * NL\_PINV + NL\_EXR * NL\_PEX}{NL\_ENDR}$$

9. Deflator of gross domestic product

$$NL\_PBIP = 100 * \frac{NL\_BIP}{NL\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$NL\_PCPD = 0.9 * NL\_PCPD_{-1} + 0.1\, \Delta_4 \ln(PCP_{-1})$$

11. Adaptive expectation on inflation rate of final demand

$$NL\_PEVD = 0.9 * NL\_PEVD_{-1} + 0.1\, \Delta_4 \ln(PEV_{-1})$$

IV. Government

1. Direct tax rate

$$NL\_TDBS = \underset{(1.417)}{1.964} + \underset{(25.918)}{0.947}\ NL\_TDBS_{-1}$$

$$\bar{R}^2 = 0.891 \quad DW = 1.537 \quad SER = 0.793$$

2. Indirect tax rate

$$NL\_TISS = \underset{(2.043)}{0.771} + \underset{(14.809)}{0.880}\ NL\_TISS_{-1}$$

$$\bar{R}^2 = 0.734 \quad DW = 2.784 \quad SER = 0.354$$

3. Real government demand

$$\begin{aligned} \Delta_4 \ln(NL\_GR) = {} & \underset{(7.618)}{0.591}\ \Delta_4 \ln(NL\_GR_{-1}) \\ & + (1 - 0.591)\ \Delta_4 \ln(NL\_BIPR) \\ & - \underset{(1.475)}{0.088} \ln(0.01 * NL\_GAPQ) \end{aligned}$$

$$\bar{R}^2 = 0.505 \quad DW = 2.298 \quad SER = 0.014$$

4. Government transfers to households

$$\begin{aligned} \ln\left(\frac{NL\_SB}{NL\_BIP}\right) = {} & -\underset{(2.037)}{0.138} + \underset{(21.843)}{0.915} \ln\left(\frac{NL\_SB_{-1}}{NL\_BIP_{-1}}\right) \\ & + \underset{(2.009)}{0.289}\ \Delta_4\ 0.01\,(NL\_ARLQ - NL\_ARLQN) \end{aligned}$$

$$\bar{R}^2 = 0.885 \quad DW = 1.260 \quad SER = 0.015$$

5. Direct taxes and social contributions

$$NL\_TDB = 0.01 * NL\_TDBS * NL\_VE$$

6. Indirect taxes (excluding subsidies)

$$NL\_TIS = 0.01 * NL\_TISS * NL\_END$$

7. Nominal government demand

$$NL\_G = 0.01 * NL\_GR * NL\_PG$$

8. Net lending of government

$$NL\_FS = NL\_TDB + NL\_TIS - NL\_G - NL\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

a) $$\ln\left(\frac{NL\_M3}{NL\_PINV}\right) = -\underset{(40.561)}{6.878} + \underset{(48.778)}{1.667}\ \ln\left(NL\_BIPR\right) + NL\_M3\_EC$$

$\bar{R}^2 = 0.974$ DW = 0.378 SER = 0.035

b) $$\Delta_4 \ln\left(\frac{NL\_M3}{NL\_PINV}\right) = \underset{(3.098)}{0.468}\ \Delta_4 \ln\left(NL\_BIPR\right) - \underset{(1.221)}{0.308}\ \Delta_4 \left(0.01 * NL\_RL\right) + \underset{(8.567)}{0.716}\ \Delta_4 \ln\left(\frac{NL\_M3_{-1}}{NL\_PINV_{-1}}\right) - \underset{(2.987)}{0.229}\ NL\_M3\_EC_{-4}$$

$\bar{R}^2 = 0.893$ DW = 2.233 SER = 0.018

2. Money market interest rate for three-month funds

$$NL\_RS = \left(1 - NL\_EMU\right) * \left\{ \begin{bmatrix} \left(1 - NL\_EWS\right) * NL\_RS_{-1} \\ + NL\_EWS * \left[GY\_RS + 100 * \ln\left(\frac{NL\_ERDM}{NL\_ERDM_{-4}}\right) + NL\_RRS \right] \end{bmatrix} \right\} + NL\_EMU * EMU\_RS$$

3. Yield on government bonds

$$
\begin{aligned}
1+0.01\,NL\_RL = & \left(1-NL\_EMU\right) * \left(1+0.01\,NL\_RL_{-1}\right)^{\left(1-0.511\right)} \\
& * \left(1+0.01\,NL\_RL_{+1}\right)^{\underset{(10.096)}{0.511}} \\
& * \left(\frac{1+0.01\,NL\_RS}{1+0.01\,NL\_RSST}\right)^{\frac{1}{40}} \\
& + NL\_EMU * \left(1+0.01\,EMU\_RL\right)
\end{aligned}
$$

$\overline{R}^2 = 1.000$ DW = 2.433 SER = 0.002

4. Short-term interest rate (long-run)

$$
NL\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} NL\_BIPQ_{-i}\right) + NL\_INFT
$$

5. Long-term interest rate (long-run)

$$
NL\_RLST = NL\_RSST + NL\_TERM
$$

6. Exchange rate of the Guilder against the US-Dollar

$$
\begin{aligned}
\ln\left(NL\_ER\right) = & \left(1-NL\_EMU\right) * \left\{
\begin{array}{l}
NL\_EWS * \ln\left(NL\_ERDM * GY\_ER\right) \\
+ \left(1-NL\_EWS\right) * \left[
\begin{array}{l}
\underset{(1.285)}{0.033} + \left(1-0.949\right)\ln\left(\frac{NL\_PCP_{+1}}{US\_PCP_{+1}}\right) \\
-1.0 * 0.01 * \left(NL\_RS - US\_RS\right) \\
+0.949 * 0.01 * \left(NL\_RS_{-1} - US\_RS_{-1}\right) \\
+\underset{(26.586)}{0.949} \ln\left(NL\_ER_{-1}\right)
\end{array}
\right]
\end{array}
\right\} \\
& + NL\_EMU * \ln\left(\frac{2.20371}{EMU\_ER}\right)
\end{aligned}
$$

$\overline{R}^2 = 0.995$ DW = 1.326 SER = 0.052

7. Long-term price level (P-Star)

$$NL\_PSM3 = (1 - NL\_EMU) * \frac{1}{0.981} * \exp\left\{\ln(NL\_M3) + 6.878 - 1.667 \ln(NL\_BIPQ)\right\}$$
$$+ NL\_EMU * EMU\_PSM3 * \frac{1}{1.158}$$

8. Risk premium

$$NL\_RRS = \underset{(7.129)}{0.627}\ NL\_RRS_{-1}$$

$\overline{R}^2 = 0.395$ DW = 1.625 SER = 0.906

9. Exchange rate of the Guilder against the D-Mark

$$NL\_ERDM = (1 - NL\_EMU) * \left\{\begin{array}{l} NL\_EWS * NL\_ERDM_{-1} \\ + (1 - NL\_EWS) * \dfrac{NL\_ER}{GY\_ER} \end{array}\right\}$$
$$+ NL\_EMU * 1.12674$$

9. Belgium

I. Aggregate demand

1. Real private per capita consumption

$$\Delta_4 \ln\left(\frac{BE\_CPR}{BE\_WOBE}\right) = \underset{(2.007)}{-\ 0.059} + \underset{(1.385)}{0.042}\ \Delta_4 \ln\left(\frac{100 * BE\_YV}{BE\_PCP * BE\_WOBE}\right)$$
$$- \underset{(1.536)}{0.052} * 0.01\left(BE\_RL - BE\_PCPD\right)$$
$$+ \underset{(16.994)}{0.840}\ \Delta_4 \ln\left(\frac{BE\_CPR_{-1}}{BE\_WOBE_{-1}}\right)$$
$$- \underset{(2.182)}{0.144}\ \ln\left(\frac{BE\_CPR_{-4}}{BE\_BIPR_{-4}}\right)$$

$\overline{R}^2 = 0.842$ DW = 0.424 SER = 0.006

2. Participation rate (labour supply)

$$\Delta_1 \ln\left(BE\_EW\right) = \underset{(28.816)}{0.939} * \Delta_1 \ln\left(BE\_EW_{-1}\right)$$
$$+ \left(1 - 0.939\right) \Delta_1 \ln\left(BE\_WOBE\right)$$

$\overline{R}^2 = 0.901$ DW = 0.536 SER = 0.000

3. Population

$$\ln\left(BE\_WOBE\right) = \underset{(472.392)}{2.083} + 0.2 * 0.01 * T$$

$\overline{R}^2 = 0.000$ DW = 0.001 SER = 0.042

4. Transfers to foreign countries

$$BE\_U = \underset{(0.337)}{-\ 1.103} + \underset{(4.105)}{0.409} * BE\_U_{-1}$$
$$+ \underset{(0.430)}{1.991}\ Q1 + \underset{(0.229)}{1.059}\ Q2 + \underset{(0.202)}{0.936}\ Q3$$

$\overline{R}^2 = 0.126$ DW = 2.067 SER = 15.712

5. Nominal private consumption

$$BE\_CP = 0.01 * BE\_CPR * BE\_PCP$$

6. Nominal gross private fixed capital investment

$$BE\_IAN = 0.01 * BE\_IANR * BE\_PIAN$$

7. Nominal final demand

$$BE\_END = 0.01 * BE\_ENDR * BE\_PEV$$

8. Real final demand

$$BE\_ENDR = BE\_CPR + BE\_IANR + BE\_GR + BE\_VR + BE\_EXR$$

9. Nominal gross domestic product

$$\begin{aligned} BE\_BIP = {} & 0.01 * [BE\_ENDR - BE\_EXR] * BE\_PINV \\ & + 0.01 * BE\_EXR * BE\_PEX \\ & - 0.01 * BE\_IMR * BE\_PIM \\ & + BE\_SDN \end{aligned}$$

10. Real gross domestic product

$$BE\_BIPR = BE\_ENDR - BE\_IMR + BE\_SDR$$

11. National income

$$BE\_VE = BE\_BIP - BE\_TIS - BE\_D$$

12. Disposable income of households

$$BE\_YV = BE\_VE - BE\_TDB + BE\_SB$$

13. Gross wage income

$$BE\_L = 0.01 * 225.978 * BE\_LA * BE\_E1$$

14. Net lending of households

$$BE\_FH = BE\_YV - BE\_CP$$

15. Current account balance

$$BE\_LBS = 0.01 * [BE\_EXR * BE\_PEX - BE\_IMR * BE\_PIM] - BE\_U$$

16. Nominal domestic demand

$$BE\_INLV = BE\_CP + BE\_G + BE\_IAN + BE\_V$$

17. Real domestic demand

$$BE\_INVR = BE\_CPR + BE\_GR + BE\_IANR + BE\_VR$$

II. Aggregate supply

1. Real gross private fixed capital investment

a)
$$\ln(BE\_IANR) = -\underset{(3.836)}{2.090} + \underset{(13.800)}{0.969}\ \ln(BE\_ENDR) + BE\_IANR\_EC$$

$\overline{R}^2 = 0.666 \quad DW = 0.021 \quad SER = 0.128$

b)
$$\Delta_4 \ln(BE\_IANR) = \underset{(4.467)}{0.443}\ \Delta_4 \ln(BE\_ENDR) + \underset{(19.405)}{0.801}\ \Delta_4 \ln(BE\_IANR_{-1}) - \underset{(0.409)}{0.088} * 0.01\,\Delta_4 \ln(BE\_RL - BE\_PEVD) - \underset{(3.882)}{0.085}\ BE\_IANR\_EC_{-4}$$

$\overline{R}^2 = 0.892 \quad DW = 0.428 \quad SER = 0.026$

2. Real inventory investment

$$BE\_VR = -\underset{(2.262)}{0.905} + \underset{(15.223)}{0.806}\ BE\_VR_{-1} + \underset{(3.461)}{0.017}\ \Delta_4\, BE\_ENDR$$

$\overline{R}^2 = 0.769 \quad DW = 0.441 \quad SER = 2.592$

3. Employment (labour demand)

$$\ln(BE\_E1) = -\underset{(5.339)}{0.160} - \underset{(2.053)}{0.003} * 0.01 * T + \underset{(202.160)}{0.975}\ \ln(BE\_E1_{-1}) + (1 - 0.975)\ln\left(BE\_ENDR * \frac{BE\_PEV\,(1 - 0.01\,BE\_TISS)}{BE\_LA}\right) + \min\left[0\,,\ \ln\left(\frac{0.97 * BE\_EW}{BE\_E1}\right)\right]$$

$\overline{R}^2 = 0.999 \quad DW = 0.101 \quad SER = 0.002$

4. Real imports of goods and services

a)
$$\ln(BE\_IMR) = \underset{(97.591)}{-0.940} + 1.00 \ln(BE\_ENDR) + \underset{(7.159)}{0.657} \ln\left(\frac{BE\_PEV * (1 - 0.01 * BE\_TISS)}{BE\_PIM}\right) + BE\_IMR\_EC$$

$\overline{R}^2 = 0.346$ DW = 0.022 SER = 0.070

b)
$$\Delta_4 \ln(BE\_IMR) = \underset{(9.256)}{0.905}\ \Delta_4 \ln(BE\_ENDR_{-1}) + \underset{(7.628)}{0.447}\ \Delta_4 \ln(BE\_IMR_{-1}) + \underset{(2.969)}{0.139}\ \Delta_4 \ln\left(\frac{BE\_PEV * (1 - 0.01 * BE\_TISS)}{BE\_PIM}\right) - \underset{(1.533)}{0.037} * BE\_IMR\_EC_{-4}$$

$\overline{R}^2 = 0.939$ DW = 0.312 SER = 0.015

5. Depreciation allowances

$$BE\_D = \underset{(2.619)}{1.464} + (1 - 0.01 * BE\_KAB) * BE\_D_{-1} + 0.01 * BE\_KAB * BE\_IANR_{-1} * 0.01 * BE\_PINV_{-1}$$

$\overline{R}^2 = 0.000$ DW = 0.372 SER = 5.361

6. Potential gross domestic product

$$BE\_BIPQ = 0.896 * \exp\left\{\begin{array}{l} \underset{(540.789)}{2.738} + \underset{(25.318)}{0.114} * 0.01 * T \\ + 0.597 \ln\left[BE\_E1 + 0.01 * (BE\_ARLQ - BE\_ARLQN) * BE\_EW\right] \\ + (1 - 0.597) \ln(BE\_KRP_{-1}) \end{array}\right\}$$

$\overline{R}^2 = 0.871$ DW = 0.330 SER = 0.012

7. Nominal inventory investment

$$BE\_V = 0.01 * BE\_PINV * (BE\_CPR + BE\_IANR + BE\_GR + BE\_VR) - (BE\_CP + BE\_IAN + BE\_G)$$

8. Private real stock of capital

$$BE\_KRP = (1 - 0.01 * BE\_KAB) * BE\_KRP_{-1} + BE\_IANR$$

9. Capacity utilisation

$$BE\_GAPQ = 100 * \frac{BE\_BIPR}{BE\_BIPQ}$$

10. Unemployment

$$BE\_ARL = BE\_EW - BE\_E1$$

11. Unemployment rate

$$BE\_ARLQ = 100 * \frac{BE\_ARL}{BE\_EW}$$

12. "Smoothed" unemployment rate

$$BE\_ARLQN = 0.9 * BE\_ARLQN_{-1} + 0.1 * BE\_ARLQ$$

13. Net lending of firms

$$BE\_FU = BE\_D - BE\_IAN - BE\_V - BE\_U - BE\_SDN$$

III. Factor costs and deflators

1. Gross wage income per employee

$$\begin{aligned} \Delta_4 \ln(BE\_LA) = & \underset{(1.045)}{0.001} + \underset{(25.438)}{0.872} \; \Delta_4 (BE\_LA_{-1}) \\ & + (1 - 0.872)\, \Delta_4 \ln(BE\_PCP) \\ & + (1 - 0.872) * 0.47\, \Delta_4 \ln(BE\_BIPQ) \\ & - \underset{(2.674)}{0.161} * 0.01 * (BE\_ARLQ_{-4} - BE\_ARLQN_{-4}) \end{aligned}$$

$\bar{R}^2 = 0.884$ DW = 0.415 SER=0.007

2. Deflator of domestic demand

a)
$$0.01 * BE\_INF = 0.03\ \Delta_4^2 \ln\left(\frac{BE\_COSI}{1 - 0.01 * BE\_TISS}\right)$$
$$+ \underset{(33.468)}{0.949} * 0.01 * \begin{bmatrix} (1-0.4) * BE\_INF_{-4} + 0.4 \\ * \begin{pmatrix} (1-0.4) * BE\_INF_{+4} \\ + 0.4 * EMU\_INFT \end{pmatrix} \end{bmatrix}$$
$$+ 0.03 * \ln(0.01\ BE\_GAPQ)$$
$$+ (1 - 0.949)\ \Delta_4 \ln(BE\_PSM3)$$
$$+ 0.1 \ln\left(\frac{BE\_PSM3_{-4}}{BE\_PINV_{-4}}\right)$$

$\bar{R}^2 = 0.961$ DW = 0.031 SER = 0.011

b) $\ln(BE\_PINV) = \ln(PINV_{-4}) + 0.01 * BE\_INF$

3. Deflator of private consumption

$$\Delta_4 \ln(BE\_PCP) = (1 - 0.713)\ 0.01\ BE\_INF + \underset{(16.529)}{0.713}\ \Delta_4 \ln(BE\_PCP_{-1})$$

$\bar{R}^2 = 0.750$ DW = 0.255 SER = 0.004

4. Deflator of government demand

$$\Delta_4 \ln(BE\_PG) = (1 - 0.809)\ 0.01\ BE\_INF + \underset{(20.655)}{0.809}\ \Delta_4 \ln(BE\_PG_{-1})$$

$\bar{R}^2 = 0.824$ DW = 0.366 SER = 0.007

5. Deflator of private fixed capital investment

$$\Delta_4 \ln(BE\_PIAN) = (1 - 0.848)\ 0.01\ BE\_INF + \underset{(17.180)}{0.848}\ \Delta_4 \ln(BE\_PIAN_{-1})$$

$\bar{R}^2 = 0.764$ DW = 0.111 SER = 0.005

6. Deflator of exports

$$\Delta_4 \ln(BE\_PEX) = (1 - 0.919)\, \Delta_4 \begin{bmatrix} (1 - 0.460) \ln(BE\_PINV_{-1}) \\ + 0.460\ BE\_LPAC_{-1} \end{bmatrix}$$

$$+ \underset{(14.966)}{0.919}\ \Delta_4 \ln(BE\_PEX_{-1})$$

$\bar{R}^2 = 0.742$ DW = 0.339 SER = 0.014

7. Production costs

$$BE\_COSI = \frac{100}{99.995} * BE\_LA^{0.469} * BE\_PIM^{1-0.469}$$

8. Deflator of final demand

$$BE\_PEV = \frac{(BE\_ENDR - BE\_EXR) * BE\_PINV + BE\_EXR * BE\_PEX}{BE\_ENDR}$$

9. Deflator of gross domestic product

$$BE\_PBIP = 100 * \frac{BE\_BIP}{BE\_BIPR}$$

10. Adaptive expectation on consumer price inflation

$$BE\_PCPD = 0.9 * BE\_PCPD_{-1} + 0.1\, \Delta_4 \ln(PCP_{-1})$$

11. Adaptive expectation on inflation rate of final demand

$$BE\_PEVD = 0.9 * BE\_PEVD_{-1} + 0.1\, \Delta_4 \ln(PEV_{-1})$$

IV. Government

1. Direct tax rate

$$BE\_TDBS = \underset{(0.779)}{0.407} + \underset{(59.358)}{0.987}\ BE\_TDBS_{-1}$$

$\bar{R}^2 = 0.975$ DW = 0.247 SER = 0.491

2. Indirect tax rate

$$BE\_TISS = \underset{(2.654)}{0.148} + \underset{(32.069)}{1.834}\ BE\_TISS_{-1} - \underset{(14.748)}{0.860}\ BE\_TISS_{-2}$$

$\overline{R}^2 = 0.992 \quad DW = 0.571 \quad SER = 0.039$

3. Real government demand

$$\begin{aligned} \Delta_4 \ln(BE\_GR) = {} & \underset{(31.117)}{0.979}\ \Delta_4 \ln(BE\_GR_{-1}) \\ & + (1 - 0 - 0.979)\ \Delta_4 \ln(BE\_BIPR) \\ & - \underset{(0.141)}{0.006}\ \ln(0.01 * BE\_GAPQ) \end{aligned}$$

$\overline{R}^2 = 0.946 \quad DW = 0.298 \quad SER = 0.007$

4. Government transfers to households

$$\begin{aligned} \ln\left(\frac{BE\_SB}{BE\_BIP}\right) = {} & -\underset{(6.114)}{0.184} + \underset{(44.796)}{0.881}\ \ln\left(\frac{BE\_SB_{-1}}{BE\_BIP_{-1}}\right) \\ & + \underset{(6.485)}{0.752} * 0.01\ (BE\_ARLQ - ARLQN) \end{aligned}$$

$\overline{R}^2 = 0.977 \quad DW = 0.342 \quad SER = 0.011$

5. Direct taxes and social contributions

$$BE\_TDB = 0.01 * BE\_TDBS * BE\_VE$$

6. Indirect taxes (excluding subsidies)

$$BE\_TIS = 0.01 * BE\_TISS * BE\_END$$

7. Nominal government demand

$$BE\_G = 0.01 * BE\_GR * BE\_PG$$

8. Net lending of government

$$BE\_FS = BE\_TDB + BE\_TIS - BE\_G - BE\_SB$$

V. Money, interest rates and exchange rate

1. Real stock of money

a) $$\ln\left(\frac{BE\_M3}{BE\_PINV}\right) = \underset{(15.735)}{-\ 6.966} + \underset{(25.875)}{1.497} \ln\left(BE\_BIPR\right) - \underset{(6.605)}{1.981} * 0.01\, BE\_RL + BE\_M3\_EC$$

$\bar{R}^2 = 0.952$ DW = 0.202 SER = 0.050

b) $$\Delta_4 \ln\left(\frac{BE\_M3}{BE\_PINV}\right) = \underset{(1.154)}{0.113}\ \Delta_4 \ln\left(BE\_BIPR\right) - \underset{(4.525)}{0.765}\ \Delta_4 \left(0.01 * BE\_RL\right) + \underset{(18.030)}{0.831}\ \Delta_4 \ln\left(\frac{BE\_M3_{-1}}{BE\_PINV_{-1}}\right) - \underset{(3.291)}{0.161}\ BE\_M3\_EC_{-4}$$

$\bar{R}^2 = 0.900$ DW = 1.047 SER = 0.018

2. Money market interest rate for three-month funds

$$BE\_RS = \left(1 - BE\_EMU\right) * \left\{ \begin{array}{l} \left(1 - BE\_EWS\right) * BE\_RS_{-1} \\ + BE\_EWS * \left[GY\_RS + 100 * \ln\left(\frac{BE\_ERDM}{BE\_ERDM_{-4}}\right) + BE\_RRS \right] \end{array} \right\} + BE\_EMU * EMU\_RS$$

3. Yield on government bonds

$$1 + 0.01 BE\_RL = \left(1 - BE\_EMU\right) * \left(1 + 0.01 BE\_RL_{-1}\right)^{(1-0.499)} * \left(1 + 0.01 BE\_RL_{+1}\right)^{\underset{(13.358)}{0.499}} * \left(\frac{1 + 0.01 BE\_RS}{1 + 0.01 BE\_RSST}\right)^{\frac{1}{40}} + BE\_EMU * \left(1 + 0.01 EMU\_RL\right)$$

$\bar{R}^2 = 1.000$ DW = 1.668 SER = 0.003

4. Short-term interest rate (long-run)

$$BE\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} BE\_BIPQ_{-i}\right) + BE\_INFT$$

5. Long-term interest rate (long-run)

$$BE\_RLST = BE\_RSST + BE\_TERM$$

6. Exchange rate of the Belgian Franc against the US-Dollar

$$\ln(BE\_ER) = (1 - BE\_EMU) * \left\{\begin{bmatrix} BE\_EWS * \ln(BE\_ERDM * GY\_ER) \\ + (1 - BE\_EWS) * \begin{bmatrix} \underset{(0.958)}{0.100} + (1 - 0.972)\ln\left(\frac{BE\_PCP_{+1}}{US\_PCP_{+1}}\right) \\ - 1.0 * 0.01 * (BE\_RS - US\_RS) \\ + 0.972 * 0.01 * (BE\_RS_{-1} - US\_RS_{-1}) \\ + \underset{(32.950)}{0.972} \ln(BE\_ER_{-1}) \end{bmatrix} \end{bmatrix}\right\}$$

$$+ BE\_EMU * \ln\left(\frac{40.3399}{EMU\_ER}\right)$$

$\bar{R}^2 = 1.000$ DW = 1.201 SER = 0.052

7. Long-term price level (P-Star)

$$BE\_PSM3 = (1 - BE\_EMU) * \frac{1}{1.112} * \exp\begin{bmatrix} \ln(BE\_M3) - 1.497 \ln(BE\_BIPQ) \\ + 6.966 + 1.981 * 0.01 * BE\_RL \end{bmatrix}$$

$$+ BE\_EMU * EMU\_PSM3 * \frac{1}{0.990}$$

8. Risk premium

$$BE\_RRS = \underset{(16.786)}{0.874} \; BE\_RRS_{-1}$$

$\bar{R}^2 = 0.766$ DW = 1.462 SER = 1.467

9. Exchange rate of the Belgian Franc against the D-Mark

$$BE\_ERDM = (1 - BE\_EMU) * \left\{ \begin{array}{l} BE\_EWS * BE\_ERDM\_{1} \\ + (1 - BE\_EWS) * \frac{BE\_ER}{GY\_ER} \end{array} \right\} + BE\_EMU * 20.6255$$

10. Euro area

I. Output and Prices

1. Nominal domestic demand

$$EMU\_INLV = \frac{1}{2.05586}\left[\begin{array}{r} GY\_INLV + FR\_INLV * \frac{1}{3.4005} \\ + IT\_INLV * \frac{1}{0.7476} \\ + NL\_INLV * \frac{1}{1.1269} \\ + BE\_INLV * \frac{1}{20.5881} \end{array}\right]$$

2. Real domestic demand

$$EMU\_INVR = \frac{1}{2.05586}\left[\begin{array}{r} GY\_INVR + FR\_INVR * \frac{1.8965}{3.4005} \\ + IT\_INVR * \frac{1.0768}{0.7476} \\ + NL\_INVR * \frac{0.9204}{1.1269} \\ + BE\_INVR * \frac{1.0334}{20.5881} \end{array}\right]$$

3. Real gross domestic product

$$EMU\_BIPR = \frac{1}{2.05586}\left[\begin{array}{r} GY\_BIPR + FR\_BIPR * \frac{1.8965}{3.4005} \\ + IT\_BIPR * \frac{1.0768}{0.7476} \\ + NL\_BIPR * \frac{0.9204}{1.1269} \\ + BE\_BIPR * \frac{1.0334}{20.5881} \end{array}\right]$$

4. Potential gross domestic product

$$EMU\_BIPQ = \frac{1}{2.05586}\left[\begin{array}{r} GY\_BIPQ + FR\_BIPQ * \frac{1.8965}{3.4005} \\ + IT\_BIPQ * \frac{1.0768}{0.7476} \\ + NL\_BIPQ * \frac{0.9204}{1.1269} \\ + BE\_BIPQ * \frac{1.0334}{20.5881} \end{array}\right]$$

5. Capacity utilisation

$$EMU\_GAPQ = 100 \frac{EMU\_BIPR}{EMU\_BIPQ}$$

6. Deflator of domestic demand

$$EMU\_PINV = 100 \frac{EMU\_INLV}{EMU\_INVR}$$

7. Inflation rate

$$EMU\_INF = 100 * \Delta_4 \ln\left(EMU\_PINV\right)$$

II. Money, interest rates and exchange rate

1. Money growth target rate

$$EMU\_MTR = 1.324 * 100 * \Delta_4 \ln\left(EMU\_BIPQ\right) + EMU\_INFT$$

2. Real stock of money

a) $$\ln\left(\frac{EMU\_M3}{EMU\_PINV}\right) = -\underset{(33.319)}{5.537} + \underset{(3.973)}{0.020}\ Q1 + \underset{(2.432)}{0.013}\ Q2 - \underset{(1.107)}{0.006}\ Q3$$

$$+ \underset{(1.025)}{0.017}\ \Delta_1\ GY\_DWU_{+1}$$

$$+ \underset{(57.032)}{1.324}\ \ln(EMU\_BIPR)$$

$$- \underset{(5.544)}{0.684} * 0.01 * EMU\_RL$$

$$+ EMU\_M3\_EC$$

$\overline{R}^2 = 0.993$ DW = 0.447 SER = 0.016

b) $$\Delta_4 \ln(EMU\_M3) - 0.01 * EMU\_INF = \underset{(1.097)}{0.006}\ \Delta_4\ GY\_DWU_{+1}$$

$$- \underset{(1.512)}{0.008}\ \Delta_4\ GY\_DWU$$

$$+ \underset{(3.230)}{0.249}\ \Delta_4 \ln(EMU\_BIPR)$$

$$+ \underset{(1.612)}{0.043} * 0.01 * EMU\_INF$$

$$- \underset{(3.262)}{0.242}\ \Delta_4\ (0.01 * EMU\_RL)$$

$$+ \underset{(13.176)}{0.767} * \begin{pmatrix} \Delta_4 \ln(EMU\_M3_{-1}) \\ - 0.01 * EMU\_INF_{-1} \end{pmatrix}$$

$$- \underset{(3.920)}{0.275}\ EMU\_M3\_EC_{-4}$$

$\overline{R}^2 = 0.966$ DW = 1.637 SER = 0.006

c) $$0.01 * EMU\_MGR = \Delta_4 \ln(EMU\_M3)$$

3. Long-term price level (P-Star)

$$0.960 * EMU\_PSM3 = \exp\left\{\begin{array}{l} \ln(EMU\_M3) + 5.537 - 0.020\ Q1 - 0.013\ Q2 + 0.006\ Q3 \\ - 0.017\ \Delta_1\ GY\_DWU_{+1} - 1.324 \ln(EMU\_BIPQ) \\ + 0.684 * 0.01\ EMU\_RLST \end{array}\right\}$$

4. Yield on government bonds

$$1+0.01\,EMU\_RL = \left(1+0.01\,EMU\_RL_{-1}\right)^{(1-0.498)} * \left(1+0.01\,EMU\_RL_{+1}\right)^{\underset{(15.776)}{0.498}} * \left(\frac{1+0.01\,EMU\_RS}{1+0.01\,EMU\_RSST}\right)^{\frac{1}{40}} * \left(\frac{1+0.01\,EMU\_RL_{-4}}{1+0.01\,EMU\_RLST_{-4}}\right)^{-0.02}$$

$\overline{R}^2 = 1.000$ DW = 1.541 SER = 0.002

5. Short-term interest rate (long-run)

$$EMU\_RSST = 100 * \Delta_4 \ln\left(\sum_{i=0}^{3} EMU\_BIPQ_{-i}\right) + EMU\_INFT$$

6. Long-term interest rate (long-run)

$$EMU\_RLST = EMU\_RSST + EMU\_TERM$$

7. Monetary policy rule: Money market interest rate for three-month funds

$$EMU\_RS = 0.75 * EMU\_RS_{-1} + (1-0.75)\,EMU\_RSST + 0.80\,\left(EMU\_MGR_{+4} - EMU\_MTR_{+4}\right)$$

8. Exchange rate of the euro against the US-Dollar

$$\ln\left(\frac{1}{EMU\_ER}\right) = -\underset{(1.570)}{0.011} + (1-0.960)\ln\left(\frac{EMU\_PINV_{+1}}{US\_PINV_{+1}}\right) - 1.0 * 0.01 * \left(EMU\_RS - US\_RS\right) + 0.960 * 0.01 * \left(EMU\_RS_{-1} - US\_RS_{-1}\right) + \underset{(34.514)}{0.960}\ln\left(\frac{1}{EMU\_ER_{-1}}\right)$$

$\overline{R}^2 = 0.953$ DW = 1.337 SER = 0.049

9. Term premium on interest rates

$$
\begin{aligned}
EMU\_TERM = {} & 0.95 * EMU\_TERM_{-1} \\
& + (1 - 0.95) * (EMU\_RL_{-1} - EMU\_RS_{-1})
\end{aligned}
$$

11. Foreign trade block

I. Exports and imports

1. Nominal world import demand for exports from the USA

$$\ln(US\_IMAK) = \frac{1}{1-0.3566} * \left[\begin{array}{l} 0.0169 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.1930 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.0336 \ln\left(\frac{FR\_IM}{FR\_ER}\right) \\ + 0.0491 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0147 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.1106 \ln\left(\frac{JP\_IM}{JP\_ER}\right) \\ + 0.0223 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.0599 \ln\left(\frac{UK\_IM}{UK\_ER}\right) \\ + 0.0122 \ln(REG\_IM) + 0.1311 \ln(ROE\_IM) \end{array} \right]$$

2. Nominal exports of the USA

$$\Delta_4 \ln(US\_EX) = \underset{(12.210)}{(1-0.675)} \Delta_4 \ln(US\_IMAK) + 0.675\, \Delta_4 \ln(US\_EX_{-1})$$

$\bar{R}^2 = 0.654$ DW = 1.509 SER=0.030

3. Real exports of the USA

$$US\_EXR = 100 * \frac{US\_EX}{US\_PEX}$$

4. Nominal world import demand for exports from Japan

$$\ln(JP\_IMAK) = \ln(JP\_ER) + \frac{1}{1-0.3754} * \left[\begin{array}{l} 0.0086 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0215 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.0213 \ln\left(\frac{FR\_IM}{FR\_ER}\right) \\ + 0.0505 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0098 \ln\left(\frac{IT\_IM}{IT\_ER}\right) \\ + 0.0159 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.0366 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.2883 \ln(US\_IM) \\ + 0.0405 \ln(REG\_IM) + 0.1317 \ln(ROE\_IM) \end{array} \right]$$

5. Nominal exports of Japan

$$\Delta_4 \ln(JP\_EX) = \underset{(13.398)}{(1-0.641)} \Delta_4 \ln(JP\_IMAK) + 0.641 \Delta_4 \ln(JP\_EX_{-1})$$

$\bar{R}^2 = 0.694$ DW = 1.098 SER = 0.041

6. Real exports of Japan

$$JP\_EXR = 100 * \frac{JP\_EX}{JP\_PEX}$$

7. Nominal world import demand for exports from Germany

$$\ln(GY\_IMAK) = \ln(GY\_ER) + \frac{1}{1-0.2180} * \left[\begin{array}{l} 0.0547 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0076 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.0876 \ln\left(\frac{FR\_IM}{FR\_ER}\right) \\ \qquad + 0.0715 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.0243 \ln\left(\frac{JP\_IM}{JP\_ER}\right) \\ + 0.0798 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.0823 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.0842 \ln(US\_IM) \\ + 0.1679 \ln(REG\_IM) + 0.1221 \ln(ROE\_IM) \end{array} \right]$$

8. Nominal exports of Germany

$$\Delta_4 \ln(GY\_EX) = \underset{(21.796)}{(1-0.783)}\ \Delta_4 \ln(GY\_IMAK) + 0.783\ \Delta_4 \ln(GY\_EX_{-1})$$

$\overline{R}^2 = 0.857$ DW = 1.887 SER = 0.033

9. Real exports of Germany

$$GY\_EXR = 100 * \frac{GY\_EX}{GY\_PEX}$$

10. Nominal world import demand for exports from the United Kingdom

$$\ln(UK\_IMAK) = \ln(UK\_ER) + \frac{1}{1-0.3338} * \left[\begin{array}{l} 0.0488 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0166 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.0813 \ln\left(\frac{FR\_IM}{FR\_ER}\right) \\ + 0.1080 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0485 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.0256 \ln\left(\frac{JP\_IM}{JP\_ER}\right) \\ + 0.0640 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.1163 \ln(US\_IM) \\ + 0.1108 \ln(REG\_IM) + 0.0462 \ln(ROE\_IM) \end{array}\right]$$

11. Nominal exports of the United Kingdom

$$\Delta_4 \ln(UK\_EX) = \underset{(10.137)}{(1-0.533)}\ \Delta_4 \ln(UK\_IMAK) + 0.533\ \Delta_4 \ln(UK\_EX_{-1})$$

$\overline{R}^2 = 0.565$ DW = 2.374 SER=0.036

12. Real exports of the United Kingdom

$$UK\_EXR = 100 * \frac{UK\_EX}{UK\_PEX}$$

13. Nominal world import demand for exports from France

$$\ln\left(FR\_IMAK\right) = \ln\left(FR\_ER\right) + \frac{1}{1-0.2242} * \left[\begin{array}{l} 0.0746 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0130 \ln\left(\frac{CA\_IM}{CA\_ER}\right) \\ + 0.1603 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0939 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.0202 \ln\left(\frac{JP\_IM}{JP\_ER}\right) \\ + 0.0458 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.1017 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.0726 \ln\left(US\_IM\right) \\ + 0.1371 \ln\left(REG\_IM\right) + 0.0565 \ln\left(ROE\_IM\right) \end{array}\right]$$

14. Nominal exports of France

$$\Delta_4 \ln\left(FR\_EX\right) = \underset{(13.532)}{(1-0.643)} \Delta_4 \ln\left(FR\_IMAK\right) + 0.643 \Delta_4 \ln\left(FR\_EX_{-1}\right)$$

$\bar{R}^2 = 0.699 \quad DW = 1.463 \quad SER = 0.028$

15. Real exports of France

$$FR\_EXR = 100 * \frac{FR\_EX}{FR\_PEX}$$

16. Nominal world import demand for exports from Italy

$$\ln\left(IT\_IMAK\right) = \ln\left(IT\_ER\right) + \frac{1}{1-0.2745} * \left[\begin{array}{l} 0.0253 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0095 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.1135 \ln\left(\frac{FR\_IM}{FR\_ER}\right) \\ + 0.1461 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0255 \ln\left(\frac{JP\_IM}{JP\_ER}\right) \\ + 0.0305 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.0665 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.0832 \ln\left(US\_IM\right) \\ + 0.1383 \ln\left(REG\_IM\right) + 0.0873 \ln\left(ROE\_IM\right) \end{array}\right]$$

17. Nominal exports of Italy

$$\Delta_4 \ln(IT\_EX) = \underset{(9.885)}{(1-0.619)}\, \Delta_4 \ln(IT\_IMAK) + 0.619\, \Delta_4 \ln(IT\_EX_{-1})$$

$\overline{R}^2 = 0.553$ DW $= 1.932$ SER$=0.049$

18. Real exports of Italy

$$IT\_EXR = 100 * \frac{IT\_EX}{IT\_PEX}$$

19. Nominal world import demand for exports from Canada

$$\ln(CA\_IMAK) = \ln(CA\_ER) + \frac{1}{1-0.1744} * \left[\begin{array}{l} 0.0045 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0079 \ln\left(\frac{FR\_IM}{FR\_ER}\right) \\ + 0.0137 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0078 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.0455 \ln\left(\frac{JP\_IM}{JP\_ER}\right) \\ + 0.0043 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.0194 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.7784 \ln(US\_IM) \\ + 0.0136 \ln(REG\_IM) - 0.0696 \ln(ROE\_IM) \end{array} \right]$$

20. Nominal exports of Canada

$$\Delta_4 \ln(CA\_EX) = \underset{(8.396)}{(1-0.514)}\, \Delta_4 \ln(CA\_IMAK) + 0.514\, \Delta_4 \ln(CA\_EX_{-1})$$

$\overline{R}^2 = 0.472$ DW$=2.084$ SER$=0.032$

21. Real exports of Canada

$$CA\_EXR = 100 * \frac{CA\_EX}{CA\_PEX}$$

22. Nominal world import demand for exports from the Netherlands

$$\ln(NL\_IMAK) = \ln(NL\_ER) + \frac{1}{1-0.2562} * \left[0.1324 \ln\left(\frac{BE\_IM}{BE\_ER}\right) + 0.0037 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.0667 \ln\left(\frac{FR\_IM}{FR\_ER}\right) + 0.1814 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0614 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.0096 \ln\left(\frac{JP\_IM}{JP\_ER}\right) + 0.0986 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.0357 \ln(US\_IM) + 0.1053 \ln(REG\_IM) + 0.0490 \ln(ROE\_IM) \right]$$

23. Nominal exports of the Netherlands

$$\Delta_4 \ln(NL\_EX) = \underset{(6.373)}{(1-0.435)} \Delta_4 \ln(NL\_IMAK) + 0.435\, \Delta_4 \ln(NL\_EX_{-1})$$

$\bar{R}^2 = 0.351$ DW $= 1.587$ SER $= 0.035$

24. Real exports of the Netherlands

$$NL\_EXR = 100 * \frac{NL\_EX}{NL\_PEX}$$

25. Nominal world import demand for exports from Belgium

$$\ln(BE\_IMAK) = \ln(BE\_ER) + \frac{1}{1-0.2545} * \left[+ 0.0039 \ln\left(\frac{CA\_IM}{CA\_ER}\right) + 0.1314 \ln\left(\frac{FR\_IM}{FR\_ER}\right) + 0.1626 \ln\left(\frac{GY\_IM}{GY\_ER}\right) + 0.0575 \ln\left(\frac{IT\_IM}{IT\_ER}\right) + 0.0112 \ln\left(\frac{JP\_IM}{JP\_ER}\right) + 0.1246 \ln\left(\frac{NL\_IM}{NL\_ER}\right) + 0.0903 \ln\left(\frac{UK\_IM}{UK\_ER}\right) + 0.0494 \ln(US\_IM) + 0.0751 \ln(REG\_IM) + 0.0396 \ln(ROE\_IM) \right]$$

26. Nominal exports of Belgium

$$\Delta_4 \ln(BE\_EX) = (1-0.830)\,\Delta_4 \ln(BE\_IMAK) + 0.830\,\Delta_4 \ln(BE\_EX_{-1})$$
$$(19.827)$$

$\bar{R}^2 = 0.833 \quad DW = 0.394 \quad SER = 0.021$

27. Real exports of Belgium

$$BE\_EXR = 100 * \frac{BE\_EX}{BE\_PEX}$$

28. Nominal imports of the USA

$US\_IM = 0.01 * US\_IMR * US\_PIM$

29. Nominal imports of Japan

$JP\_IM = 0.01 * JP\_IMR * JP\_PIM$

30. Nominal imports of Germany

$GY\_IM = 0.01 * GY\_IMR * GY\_PIM$

31. Nominal imports of the United Kingdom

$UK\_IM = 0.01 * UK\_IMR * UK\_PIM$

32. Nominal imports of France

$FR\_IM = 0.01 * FR\_IMR * FR\_PIM$

33. Nominal imports of Italy

$IT\_IM = 0.01 * IT\_IMR * IT\_PIM$

34. Nominal imports of Canada

$CA\_IM = 0.01 * CA\_IMR * CA\_PIM$

35. Nominal imports of the Netherlands

$NL\_IM = 0.01 * NL\_IMR * NL\_PIM$

36. Nominal imports of Belgium

$BE\_IM = 0.01 * BE\_IMR * BE\_PIM$

37. Nominal imports of other EU countries

$REG\_IM = 1.02 * REG\_IM_{-1}$

38. Nominal imports of other OECD countries

$ROE\_IM = 1.02 * ROE\_IM_{-1}$

II. Price deflator of exports and imports

1. Price deflator of exports of other EU countries

$REG\_PEX = 1.005 * REG\_PEX_{-1}$

2. Price deflator of exports of other OECD countries

$ROE\_PEX = 1.005 * ROE\_PEX_{-4}$

3. World export price deflator for imports of the USA

$$\begin{aligned}\ln\left(US\_PEXA\right) = {} & 0.0094 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.1932 \ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.0238 \ln\left(\frac{FR\_PEX}{FR\_ER}\right) \\ & + 0.0495 \ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0223 \ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.1395 \ln\left(\frac{JP\_PEX}{JP\_ER}\right) \\ & + 0.0084 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0376 \ln\left(\frac{UK\_PEX}{UK\_ER}\right) \\ & + 0.0302 \ln\left(REG\_PEX\right) + 0.1519 \ln\left(ROE\_PEX\right) + 0.3343 \ln\left(WE\_POIL\right)\end{aligned}$$

4. Price deflator of imports of the USA

$$\begin{aligned}\Delta_4 \ln\left(US\_PIM\right) = {} & \underset{(40.798)}{(1-0.820)}\Delta_4 \ln\left(US\_PEXA\right) \\ & +0.820\, \Delta_4 \ln\left(US\_PIM_{-1}\right)\end{aligned}$$

$\overline{R}^2=0.955$ DW=1.042 SER=0.018

5. World export price deflator for imports of Japan

$$\begin{aligned}\ln(JP\_PEXA) = {} & \ln(JP\_ER) \\ & + 0.0055 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0290 \ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.0170 \ln\left(\frac{FR\_PEX}{FR\_ER}\right) \\ & + 0.0367 \ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0175 \ln\left(\frac{IT\_PEX}{IT\_ER}\right) \\ & + 0.0058 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0212 \ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.2244 \ln(US\_PEX) \\ & + 0.0293 \ln(REG\_PEX) + 0.1141 \ln(ROE\_PEX) + 0.4995 \ln(WE\_POIL)\end{aligned}$$

6. Price deflator of imports of Japan

$$\begin{aligned}\Delta_4 \ln(JP\_PIM) = {} & \underset{(25.497)}{(1-0.638)} \Delta_4 \ln(JP\_PEXA) \\ & + 0.638 \Delta_4 \ln(JP\_PIM_{-1})\end{aligned}$$

$\bar{R}^2 = 0.892$ DW=1.282 SER=0.040

7. World export price deflator for imports of Germany

$$\begin{aligned}\ln(GY\_PEXA) = {} & \ln(GY\_ER) \\ & + 0.0615 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0068 \ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.1050 \ln\left(\frac{FR\_PEX}{FR\_ER}\right) \\ & + 0.0780 \ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.0487 \ln\left(\frac{JP\_PEX}{JP\_ER}\right) \\ & + 0.0848 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0696 \ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.0775 \ln(US\_PEX) \\ & + 0.1438 \ln(REG\_PEX) + 0.1401 \ln(ROE\_PEX) + 0.1843 \ln(WE\_POIL)\end{aligned}$$

8. Price deflator of imports of Germany

$$\begin{aligned}\Delta_4 \ln(GY\_PIM) = {} & \underset{(36.748)}{(1-0.837)} \Delta_4 \ln(GY\_PEXA) \\ & + 0.837 \Delta_4 \ln(GY\_PIM_{-1})\end{aligned}$$

$\bar{R}^2 = 0.945$ DW = 1.069 SER = 0.019

9. World export price deflator for imports of the United Kingdom

$$\ln(UK\_PEXA) = \ln(UK\_ER) + 0.0485 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0136 \ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.0946 \ln\left(\frac{FR\_PEX}{FR\_ER}\right) + 0.1368 \ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0503 \ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.0502 \ln\left(\frac{JP\_PEX}{JP\_ER}\right) + 0.0654 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.1340 \ln(US\_PEX) + 0.1352 \ln(REG\_PEX) + 0.0920 \ln(ROE\_PEX) + 0.1794 \ln(WE\_POIL)$$

10. Price deflator of imports of the United Kingdom

$$\Delta_4 \ln(UK\_PIM) = \underset{(18.157)}{(1-0.716)}\, \Delta_4 \ln(UK\_PEXA) + 0.716 \Delta_4 \ln(UK\_PIM_{-1})$$

$\bar{R}^2 = 0.807$ DW = 1.328 SER=0.026

11. World export price deflator for imports of France

$$\ln(FR\_PEXA) = \ln(FR\_ER) + 0.0805 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0064 \ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.1660 \ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0980 \ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.0332 \ln\left(\frac{JP\_PEX}{JP\_ER}\right) + 0.0505 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0847 \ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.0857 \ln(US\_PEX) + 0.1338 \ln(REG\_PEX) + 0.0711 \ln(ROE\_PEX) + 0.1902 \ln(WE\_POIL)$$

12. Price deflator of imports of France

$$\Delta_4 \ln(FR\_PIM) = \underset{(22.998)}{(1-0.738)}\, \Delta_4 \ln(FR\_PEXA) + 0.738\, \Delta_4 \ln(FR\_PIM_{-1})$$

$\bar{R}^2 = 0.870$ DW=1.082 SER=0.021

13. World export price deflator for imports of Italy

$$\ln(IT\_PEXA) = \ln(IT\_ER)$$
$$+ 0.0467 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0083 \ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.1319 \ln\left(\frac{FR\_PEX}{FR\_ER}\right)$$
$$+ 0.1797 \ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0203 \ln\left(\frac{JP\_PEX}{JP\_ER}\right)$$
$$+ 0.0615 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0670 \ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.0498 \ln(US\_PEX)$$
$$+ 0.1195 \ln(REG\_PEX) + 0.0825 \ln(ROE\_PEX) + 0.2329 \ln(WE\_POIL)$$

14. Price deflator of imports of Italy

$$\Delta_4 \ln(IT\_PIM) = \underset{(22.100)}{(1-0.628)}\, \Delta_4 \ln(IT\_PEXA) + 0.632\, \Delta_4 \ln(IT\_PIM_{-1})$$

$\bar{R}^2 = 0.861$ DW $= 0.867$ SER$=0.021$

15. World export price deflator for imports of Canada

$$\ln(CA\_PEXA) = \ln(CA\_ER)$$
$$+ 0.0033 \ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0189 \ln\left(\frac{FR\_PEX}{FR\_ER}\right)$$
$$+ 0.0198 \ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0112 \ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.0460 \ln\left(\frac{JP\_PEX}{JP\_ER}\right)$$
$$+ 0.0039 \ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0237 \ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.6759 \ln(US\_PEX)$$
$$+ 0.0177 \ln(REG\_PEX) + 0.0596 \ln(ROE\_PEX) + 0.1200 \ln(WE\_POIL)$$

16. Price deflator of imports of Canada

$$\Delta_4 \ln(CA\_PIM) = \underset{(18.802)}{(1-0.809)}\, \Delta_4 \ln(CA\_PEXA) + 0.809\, \Delta_4 \ln(CA\_PIM_{-1})$$

$\bar{R}^2 = 0.817$ DW $= 1.420$ SER$=0.020$

17. World export price deflator for imports of the Netherlands

$$\begin{aligned}\ln\left(NL\_PEXA\right) &= \ln\left(NL\_ER\right)\\ &+ 0.1116\ln\left(\frac{BE\_PEX}{BE\_ER}\right) + 0.0051\ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.0710\ln\left(\frac{FR\_PEX}{FR\_ER}\right)\\ &+ 0.2214\ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0385\ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.0362\ln\left(\frac{JP\_PEX}{JP\_ER}\right)\\ &+ 0.0975\ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.0831\ln\left(US\_PEX\right)\\ &+ 0.0939\ln\left(REG\_PEX\right) + 0.0563\ln\left(ROE\_PEX\right) + 0.1854\ln\left(WE\_POIL\right)\end{aligned}$$

18. Price deflator of imports of the Netherlands

$$\begin{aligned}\Delta_4 \ln\left(NL\_PIM\right) &= \underset{(17.242)}{(1-0.651)}\,\Delta_4 \ln\left(NL\_PEXA\right)\\ &+ 0.651\,\Delta_4 \ln\left(NL\_PIM_{-1}\right)\end{aligned}$$

$\overline{R}^2 = 0.799$ $DW = 0.947$ $SER = 0.022$

19. World export price deflator for imports of Belgium

$$\begin{aligned}\ln\left(BE\_PEXA\right) &= \ln\left(BE\_ER\right)\\ &+ 0.0064\ln\left(\frac{CA\_PEX}{CA\_ER}\right) + 0.1413\ln\left(\frac{FR\_PEX}{FR\_ER}\right)\\ &+ 0.1856\ln\left(\frac{GY\_PEX}{GY\_ER}\right) + 0.0390\ln\left(\frac{IT\_PEX}{IT\_ER}\right) + 0.0239\ln\left(\frac{JP\_PEX}{JP\_ER}\right)\\ &+ 0.1790\ln\left(\frac{NL\_PEX}{NL\_ER}\right) + 0.0910\ln\left(\frac{UK\_PEX}{UK\_ER}\right) + 0.0771\ln\left(US\_PEX\right)\\ &+ 0.0855\ln\left(REG\_PEX\right) + 0.0423\ln\left(ROE\_PEX\right) + 0.1288\ln\left(WE\_POIL\right)\end{aligned}$$

20. Price deflator of imports of Belgium

$$\begin{aligned}\Delta_4 \ln\left(BE\_PIM\right) &= \underset{(29.515)}{(1-0.829)}\,\Delta_4 \ln\left(BE\_PEXA\right)\\ &+ 0.829\,\Delta_4 \ln\left(BE\_PIM_{-1}\right)\end{aligned}$$

$\overline{R}^2 = 0.917$ $DW = 0.414$ $SER = 0.015$

21. Foreign competitors' price deflator of the USA

$$US\_LPAC = \frac{1}{1-0.3566} * \left[\begin{array}{l} 0.0169 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.1930 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.0336 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\ + 0.0491 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0147 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.1106 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\ + 0.0223 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.0599 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) \\ + 0.0122 \ln(REG\_PEX) + 0.1311 \ln(ROE\_PEX) \end{array} \right]$$

22. Foreign competitors' price deflator of Japan

$$JP\_LPAC = \frac{1}{1-0.3754} * \left[\begin{array}{l} 0.0086 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0215 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.0213 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\ 0.0505 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0098 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) \\ + 0.0159 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.0366 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.2883 \ln(US\_PINV) \\ + 0.0405 \ln(REG\_PEX) + 0.1317 \ln(ROE\_PEX) \end{array} \right] + \ln(JP\_ER)$$

23. Foreign competitors' price deflator of Germany

$$GY\_LPAC = \frac{1}{1-0.2180} * \left[\begin{array}{l} 0.0547 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0076 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.0876 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\ + 0.0715 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.0243 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\ + 0.0798 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.0823 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.0842 \ln(US\_PINV) \\ + 0.1679 \ln(REG\_PEX) + 0.1221 \ln(ROE\_PEX) \end{array} \right] + \ln(GY\_ER)$$

24. Foreign competitors' price deflator of the United Kingdom

$$UK\_LPAC = \frac{1}{1-0.3338} * \begin{bmatrix} 0.0488 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0166 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.0813 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\ + 0.1080 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0485 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.0256 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\ + 0.0640 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) \qquad + 0.1163 \ln\left(US\_PINV\right) \\ + 0.1108 \ln\left(REG\_PEX\right) + 0.0462 \ln\left(ROE\_PEX\right) \end{bmatrix} + \ln\left(UK\_ER\right)$$

25. Foreign competitors' price deflator of France

$$FR\_LPAC = \frac{1}{1-0.2242} * \begin{bmatrix} 0.0746 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0130 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) \\ + 0.1603 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0939 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.0202 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\ + 0.0458 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.1017 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.0726 \ln\left(US\_PINV\right) \\ + 0.1371 \ln\left(REG\_PEX\right) + 0.0565 \ln\left(ROE\_PEX\right) \end{bmatrix} + \ln\left(FR\_ER\right)$$

26. Foreign competitors' price deflator of Italy

$$IT\_LPAC = \frac{1}{1-0.2745} * \begin{bmatrix} 0.0253 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0095 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.1135 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\ + 0.1461 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) \qquad + 0.0255 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\ + 0.0305 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.0665 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.0832 \ln\left(US\_PINV\right) \\ + 0.1383 \ln\left(REG\_PEX\right) + 0.0873 \ln\left(ROE\_PEX\right) \end{bmatrix} + \ln\left(IT\_ER\right)$$

27. Foreign competitors' price deflator of Canada

$$
\begin{aligned}
CA\_LPAC = \frac{1}{1-0.1744} \\
* \Bigg[& 0.0045 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0079 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\
& + 0.0137 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0078 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.0455 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\
& + 0.0043 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.0194 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.7784 \ln\left(US\_PINV\right) \\
& + 0.0136 \ln\left(REG\_PEX\right) - 0.0696 \ln\left(ROE\_PEX\right) \Bigg] \\
& + \ln\left(CA\_ER\right)
\end{aligned}
$$

28. Foreign competitors' price deflator of the Netherlands

$$
\begin{aligned}
NL\_LPAC = \frac{1}{1-0.2562} \\
* \Bigg[& 0.1324 \ln\left(\frac{BE\_PINV}{BE\_ER}\right) + 0.0037 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.0667 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\
& + 0.1814 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0614 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.0096 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\
& + 0.0986 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.0357 \ln\left(US\_PINV\right) \\
& + 0.1053 \ln\left(REG\_PEX\right) + 0.0490 \ln\left(ROE\_PEX\right) \Bigg] \\
& + \ln\left(NL\_ER\right)
\end{aligned}
$$

29. Foreign competitors' price deflator of Belgium

$$
\begin{aligned}
BE\_LPAC = \frac{1}{1-0.2545} \\
* \Bigg[& 0.0039 \ln\left(\frac{CA\_PINV}{CA\_ER}\right) + 0.1314 \ln\left(\frac{FR\_PINV}{FR\_ER}\right) \\
& + 0.1626 \ln\left(\frac{GY\_PINV}{GY\_ER}\right) + 0.0575 \ln\left(\frac{IT\_PINV}{IT\_ER}\right) + 0.0112 \ln\left(\frac{JP\_PINV}{JP\_ER}\right) \\
& + 0.1246 \ln\left(\frac{NL\_PINV}{NL\_ER}\right) + 0.0903 \ln\left(\frac{UK\_PINV}{UK\_ER}\right) + 0.0494 \ln\left(US\_PINV\right) \\
& + 0.0751 \ln\left(REG\_PEX\right) + 0.0396 \ln\left(ROE\_PEX\right) \Bigg] \\
& + \ln\left(BE\_ER\right)
\end{aligned}
$$

30. World price of oil

$$\ln(\text{WE\_POIL}) = \underset{(3.331)}{0.801} + \underset{(16.138)}{0.830} \ln(\text{WE\_POIL}_{-4})$$
$$+ \underset{(9.860)}{1.001} \; \Delta_4 \ln(\text{WE\_POIL}_{-1})$$
$$- \underset{(3.677)}{0.359} \; \Delta_4 \ln(\text{WE\_POIL}_{-2})$$

$\bar{R}^2 = 0.789 \quad DW = 1.820 \quad SER = 0.146$

II. Model variables

The series identifications refer to the time series data base of the Deutsche Bundesbank. The exogenous variables are marked by an X. The second column shows the number of the equation which is associated with the variable. The Roman numeral refers to the group within the corresponding country block. The trade block equations (block 11) are marked with "t.b." Most variables except those for Germany are seasonally adjusted.

USA

US_ARL	II.10	Unemployment, million, Series YSU300
US_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $US\_ARLQ = 100 * \frac{US\_ARL}{US\_E1 + US\_ARL}$
US_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $US\_ARLQN = 0.9 * US\_ARLQN_{-1} + 0.1 * US\_ARLQ$
US_BIP	I.9	Gross domestic product, at current prices, US$ billion, Series YAU003
US_BIPQ	II.6	Potential gross domestic product, at 1992 prices, US$ billion, definition
US_BIPR	I.10	Gross domestic product, at 1992 prices, US$ billion, Series YAU103
US_COSI	III.7	Index of production costs, 1992 = 100, defined: $US\_COSI = \frac{100}{99.999} * US\_LA^{0.847} * US\_PIM^{1-0.847}$
US_CP	I.5	Private consumption, at current prices, US$ billion, Series YAU008
US_CPR	I.1	Private consumption, at 1992 prices, US$ billion, Series YAU108

US_D	II.5	Depreciation allowances, US$ billion, defined: $US\_D = US\_BIP - US\_TDB - US\_TIS - US\_YV + US\_SB$
US_E1	II.3	Employment, million, Series YUU330
US_END	I.7	Final demand, at current prices, US$ billion, defined: $US\_END = US\_CP + US\_IAN + US\_G + US\_V + US\_EX$
US_ENDR	I.8	Final demand, at 1992 prices, US$ billion, defined: $US\_ENDR = US\_CPR + US\_IANR + US\_GR + US\_VR + US\_EXR$
US_EW	I.2	Total labour force, million, defined: $US\_EW = US\_E1 + US\_ARL$
US_EX	11.I.2 (t.b.)	Exports of goods and services, at current prices, US$ billion, Series YAU005
US_EXR	11.I.3 (t.b.)	Exports of goods and services, at 1992 prices, US$ billion, Series YAU105
US_FH	I.14	Net lending of households, US$ billion, Series LQ1778
US_FS	IV.8	Net lending of government, US$ billion, Series LJ9996
US_FU	II.13	Net lending of firms, US$ billion, defined: $US\_FU = -US\_FH - US\_FS + US\_LBS$
US_G	IV.7	Government demand, at current prices, US$ billion, Series YAU009
US_GAPQ	II.9	Capacity utilisation, per cent, defined: $US\_GAPQ = 100 * \frac{US\_BIPR}{US\_BIPQ}$
US_GR	IV.3	Government demand, at 1992 prices, US$ billion, Series YAU109
US_IAN	I.6	Gross private fixed capital investment, at current prices, US$ billion, Series YAU011
US_IANR	II.1	Gross private fixed capital investment, at 1992 prices, US$ billion, Series YAU111
US_IM	11.I.28 (t.b.)	Imports of goods and services, at current prices, US$ billion, Series YAU006

US_IMAK	11.I.1 (t.b.)	World import demand for exports from the USA, at current prices, US$ billion, definition
US_IMR	II.4	Imports of goods and services, at 1992 prices, US$ billion, Series YAU106
US_INF	III.2a	Domestic price inflation, per cent p. a., defined: $US\_INF = 100\ \Delta_4 \ln(US\_PINV)$
US_INFT'X		Target inflation rate, per cent p.a., defined: $US\_INFT = 2.5$
US_KAB'X		Depreciation rate, per cent, defined: $US\_KAB = 100 * \left(1 - \frac{US\_KRP - US\_IANR}{US\_KRP_{-1}}\right)$
US_KRP	II.8	Private capital stock, at 1992 prices, US$ billion, Series PJ040G
US_L	I.13	Gross wage income, US$ billion, Series LQ1771
US_LA	III.1	Gross wage income per employee, 1992 = 100, defined: $US\_LA = \frac{100}{7.690} * \frac{US\_L}{US\_E1}$
US_LBS	I.15	Current account balance, US$ billion, Series LA1859
US_LPAC	11.II.21 (t.b.)	Foreign competitors' deflator, definition
US_M2	V.1	Money stock M2, US$ billion, Series AS3439
US_PBIP	III.9	Deflator of gross domestic product, 1992 = 100, defined: $US\_PBIP = 100 * \frac{US\_BIP}{US\_BIPR}$
US_PCP	III.3	Deflator of private consumption, 1992 = 100, defined: $US\_PCP = 100 * \frac{US\_CP}{US\_CPR}$
US_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $US\_PCPD = 0.9 * US\_PCPD_{-1} + 0.1 * \Delta_4 \ln(US\_PCP_{-1}) * 100$

US_PEV	III.8	Deflator of final demand, 1992 = 100, defined: $US\_PEV = 100 * \frac{US\_END}{US\_ENDR}$
US_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $US\_PEVD = 0.9 * US\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(US\_PEV_{-1}\right) * 100$
US_PEX	III.6	Deflator of exports of goods and services, 1992 = 100, defined: $US\_PEX = 100 * \frac{US\_EX}{US\_EXR}$
US_PEXA	11.II.3 (t.b.)	World export deflator for imports of the USA, definition
US_PG	III.4	Deflator of government demand, 1992 = 100, defined: $US\_PG = 100 * \frac{US\_G}{US\_GR}$
US_PIAN	III.5	Deflator of private fixed capital investment, 1992 = 100, defined: $US\_PIAN = 100 * \frac{US\_IAN}{US\_IANR}$
US_PIM	11.II.4 (t.b.)	Deflator of imports of goods and services, 1992 = 100, defined: $US\_PIM = 100 * \frac{US\_IM}{US\_IMR}$
US_PINV	III.2b	Deflator of domestic demand, 1992 = 100, defined: $US\_PINV = 100 * \frac{US\_CP + US\_IAN + US\_G + US\_V}{US\_CPR + US\_IANR + US\_GR + US\_VR}$
US_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series AU3317
US_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
US_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series AU3211
US_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
US_SB	IV.4	Government transfers to households, US$ billion, Series LJ1647

US_SDN'X		Statistical discrepancy of gross domestic product, at current prices, US$ billion, defined: $US\_SDN = US\_BIP - \begin{pmatrix} US\_CP + US\_G + US\_IAN \\ + US\_V + US\_EX - US\_IM \end{pmatrix}$
US_SDR'X		Statistical discrepancy of gross domestic product, at 1992 prices, US$ billion, defined: $US\_SDR = US\_BIPR - \begin{pmatrix} US\_CPR + US\_GR + US\_IANR \\ + US\_VR + US\_EXR - US\_IMR \end{pmatrix}$
US_TDB	IV.5	Direct taxes, US$ billion, defined: $US\_TDB = US\_G + US\_SB + US\_FS - US\_TIS$
US_TDBS	IV.1	Direct tax rate, per cent, defined: $US\_TDBS = \frac{US\_TDB}{US\_VE} * 100$
US_TERM'X		Term premium on interest rates, per cent p. a., defined: $US\_TERM = mean\,(US\_RL - US\_RS)$
US_TIS	IV.6	Indirect taxes excluding subsidies, US$ billion, Series LQ1777
US_TISS	IV.2	Indirect tax rate, per cent, defined: $US\_TISS = \frac{US\_TIS}{US\_END} * 100$
US_U	I.4	Transfers to foreign countries, US$ billion, defined: $US\_U = US\_EX - US\_IM - US\_LBS$
US_V	II.7	Inventory investment, at current prices, US$ billion, Series YAU010
US_VE	I.11	National income, US$ billion, defined: $US\_VE = US\_BIP - US\_TIS - US\_D$
US_VR	II.2	Inventory investment, at 1992 prices, US$ billion, Series YAU110
US_WOBE	I.3	Population, million, Series YJU350
US_YV	I.12	Disposable income of households, US$ billion, defined: $US\_YV = US\_CP + US\_FH$

Japan

JP_ARL	II.10	Unemployment, million, Series YSJ300
JP_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $JP\_ARLQ = 100 * \frac{JP\_ARL}{JP\_E1 + JP\_ARL}$
JP_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $JP\_ARLQN = 0.9 * JP\_ARLQN_{-1} + 0.1 * JP\_ARLQ$
JP_BIP	I.9	Gross domestic product, at current prices, ¥ trillion, Series YAJ003
JP_BIPQ	II.6	Potential gross domestic product, at 1990 prices, ¥ trillion, definition
JP_BIPR	I.10	Gross domestic product, at 1990 prices, ¥ trillion, Series YAJ103
JP_BPR	III.13	"Smoothed" labour productivity, 1990 = 100, defined: $JP\_BPR = 0.9\ JP\_BPR_{-1} + 0.1\ \frac{JP\_ENDR}{JP\_E1}$
JP_COSI	III.7	Index of production costs, 1990 = 100, defined: $JP\_COSI = \frac{100}{99.966} * JP\_LA^{0.844} * JP\_PIM^{1-0.844}$
JP_CP	I.5	Private consumption, at current prices, ¥ trillion, Series YAJ008
JP_CPR	I.1	Private consumption, at 1990 prices, ¥ trillion, Series YAJ108
JP_D	II.5	Depreciation allowances, ¥ trillion, defined: $JP\_D = JP\_BIP - JP\_TDB - JP\_TIS - JP\_YV + JP\_SB$
JP_E1	II.3	Employment, million, Series YUJ330
JP_END	I.7	Final demand, at current prices, ¥ trillion, defined: $JP\_END = JP\_CP + JP\_IAN + JP\_G + JP\_V + JP\_EX$

JP_ENDR	I.8	Final demand, at 1990 prices, ¥ trillion, defined: $JP\_ENDR = JP\_CPR + JP\_IANR + JP\_GR + JP\_VR + JP\_EXR$
JP_ER	V.6	Exchange rate of yen against US$, yen per US $, defined: $JP\_ER = GY\_ER * WU5014$
JP_EW	I.2	Total labour force, million, defined: $JP\_EW = JP\_E1 + JP\_ARL$
JP_EX	11.I.5 (t.b.)	Exports of goods and services, at current prices, ¥ trillion, Series YAJ005
JP_EXR	11.I.6 (t.b.),	Exports of goods and services, at 1990 prices, ¥ trillion, Series YAJ105
JP_FH	I.14	Net lending of households, ¥ trillion, Series LQ1029
JP_FS	IV.8	Net lending of government, ¥ trillion, Series LJ9997
JP_FU	II.13	Net lending of firms, ¥ trillion, defined: $JP\_FU = -JP\_FH - JP\_FS + JP\_LBS$
JP_G	IV.7	Government demand, at current prices, ¥ trillion, Series (YAJ009 + LQ1017)
JP_GAPQ	II.9	Capacity utilisation, per cent, defined: $JP\_GAPQ = 100 * \frac{JP\_BIPR}{JP\_BIPQ}$
JP_GR	IV.3	Government demand, at 1990 prices, ¥ trillion, Series (YAJ109 + LQ1018)
JP_IAN	I.6	Gross private fixed capital investment, at current prices, ¥ trillion, Series (YAJ011 - LQ1017)
JP_IANR	II.1	Gross private fixed capital investment, at 1990 prices, ¥ trillion, Series (YAJ111 - LQ1018)
JP_IM	11.I.29 (t.b.)	Imports of goods and services, at current prices, ¥ trillion, Series YAJ006
JP_IMAK	11.I.4 (t.b.)	World import demand for exports from Japan, definition
JP_IMR	II.4	Imports of goods and services, at 1990 prices, ¥ trillion, Series YAJ106

JP_INF	III.2a	Domestic price inflation, per cent p. a., defined: $JP\_INF = 100\ \Delta_4\ \ln\left(JP\_PINV\right)$
JP_INFT'X		Target inflation rate, per cent p.a., defined: $JP\_INFT = 2.5$
JP_KAB'X		Depreciation rate, per cent, defined: $JP\_KAB = 100 * \left(1 - \frac{JP\_KRP - JP\_IANR}{JP\_KRP_{-1}}\right)$
JP_KRP	II.8	Private capital stock, at 1990 prices, ¥ trillion, Series PJ03HG
JP_L	I.13	Gross wage income, ¥ trillion, Series LQ1001
JP_LA	III.1	Gross wage income per employee, 1990 = 100, defined: $JP\_LA = \frac{100}{0.919} * \frac{JP\_L}{JP\_E1}$
JP_LAS	III.12	Long-term gross wage income per employee, 1990 = 100, defined: $JP\_LAS = \frac{1}{1.5399}\ JP\_PCP * JP\_BPR^{0.8} * \left(1 - 0.01\ JP\_ARLQ\right)^{0.8}$
JP_LBS	I.15	Current account balance, ¥ trillion, Series LA1111
JP_LPAC	11.II.22 (t.b.)	Foreign competitors' deflator, definition
JP_M	V.1	Broad money stock, ¥ trillion, Series AS3491
JP_PBIP	III.9	Deflator of gross domestic product, 1990 = 100, defined: $JP\_PBIP = 100 * \frac{JP\_BIP}{JP\_BIPR}$
JP_PCP	III.3	Deflator of private consumption, 1990 = 100, defined: $JP\_PCP = 100 * \frac{JP\_CP}{JP\_CPR}$
JP_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $JP\_PCPD = 0.9 * JP\_PCPD_{-1} + 0.1 * \Delta_4\ \ln\left(JP\_PCP_{-1}\right) * 100$

JP_PEV	III.8	Deflator of final demand, 1990 = 100, defined: $JP\_PEV = 100 * \frac{JP\_END}{JP\_ENDR}$
JP_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $JP\_PEVD = 0.9 * JP\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(JP\_PEV_{-1}\right) * 100$
JP_PEX	III.6	Deflator of exports of goods and services, 1990 = 100, defined: $JP\_PEX = 100 * \frac{JP\_EX}{JP\_EXR}$
JP_PEXA	11.II.5 (t.b.)	World export deflator for imports of Japan, definition
JP_PG	III.4	Deflator of government demand, 1990 = 100, defined: $JP\_PG = 100 * \frac{JP\_G}{JP\_GR}$
JP_PIAN	III.5	Deflator of private fixed capital investment, 1990 = 100, defined: $JP\_PIAN = 100 * \frac{JP\_IAN}{JP\_IANR}$
JP_PIM	11.II.6 (t.b.)	Deflator of imports of goods and services, 1990 = 100, defined: $JP\_PIM = 100 * \frac{JP\_IM}{JP\_IMR}$
JP_PINV	III.2b	Deflator of domestic demand, 1990 = 100, defined: $JP\_PINV = 100 * \frac{JP\_CP + JP\_IAN + JP\_G + JP\_V}{JP\_CPR + JP\_IANR + JP\_GR + JP\_VR}$
JP_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series AU3311
JP_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
JP_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series AU3221
JP_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
JP_SB	IV.4	Government transfers to households, ¥ trillion, Series LJ1644

JP_SDN'X		Statistical discrepancy of gross domestic product, at current prices, ¥ trillion, defined: $JP\_SDN = JP\_BIP - \begin{pmatrix} JP\_CP + JP\_G + JP\_IAN \\ + JP\_V + JP\_EX - JP\_IM \end{pmatrix}$
JP_SDR'X		Statistical discrepancy of gross domestic product, at 1990 prices, ¥ trillion, defined: $JP\_SDR = JP\_BIPR - \begin{pmatrix} JP\_CPR + JP\_GR + JP\_IANR \\ + JP\_VR + JP\_EXR - JP\_IMR \end{pmatrix}$
JP_TDB	IV.5	Direct taxes, ¥ trillion, defined: $JP\_TDB = JP\_G + JP\_SB + JP\_FS - JP\_TIS$
JP_TDBS	IV.1	Direct tax rate, per cent, defined: $JP\_TDBS = \frac{JP\_TDB}{JP\_VE} * 100$
JP_TERM'X		Term premium on interest rates, per cent p. a., defined: $JP\_TERM = \text{mean}\left(JP\_RL - JP\_RS\right)$
JP_TIS	IV.6	Indirect taxes excluding subsidies, ¥ trillion, Series LQ1003
JP_TISS	IV.2	Indirect tax rate, per cent, defined: $JP\_TISS = \frac{JP\_TIS}{JP\_END} * 100$
JP_U	I.4	Transfers to foreign countries, ¥ trillion, defined: $JP\_U = JP\_EX - JP\_IM - JP\_LBS$
JP_V	II.7	Inventory investment, at current prices, ¥ trillion, Series YAJ010
JP_VE	I.11	National income, ¥ trillion, defined: $JP\_VE = JP\_BIP - JP\_TIS - JP\_D$
JP_VR	II.2	Inventory investment, at 1990 prices, ¥ trillion, Series YAJ110
JP_WOBE	I.3	Population, million, Series YJJ350
JP_YV	I.12	Disposable income of households, ¥ trillion, defined: $JP\_YV = JP\_CP + JP\_FH$

Germany

GY_ARL	II.28	Unemployment, million, Deutsche Bundesbank, Monthly Report, Table IX.6, Series UU0289 and UX1100
GY_ARLQ	II.29	Unemployment rate, as a percentage of total labour force, per cent, defined: $GY\_ARLQ = 100 * \frac{GY\_ARL}{GY\_EW}$
GY_ARLQN	II.30	"Smoothed" unemployment rate, as a percentage of total labour force, per cent, defined: $GY\_ARLQN = 0.9 * GY\_ARLQN_{-1} + 0.1 * GY\_ARLQ$
GY_ARSF	I.6	Transfers of firms to foreign countries, DM billion, defined: $GY\_ARSF = GY\_EX - GY\_IM + GY\_FA - GY\_VERR + GY\_SEVE$
GY_ARST	II.8	Hours worked per employee, hours, Series DQ9436
GY_AVBI	II.7	Total hours worked by employees, billion hours, defined: $GY\_AVBI = 0.001 * GY\_BI * GY\_ARST$
GY_B1	II.27	Employment (residence concept), million, Series DQ0004 and DQ9004
GY_BI	II.26	Employment (internal-market concept), million, Deutsche Bundesbank, Monthly Report, Table IX.6., Series DQ0146 and DQ9146
GY_BIP	I.12	Gross domestic product, at current prices, DM billion, defined: $GY\_BIP = GY\_CP + GY\_CS + GY\_IAU + GY\_IAS + GY\_IBU + GY\_IW + GY\_IBS + GY\_V + GY\_EX - GY\_IM$
GY_BIPQ	II.11	Potential gross domestic product, at 1991 prices, DM billion, definition
GY_BIPR	I.13	Gross domestic product, at 1991 prices, DM billion, defined: $GY\_BIPR = GY\_CPR + GY\_CSR + GY\_IAUR + GY\_IASR + GY\_IBUR + GY\_IWR + GY\_IBSR + GY\_VR + GY\_EXR - GY\_IMR$

GY_BSP	I.14	Gross national product, at current prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0007 and DQ9007
GY_BVS	IV.10	Gross indebtedness of government, DM billion, Deutsche Bundesbank, Monthly Report, Table VIII.8., Series BQ1710
GY_CCRA	III.17	User costs of machinery and equipment investment, 1991 = 100, defined: $GY\_CCRA = \begin{bmatrix} (0.01 * GY\_RL + 0.026) * (1 - GY\_TSUD) \\ - GY\_PEVD + 0.075 \end{bmatrix} * \frac{1 - GY\_TSUD * GY\_ZAU}{1 - GY\_TSUD} * 0.01 * GY\_PIAU * 662.652$
GY_COSI	III.18	Index of production costs, 1991 = 100, defined: $GY\_COSI = GY\_LAST^{0.491} * GY\_PIM^{0.217} * GY\_CCRA^{(1 - 0.491 - 0.217)}$
GY_CP	I.7	Private consumption, at current prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0011 and DQ9011
GY_CPR	I.1	Private consumption, at 1991 prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0012 and DQ9012
GY_CS	IV.7	Government consumption, at current prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0013 and DQ9013
GY_CSR	IV.12	Government consumption, at 1991 prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0014 and DQ9014
GY_D	II.23	Depreciation allowances, DM billion, Series DQ0411 and DQ9411
GY_DLBS'X		Residual item in the current account and capital transfers to foreign countries, DM billion, defined: GY_DLBS = GY_LBS + GY_FA

GY_DSW'X		Depreciation allowances for residential construction and government, DM billion, defined: $GY\_DSW = GY\_D - 0.01 * 0.25 * (0.075 * GY\_PIAU * GY\_KRAU) - 0.01 * 0.25 * (0.015 * GY\_PIBU * GY\_KRBU)$
GY_DUM951'X		Dummy variable for break in data in 1995 quarter 1
GY_DWU'X		Dummy variable for German unification, from 3rd quarter 1990 = 1, before = 0
GY_EBQQ	I.15	"Smoothed" ratio of nominal final demand to nominal gross domestic product, defined: $GY\_EBQQ = 0.7\ GY\_EBQQ_{-1} + 0.3\left(\frac{GY\_END - GY\_TBSP + GY\_SUBV}{GY\_BIP - GY\_TBSP + GY\_SUBV}\right)$
GY_EMU'X		Dummy variable for participation of Germany in European Monetary Union, from 1999 Q1 = 1, before = 0
GY_END	I.10	Final demand, at current prices, DM billion, defined: $GY\_END = GY\_CP + GY\_CS + GY\_IAU + GY\_IAS + GY\_IBU + GY\_IBS + GY\_IW + GY\_V + GY\_EX$
GY_ENDR	I.11	Final demand, at 1991 prices, DM billion, defined: $GY\_ENDR = GY\_CPR + GY\_CSR + GY\_IAUR + GY\_IASR + GY\_IBUR + GY\_IWR + GY\_IBSR + GY\_VR + GY\_EXR$
GY_EQU	I.2	Labour force participation rate of employees (residents), defined: $GY\_EQU = \frac{GY\_EW - GY\_SELB}{GY\_WOBE}$
GY_ER	V.9	Exchange rate of the D-Mark against the US$, DM per US$, Series WU5009
GY_EW	I.24	Total labour force (residents), million, defined: $GY\_EW = GY\_B1 + GY\_SELB + GY\_ARL$
GY_EX	11.I.8 (t.b.)	Exports of goods and services, at current prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0252 and DQ9252
GY_EXR	11.I.9 (t.b.)	Exports of goods and services, at 1991 prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0253 and DQ9253

GY_FA	I.26	Net lending of foreign countries, DM billion, Series DQ0491 and DQ9491
GY_FH	I.22	Net lending of households, DM billion, Series DQ0478 and DQ9478
GY_FS	IV.20	Net lending of government, DM billion, Series DQ0472 and DQ9472
GY_FU	II.24	Net lending of firms, DM billion, defined: GY_FU = - GY_FA - GY_FH - GY_FS
GY_GAPQ	II.12	Capacity utilisation, per cent, defined: $GY\_GAPQ = 100 * \frac{GY\_BIPR}{GY\_BIPQ}$
GY_GNEH	I.3	Withdrawn profits and property income of households (after deduction of interest paid on consumer loans), DM billion, Series DQ0408 and DQ9408
GY_GST'X		Gross profit income of government, DM billion, Series DQ0455 and DQ9455
GY_GU	I.20	Gross profit income of firms, DM billion, defined: GY_GU = GY_GW - GY_GST + GY_ZINS
GY_GW	I.19	Gross profit income, DM billion, defined: GY_GW = GY_BSP - GY_L - GY_TBSP + GY_SUBV - GY_D
GY_IAS'X		Government gross machinery and equipment investment, at current prices, DM billion, Series DQ0043 and DQ9043
GY_IASR	II.14	Government gross machinery and equipment investment, at 1991 prices, DM billion, Series DQ0051 and DQ9051
GY_IAU	II.13	Firms' gross machinery and equipment investment, at current prices, DM billion, Series DQ0091 and DQ9091 minus Series DQ0043 and DQ9043
GY_IAUR	II.1	Firms' gross machinery and equipment investment, at 1991 prices, DM billion, Series DQ0092 and DQ9092 minus Series DQ0593 and DQ9593

GY_IBS'X		Government gross investment in construction, including purchases and sales of land and used equipment, at current prices, DM billion, Series DQ0037 and DQ9037
GY_IBSR	II.16	Government gross investment in construction, at 1991 prices, DM billion, Series DQ0038 and DQ9038
GY_IBU	II.15	Firms' gross investment in construction, at current prices, DM billion, defined: GY_IBU = DQ0093 and DQ9093 - GY_IBS - GY_IW
GY_IBUR	II.2	Firms' gross investment in construction, at 1991 prices, DM billion, defined: GY_IBUR = DQ0094 and DQ9094 - GY_IBSR - GY_IWR
GY_IM	11.I.30 (t.b.)	Imports of goods and services, at current prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0254 and DQ9254
GY_IMAK	11.I.19 (t.b.)	World import demand for exports from Germany, definition
GY_IMR	II.10	Imports of goods and services, at 1991 prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0255 and DQ9255
GY_INF	III.3a	Domestic price inflation, per cent p. a., defined: $GY\_INF = 100\ \Delta_4 \ln(GY\_PINV)$
GY_INFT'X		Target inflation rate, per cent p. a., defined: $GY\_INFT = 2.0$
GY_INLV	I.8	Domestic demand, at current prices, DM billion, defined: $GY\_INLV = GY\_CP + GY\_CS + GY\_IAU + GY\_IAS + GY\_IBU + GY\_IBS + GY\_IW + GY\_V$
GY_INVR	I.9	Domestic demand, at 1991 prices, DM billion, defined: $GY\_INVR = GY\_CPR + GY\_CSR + GY\_IAUR + GY\_IASR + GY\_IBUR + GY\_IBSR + GY\_IWR + GY\_VR$
GY_IW	II.17	Gross investment in residential construction, at current prices, DM billion, Series DQ0033 and DQ9033

GY_IWR	II.3	Gross investment in residential construction, at 1991 prices, DM billion, Series DQ0034 and DQ9034
GY_KATA'X		Potential working days, Series VJ7027
GY_KBAU	II.5	Firms' capital consumption in machinery and equipment, at 1991 prices, DM billion, Series VQ7101
GY_KBBU	II.6	Firms' capital consumption in construction, at 1991 prices, DM billion, Series VQ7100 minus VQ7101
GY_KRAD	II.20	"Smoothed" private capital stock in machinery and equipment, at 1991 prices, DM billion, defined: $GY\_KRAD = 0.5 * (GY\_KRAU + GY\_KRAU_{-1})$
GY_KRAU	II.19	Private capital stock in machinery and equipment, at 1991 prices, DM billion, defined: $GY\_KRAU = 606.12 + \sum_{1960/1}^{1990/2}(GY\_IAUR - GY\_KBAU) + 144.96 + \sum_{1990/3}(GY\_IAUR - GY\_KBAU)$
GY_KRBD	II.22	"Smoothed" private capital stock in construction, at 1991 prices, DM billion, defined: $GY\_KRBD = 0.5 * (GY\_KRBU + GY\_KRBU_{-1})$
GY_KRBU	II.21	Private capital stock in construction, at 1991 prices, DM billion, defined: $GY\_KRBU = 842.28 + \sum_{1960/1}^{1990/2}(GY\_IBUR - GY\_KBBU) + 432.11 + \sum_{1990/3}(GY\_IBUR - GY\_KBBU)$
GY_KSTA'X		Corporate tax rate for withdrawn profits, Series VQ7193
GY_KSTN'X		Corporate tax rate for retained profits, Series VQ7194
GY_L	I.16	Gross wage income, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0048 and DQ9048

GY_LAST	III.2	Gross wage income per hour worked, 1991 = 100, defined: $GY\_LAST = 3.232 * \frac{GY\_L}{0.001 * GY\_B1 * GY\_ARST}$
GY_LBS	I.28	Current account balance, DM billion, Deutsche Bundesbank, Monthly Report, Table X.1., Series EU4710
GY_LG	I.17	Gross wage income (excluding employers' social contributions), DM billion, Series DQ0426 and DQ9426
GY_LN	I.18	Net wage income, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.8., Series DQ0403 and DQ9403
GY_LOST	IV.11	Tax on wage income, DM billion, Series DQ0734 and DQ9734
GY_LPAC	11.II.23 (t.b.)	Foreign competitors' deflator, definition
GY_LST	IV.1	Wage tax rate, per cent, defined: $GY\_LST = 100 \frac{GY\_LOST}{0.85 * GY\_LG}$
GY_LTGO'X		Negotiated monthly wage and salary level (eastern Germany), 1991 = 100, Deutsche Bundesbank, Monthly Report, Table IX.9., Series DC7504
GY_LTGW	III.1	Negotiated monthly wage and salary level (western Germany), 1991 = 100, Deutsche Bundesbank, Monthly Report, Table IX.9., Series DC5504
GY_M3	V.2a	Money stock M3, DM billion, end-of-quarter values, Series TU0800
GY_MGR	V.2c	Monetary growth rate, per cent p.a., defined: $0.01\, GY\_MGR = \Delta_4 \ln(GY\_M3)$
GY_MTR	V.1	Monetary target rate, per cent p.a., definition
GY_MWST'X		"Normal" value-added tax rate, Series VQ7015

GY_NGVA | I.27 | Net financial wealth of foreign countries, DM billion, defined:

$$GY\_NGVA = -23.10 + \sum_{1960/1}^{1990/2} GY\_FA + 71.43 + \sum_{1990/3} GY\_FA$$

GY_NGVH | I.23 | Net financial wealth of households, DM billion, defined:

$$GY\_NGVH = 108.20 + \sum_{1960/1}^{1990/2} GY\_FH + 316.35 + \sum_{1990/3} GY\_FH$$

GY_NGVS | IV.21 | Net financial wealth of government, DM billion, defined: $GY\_NGVS = 41.00 + \sum_{1960/1}^{1990/2} GY\_FS + 41.45 + \sum_{1990/3} GY\_FS$

GY_NGVU | II.25 | Net financial wealth of firms, DM billion, defined:

$$GY\_NGVU = -126.10 + \sum_{1960/1}^{1990/2} GY\_FU - 429.23 + \sum_{1990/3} GY\_FU$$

GY_PBIP | III.13 | Deflator of gross domestic product, 1991 = 100, defined: $GY\_PBIP = 100 * \frac{GY\_BIP}{GY\_BIPR}$

GY_PCP | III.4 | Deflator of private consumption, 1991 = 100, defined:

$$GY\_PCP = 100 * \frac{GY\_CP}{GY\_CPR}$$

GY_PCPD | III.14 | Adaptive expectation on consumer price inflation, per cent p.a., defined:

$$GY\_PCPD = 0.9 * GY\_PCPD_{-1} + 0.1 * \Delta_4 \ln(GY\_PCP_{-1}) * 100$$

GY_PCS | III.5 | Deflator of government consumption, 1991 = 100, defined: $GY\_PCS = 100 * \frac{GY\_CS}{GY\_CSR}$

GY_PEND | II.9 | Commuters, million, defined: GY_PEND = GY_BI - GY_B1

GY_PEV | III.12 | Deflator of final demand, 1991 = 100, defined:

$$GY\_PEV = 100 * \frac{GY\_END}{GY\_ENDR}$$

GY_PEVD | III.15 | Adaptive expectation on inflation rate of final demand, per cent p.a., defined:

$$GY\_PEVD = 0.9 * GY\_PEVD_{-1} + 0.1 * \Delta_4 \ln(GY\_PEV_{-1}) * 100$$

GY_PEX	III.11	Deflator of exports of goods and services, 1991 = 100, defined: $GY\_PEX = 100 * \frac{GY\_EX}{GY\_EXR}$
GY_PEXA	11.II.7 (t.b.)	World export deflator for imports of Germany, definition
GY_PIAS	III.7	Deflator of government gross machinery and equipment investment, 1991 = 100, defined: $GY\_PIAS = 100 * \frac{GY\_IAS}{GY\_IASR}$
GY_PIAU	III.6	Deflator of firms' gross machinery and equipment investment, 1991 = 100, defined: $GY\_PIAU = 100 * \frac{GY\_IAU}{GY\_IAUR}$
GY_PIBS	III.9	Deflator of government gross investment in construction, 1991 = 100, defined: $GY\_PIBS = 100 * \frac{GY\_IBS}{GY\_IBSR}$
GY_PIBU	III.8	Deflator of firms' gross investment in construction, 1991 = 100, defined: $GY\_PIBU = 100 * \frac{GY\_IBU}{GY\_IBUR}$
GY_PIM	11.II.8 (t.b.)	Deflator of imports of goods and services, 1991 = 100, defined: $GY\_PIM = 100 * \frac{GY\_IM}{GY\_IMR}$
GY_PINV	III.3b	Deflator of domestic demand, 1991 = 100, defined: $GY\_PINV = 100 * \frac{GY\_INLV}{GY\_INVR}$
GY_PIW	III.10	Deflator of investment in residential construction, 1991 = 100, defined: $GY\_PIW = 100 * \frac{GY\_IW}{GY\_IWR}$
GY_PSM3	V.3	Long-term price level (P-Star), 1991 = 100, definition
GY_RL	V.5	Yield on government bonds with residual maturities of nine to ten years, per cent p. a., Deutsche Bundesbank, Monthly Report, Table VII.5, Series WX3950 and WU8612

GY_RLST	V.7	Long-term interest rate (long-run), per cent p.a., definition
GY_RPEN	V.10	Interest rate for Bundesbank's open market transactions in securities under repurchase agreements, per cent p. a., Deutsche Bundesbank, Monthly Report, Table VI.3., Series VQ7225
GY_RS	V.4	Interest rate for three-month money market funds, per cent p. a., Deutsche Bundesbank, Monthly Report, Table VI.5., Series SU0107
GY_RSST	V.6	Short-term interest rate (long-run), per cent p.a., definition
GY_RZIN	V.8	Interest rate on government debt, per cent p. a., defined: $GY\_RZIN = 100 * \sum_{0}^{3} \frac{GY\_ZINS_{-i}}{GY\_BVS_{-i}}$
GY_SEIN	IV.19	Government revenue, DM billion, defined: GY_SEIN = GY_TDIR + GY_TBSP + GY_SOZ + GY_GST
GY_SELB'X		Number of self-employed and unpaid family workers, million, Series DQ9143
GY_SEVE'X		Net current transfers from the rest of the world, DM billion, defined: GY_SEVE = GY_BSP - GY_BIP
GY_SOZ	IV.16	Employers' and employees' social contributions, DM billion, defined: GY_SOZ = GY_L - GY_LN - GY_LOST
GY_SOZB'X		Rate of contributions to pension insurance, unemployment insurance, and health insurance, per cent, Series VQ7230
GY_SOZN	IV.5	Employees' social contributions, DM billion, defined: GY_SOZN = GY_SOZ - GY_SZAF
GY_SRSS'X		Residual item in the financial account of government, DM billion, defined: GY_SRSS = GY_SEIN - GY_CS - GY_IAS - GY_IBS - GY_SUBV - GY_TRN - GY_ZINS - GY_FS

GY_SUBV	IV.9	Government subsidies to private firms (including subsidies of foreign countries), DM billion, Series DQ0413 and DQ9413
GY_SVPH	I.5	Net capital transfer payments of households, DM billion, defined: GY_SVPH = GY_YV - GY_CP - GY_FH
GY_SZAF	IV.6	Employers' social contributions, including voluntary contributions, DM billion, defined: GY_SZAF = GY_L - GY_LG
GY_TA	II.31	Negotiated working time per employee, hours, defined: $GY\_TA = (GY\_KATA - GY\_TJU) * \frac{GY\_WOST}{5}$
GY_TBSO	IV.4	Other indirect taxes, DM billion, defined: GY_TBSO = GY_TBSP - GY_UST
GY_TBSP	IV.15	Indirect taxes, DM billion, Series DQ0412 and DQ9412
GY_TDIR	IV.14	Direct taxes, DM billion, Series DQ0450 and DQ9450
GY_TDSO	IV.2	Other direct taxes, DM billion, defined: GY_TDSO = GY_TDIR - GY_LOST
GY_TIPS	IV.18	Indirect tax rate, defined: $GY\_TIPS = 1 - 0.333 * GY\_MWST - \frac{GY\_TBSO - GY\_SUBV}{GY\_END}$
GY_TJU'X		Negotiated vacation time, days, Series VQ7110
GY_TRN	IV.8	Government current transfer payments to households (after deduction of tax on pensions), Deutsche Bundesbank, Monthly Report, Table IX.8., Series DQ0082 and DQ9082
GY_TSUD	IV.17	Corporate tax rate, defined: GY_TSUD = 0.5 * (0.4 * GY_KSTA + 0.6 * GY_KSTN)
GY_UST	IV.3	Value-added taxes (including turnover tax on imports), DM billion, Deutsche Bundesbank, Monthly Report, Table VIII.5., Series BU2001 and BU2002
GY_V	II.18	Inventory investment, at current prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0084 and DQ9084

GY_VERR	I.4	Transfers of households to foreign countries, DM billion, defined: GY_VERR = GY_LN + GY_GNEH + GY_TRN - GY_YV
GY_VR	II.4	Inventory investment, at 1991 prices, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.1., Series DQ0085 and DQ9085
GY_WOBA	I.25	Population between 15 and 65 years of age, million, defined: GY_WOBA = GY_WOBE - GY_WOBS
GY_WOBE'X		Population, million, Series UQBA28
GY_WOBS'X		Population under 15 and over 65 years of age, million, Series VJ7009
GY_WOST'X		Negotiated working time per week, hours, Series VQ7109
GY_YV	I.21	Disposable income of households, DM billion, Deutsche Bundesbank, Monthly Report, Table IX.8., Series DQ0405 and DQ9405
GY_ZAU	III.16	Present value of depreciation allowances for machinery and equipment investment, defined: $GY\_ZAU = \frac{0.2}{(0.1 * GY\_RL + 0.026) * (1 - GY\_TSUD) + 0.2}$
GY_ZINS	IV.13	Interest payments by government, DM billion, Series DQ0460 and DQ9460

United Kingdom

UK_ARL	II.10	Unemployment, million, Series YSG300
UK_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $UK\_ARLQ = 100 * \frac{UK\_ARL}{UK\_E1 + UK\_ARL}$
UK_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $UK\_ARLQN = 0.9 * UK\_ARLQN_{-1} + 0.1 * UK\_ARLQ$

UK_BIP	I.9	Gross domestic product, at current prices, £ billion, Series, YAG003
UK_BIPQ	II.6	Potential gross domestic product, at 1995 prices, £ billion, definition
UK_BIPR	I.10	Gross domestic product, at 1995 prices, £ billion, Series YAG103
UK_COSI	III.7	Index of production costs, 1995 = 100, defined: $UK\_COSI = \frac{100}{99.987} * UK\_LA^{0.678} * UK\_PIM^{1-0.678}$
UK_CP	I.5	Private consumption, at current prices, £ billion, Series YAG008
UK_CPR	I.1	Private consumption, at 1995 prices, £ billion, Series YAG108
UK_D	II.5	Depreciation allowances, £ billion, defined: $UK\_D = UK\_BIP - UK\_TDB - UK\_TIS - UK\_YV + UK\_SB$
UK_E1	II.3	Employment, million, Series YQG330
UK_END	I.7	Final demand, at current prices, £ billion, defined: $UK\_END = UK\_CP + UK\_IAN + UK\_G + UK\_V + UK\_EX$
UK_ENDR	I.8	Final demand, at 1995 prices, £ billion, defined: $UK\_ENDR = UK\_CPR + UK\_IANR + UK\_GR + UK\_VR + UK\_EXR$
UK_ER	V.6	Exchange rate of pound against US$, pounds per US$ 100, defined: $UK\_ER = GY\_ER * WU5005$
UK_EW	I.2	Total labour force, million, defined: $UK\_EW = UK\_E1 + UK\_ARL$
UK_EX	11.I.11 (t.b.),	Exports of goods and services, at current prices, £ billion, Series YAG005
UK_EXR	11.I.12 (t.b.),	Exports of goods and services, at 1995 prices, £ billion, Series YAG105
UK_FH	I.14	Net lending of households, £ billion, Series LQ0783
UK_FS	IV.8	Net lending of government, £ billion, Series LJ9995

UK_FU	II.13	Net lending of firms, £ billion, defined: $UK\_FU = -UK\_FH - UK\_FS + UK\_LBS$
UK_G	IV.7	Government demand, at current prices, £ billion, Series (YAG009 + LQ0773)
UK_GAPQ	II.9	Capacity utilisation, per cent, defined: $UK\_GAPQ = 100 * \frac{UK\_BIPR}{UK\_BIPQ}$
UK_GR	IV.3	Government demand, at 1995 prices, £ billion, Series (YAG109 + LQ0799)
UK_IAN	I.6	Gross private fixed capital investment, at current prices, £ billion, Series (YAG011 - LQ0773)
UK_IANR	II.1	Gross private fixed capital investment, at 1995 prices, £ billion, Series (YAG111 - LQ0799)
UK_IM	11.I.31 (t.b.)	Imports of goods and services, at current prices, £ billion, Series YAG006
UK_IMAK	11.I.10 (t.b.)	World import demand for exports from the United Kingdom, definition
UK_IMR	II.4	Imports of goods and services, at 1995 prices, £ billion, Series YAG106
UK_INF	III.2a	Domestic price inflation, per cent p. a., defined: $UK\_INF = 100\ \Delta_4 \ln(UK\_PINV)$
UK_INFT'X		Target inflation rate, per cent p.a., defined: $UK\_INFT = 2.5$
UK_KAB'X		Depreciation rate, per cent, defined: $UK\_KAB = 100 * \left(1 - \frac{UK\_KRP - UK\_IANR}{UK\_KRP_{-1}}\right)$
UK_KRP	II.8	Private capital stock, at 1995 prices, £ billion, Series PJ02TY
UK_L	I.13	Gross wage income, £ billion, Series LQ0767

UK_LA	III.1	Gross wage income per employee, 1995 = 100, defined: $UK\_LA = \frac{UK\_L}{UK\_E1} * \frac{100}{3.688}$
UK_LBS	I.15	Current account balance, £ billion, Series LA0859
UK_LPAC	11.II.24 (t.b.)	Foreign competitors' deflator, definition
UK_M4	V.1	Money stock, £ billion, Series AS3478
UK_PBIP	III.9	Deflator of gross domestic product, 1995 = 100, defined: $UK\_PBIP = 100 * \frac{UK\_BIP}{UK\_BIPR}$
UK_PCP	III.3	Deflator of private consumption, 1995 = 100, defined: $UK\_PCP = 100 * \frac{UK\_CP}{UK\_CPR}$
UK_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $UK\_PCPD = 0.9 * UK\_PCPD_{-1} + 0.1 * \Delta_4 \ln(UK\_PCP_{-1}) * 100$
UK_PEV	III.8	Deflator of final demand, 1995 = 100, defined: $UK\_PEV = 100 * \frac{UK\_END}{UK\_ENDR}$
UK_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $UK\_PEVD = 0.9 * UK\_PEVD_{-1} + 0.1 * \Delta_4 \ln(UK\_PEV_{-1}) * 100$
UK_PEX	III.6	Deflator of exports of goods and services, 1995 = 100, defined: $UK\_PEX = 100 * \frac{UK\_EX}{UK\_EXR}$
UK_PEXA	11.II.9 (t.b.)	World export deflator for imports of the United Kingdom, definition
UK_PG	III.4	Deflator of government demand, 1995 = 100, defined: $UK\_PG = 100 * \frac{UK\_G}{UK\_GR}$
UK_PIAN	III.5	Deflator of private fixed capital investment, 1995 = 100, defined: $UK\_PIAN = 100 * \frac{UK\_IAN}{UK\_IANR}$

UK_PIM	11.II.10 (t.b.)	Deflator of imports of goods and services, 1995 = 100, defined: $\text{UK\_PIM} = 100 * \frac{\text{UK\_IM}}{\text{UK\_IMR}}$
UK_PINV	III.2b	Deflator of domestic demand, 1995 = 100, defined: $\text{UK\_PINV} = 100 * \frac{\text{UK\_INLV}}{\text{UK\_INVR}}$
UK_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series AU3325
UK_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
UK_RS	V.2	Money market interest rate for three-month funds (Treasury bill rate), per cent p. a., Series AU3210
UK_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
UK_SB	IV.4	Government transfers to households, £ billion, Series LJ1646
UK_SDN'X		Statistical discrepancy of gross domestic product, at current prices, £ billion, defined: $\text{UK\_SDN} = \text{UK\_BIP} - \begin{pmatrix} \text{UK\_CP} + \text{UK\_G} + \text{UK\_IAN} \\ + \text{UK\_V} + \text{UK\_EX} - \text{UK\_IM} \end{pmatrix}$
UK_SDR'X		Statistical discrepancy of gross domestic product, at 1995 prices, £ billion, defined: $\text{UK\_SDR} = \text{UK\_BIPR} - \begin{pmatrix} \text{UK\_CPR} + \text{UK\_GR} + \text{UK\_IANR} \\ + \text{UK\_VR} + \text{UK\_EXR} - \text{UK\_IMR} \end{pmatrix}$
UK_TDB	IV.5	Direct taxes, £ billion, defined: $\text{UK\_TDB} = \text{UK\_G} + \text{UK\_SB} + \text{UK\_FS} - \text{UK\_TIS}$
UK_TDBS	IV.1	Direct tax rate, per cent, defined: $\text{UK\_TDBS} = \frac{\text{UK\_TDB}}{\text{UK\_VE}} * 100$
UK_TERM'X		Term premium on interest rates, per cent p. a., defined: $\text{UK\_TERM} = \text{mean}\left(\text{UK\_RL} - \text{UK\_RS}\right)$
UK_TIS	IV.6	Indirect taxes excluding subsidies, £ billion, Series LQ0766

UK_TISS	IV.2	Indirect tax rate, per cent, defined: $UK\_TISS = \frac{UK\_TIS}{UK\_END} * 100$
UK_U	I.4	Transfers to foreign countries, £ billion, defined: $UK\_U = UK\_EX - UK\_IM - UK\_LBS$
UK_V	II.7	Inventory investment, at current prices, £ billion, Series YAG010
UK_VE	I.11	National income, £ billion, defined: $UK\_VE = UK\_BIP - UK\_TIS - UK\_D$
UK_VR	II.2	Inventory investment, at 1995 prices, £ billion, Series YAG110
UK_WOBE	I.3	Population, million, Series YJG350
UK_YV	I.12	Disposable income of households, £ billion, defined: $UK\_YV = UK\_CP + UK\_FH$

France

FR_ARL	II.10	Unemployment, million, Series YSF300
FR_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $FR\_ARLQ = 100 * \frac{FR\_ARL}{FR\_E1 + FR\_ARL}$
FR_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $FR\_ARLQN = 0.9 * FR\_ARLQN_{-1} + 0.1 * FR\_ARLQ$
FR_BIP	I.9	Gross domestic product, at current prices, FF billion, Series YAF003
FR_BIPQ	II.6	Potential gross domestic product, at 1980 prices, FF billion, definition
FR_BIPR	I.10	Gross domestic product, at 1980 prices, FF billion, Series YAF103

FR_COSI	III.7	Index of production costs, 1980 = 100, defined: $FR\_COSI = \frac{100}{100.01} * FR\_LA^{0.713} * FR\_PIM^{1-0.713}$
FR_CP	I.5	Private consumption, at current prices, FF billion, Series YAF008
FR_CPR	I.1	Private consumption, at 1980 prices, FF billion, Series YAF108
FR_D	II.5	Depreciation allowances, FF billion, defined: $FR\_D = FR\_BIP - FR\_TDB - FR\_TIS - FR\_YV + FR\_SB$
FR_E1	II.3	Employment, million, Series YJF330
FR_EMU'X		Dummy variable for participation in European Monetary Union, until 1998 Q4 = 0, from 1999 Q1 = 1
FR_END	I.7	Final demand, at current prices, FF billion, defined: $FR\_END = FR\_CP + FR\_IAN + FR\_G + FR\_V + FR\_EX$
FR_ENDR	I.8	Final demand, at 1980 prices, FF billion, defined: $FR\_ENDR = FR\_CPR + FR\_IANR + FR\_GR + FR\_VR + FR\_EXR$
FR_ER	V.6	Exchange rate of the franc against the US$, French francs per US$, defined: $FR\_ER = GY\_ER * FR\_ERDM$
FR_ERDM	V.9	Exchange rate of the franc against the D-Mark, French francs per D-Mark, Series WU5012
FR_EW	I.2	Total labour force, million, defined: $FR\_EW = FR\_E1 + FR\_ARL$
FR_EWS'X		Dummy variable for the exchange rate mechanism of the European Monetary System, full participation = 1, non-participation = 0, otherwise in-between
FR_EX	11.I.14 (t.b.)	Exports of goods and services, at current prices, FF billion, Series YAF005
FR_EXR	11.I.15 (t.b.)	Exports of goods and services, at 1980 prices, FF billion, Series YAF105
FR_FH	I.14	Net lending of households, FF billion, Series LQ0530
FR_FS	IV.8	Net lending of government, FF billion, Series LJ9993

FR_FU	II.13	Net lending of firms, FF billion, defined: $FR\_FU = -FR\_FH - FR\_FS + FR\_LBS$
FR_G	IV.7	Government demand, at current prices, FF billion, Series (YAF009 + LQ0502)
FR_GAPQ	II.9	Capacity utilisation, per cent, defined: $FR\_GAPQ = 100 * \frac{FR\_BIPR}{FR\_BIPQ}$
FR_GR	IV.3	Government demand, at 1980 prices, FF billion, Series (YAF109 + LQ0503)
FR_IAN	I.6	Gross private fixed capital investment, at current prices, FF billion, Series (YAF011 - LQ0502)
FR_IANR	II.1	Gross private fixed capital investment, at 1980 prices, FF billion, Series (YAF111 - LQ0503)
FR_IM	11.I.32 (t.b.)	Imports of goods and services, at current prices, FF billion, Series YAF006
FR_IMAK	11.I.13 (t.b.)	World import demand for exports from France, definition
FR_IMR	II.4	Imports of goods and services, at 1980 prices, FF billion, Series YAF106
FR_INF	III.2a	Domestic price inflation, per cent p. a., defined: $FR\_INF = 100\ \Delta_4 \ln\left(FR\_PINV\right)$
FR_INLV	I.16	Domestic demand, at current prices, FF billion, defined: $FR\_INLV = FR\_CP + FR\_G + FR\_IAN + FR\_V$
FR_INVR	I.17	Domestic demand, at 1980 prices, FF billion, defined: $FR\_INVR = FR\_CPR + FR\_GR + FR\_IANR + FR\_VR$
FR_KAB'X		Depreciation rate, per cent, defined: $FR\_KAB = 100 * \left(1 - \frac{FR\_KRP - FR\_IANR}{FR\_KRP_{-1}}\right)$
FR_KRP	II.8	Private capital stock, at 1980 prices, FF billion, Series PJ02P1
FR_L	I.13	Gross wage income, FF billion, Series LQ0524

FR_LA	III.1	Gross wage income per employee, 1980 = 100, defined: $FR\_LA = \frac{FR\_L}{FR\_E1} * \frac{100}{18.372}$
FR_LBS	I.15	Current account balance, FF billion, Series LQ0616
FR_LPAC	11.II.25 (t.b.)	Foreign competitors' price deflator, definition
FR_M3	V.1	Money stock, FF billion, Series VX8902
FR_PBIP	III.9	Price deflator of gross domestic product, 1980 = 100, defined: $FR\_PBIP = 100 * \frac{FR\_BIP}{FR\_BIPR}$
FR_PCP	III.3	Price deflator of private consumption, 1980 = 100, defined: $FR\_PCP = 100 * \frac{FR\_CP}{FR\_CPR}$
FR_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $FR\_PCPD = 0.9 * FR\_PCPD_{-1} + 0.1 * \Delta_4 \ln\left(FR\_PCP_{-1}\right) * 100$
FR_PEV	III.8	Price deflator of final demand, 1980 = 100, defined: $FR\_PEV = 100 * \frac{FR\_END}{FR\_ENDR}$
FR_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $FR\_PEVD = 0.9 * FR\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(FR\_PEV_{-1}\right) * 100$
FR_PEX	III.6	Price deflator of exports of goods and services, 1980 = 100, defined: $FR\_PEX = 100 * \frac{FR\_EX}{FR\_EXR}$
FR_PEXA	11.II.11 (t.b.)	World export price deflator for imports of France, definition
FR_PG	III.4	Price deflator of government demand, 1980 = 100, defined: $FR\_PG = 100 * \frac{FR\_G}{FR\_GR}$
FR_PIAN	III.5	Price deflator of private fixed capital investment, 1980 = 100, defined: $FR\_PIAN = 100 * \frac{FR\_IAN}{FR\_IANR}$

FR_PIM	11.II.12 (t.b.)	Price deflator of imports of goods and services, 1980 = 100, defined: $FR\_PIM = 100 * \frac{FR\_IM}{FR\_IMR}$
FR_PINV	III.2b	Price deflator of domestic demand, 1980 = 100, defined: $FR\_PINV = 100 * \frac{FR\_INLV}{FR\_INVR}$
FR_PSM3	V.7	Long-term price level (P-Star), 1980 = 100, definition
FR_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series LQ9983
FR_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
FR_RRS	V.8	Risk premium, per cent p. a., defined: $FR\_RRS = FR\_RS - GY\_RS - 100 * \ln\left(\frac{FR\_ERDM}{FR\_ERDM_{-4}}\right)$
FR_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series AU3504
FR_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
FR_SB	IV.4	Government transfers to households, FF billion, Series LJ1642
FR_SDN'X		Statistical discrepancy of gross domestic product, at current prices, FF billion, defined: $FR\_SDN = FR\_BIP - \begin{pmatrix} FR\_CP + FR\_G + FR\_IAN \\ + FR\_V + FR\_EX - FR\_IM \end{pmatrix}$
FR_SDR'X		Statistical discrepancy of gross domestic product, at 1980 prices, FF billion, defined: $FR\_SDR = FR\_BIPR - \begin{pmatrix} FR\_CPR + FR\_GR + FR\_IANR \\ + FR\_VR + FR\_EXR - FR\_IMR \end{pmatrix}$
FR_TDB	IV.5	Direct taxes, FF billion, defined: $FR\_TDB = FR\_G + FR\_SB + FR\_FS - FR\_TIS$
FR_TDBS	IV.1	Direct tax rate, per cent, defined: $FR\_TDBS = \frac{FR\_TDB}{FR\_VE} * 100$

FR_TIS	IV.6	Indirect taxes excluding subsidies, FF billion, Series LQ0525
FR_TISS	IV.2	Indirect tax rate, per cent, defined: $FR\_TISS = \frac{FR\_TIS}{FR\_END} * 100$
FR_U	I.4	Transfers to foreign countries, FF billion, defined: $FR\_U = FR\_EX - FR\_IM - FR\_LBS$
FR_V	II.7	Inventory investment, at current prices, FF billion, Series YAF010
FR_VE	I.11	National income, FF billion, defined: $FR\_VE = FR\_BIP - FR\_TIS - FR\_D$
FR_VR	II.2	Inventory investment, at 1980 prices, FF billion, Series YAF110
FR_WOBE	I.3	Population, million, Series YJF350
FR_YV	I.12	Disposable income of households, FF billion, defined: $FR\_YV = FR\_CP + FR\_FH$

Italy

IT_ARL	II.10	Unemployment, million, Series YAI300
IT_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $IT\_ARLQ = 100 * \frac{IT\_ARL}{IT\_E1 + IT\_ARL}$
IT_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $IT\_ARLQN = 0.9 * IT\_ARLQN_{-1} + 0.1 * IT\_ARLQ$
IT_BIP	I.9	Gross domestic product, at current prices, trillion lira, Series YAI003
IT_BIPQ	II.6	Potential gross domestic product, at 1990 prices, trillion lira, definition

IT_BIPR	I.10	Gross domestic product, at 1990 prices, trillion lira, Series YAI103
IT_BPR	III.13	"Smoothed" labour productivity, 1990 = 100, defined: $IT\_BPR = 0.9\ IT\_BPR_{-1} + 0.1 \frac{IT\_ENDR}{IT\_E1}$
IT_COSI	III.7	Index of production costs, 1990 = 100, defined: $IT\_COSI = \frac{100}{99.989} IT\_LA^{0.687} * IT\_PIM^{1-0.687}$
IT_CP	I.5	Private consumption, at current prices, trillion lira, Series YAI008
IT_CPR	I.1	Private consumption, at 1990 prices, trillion lira, Series YAI108
IT_D	II.5	Depreciation allowances, trillion lira, defined: $IT\_D = IT\_BIP - IT\_TDB - IT\_TIS - IT\_YV + IT\_SB$
IT_D09’X		Dummy variable for structural break in labour market statistics, until 1992 Q4 = 0, from 1993 Q1 = 1
IT_D11’X		Dummy variable for structural break in population statistics, until 1990 Q4 = 0, from 1991 Q1 = 1
IT_E1	II.3	Employment, million, Series YQI330
IT_EMU’X		Dummy variable for participation in European Monetary Union, until 1998 Q4 = 0, from 1999 Q1 = 1
IT_END	I.7	Final demand, at current prices, trillion lira, defined: $IT\_END = IT\_CP + IT\_IAN + IT\_G + IT\_V + IT\_EX$
IT_ENDR	I.8	Final demand, at 1990 prices, trillion lira, defined: $IT\_ENDR = IT\_CPR + IT\_IANR + IT\_GR + IT\_VR + IT\_EXR$
IT_ER	V.6	Exchange rate of the lira against the US$, lira per US$, defined: $IT\_ER = GY\_ER * IT\_ERDM$
IT_ERDM	V.9	Exchange rate of the lira against the D-Mark, lira per D-Mark, Series WU5007
IT_EW	I.2	Total labour force, million, defined: $IT\_EW = IT\_E1 + IT\_ARL$

IT_EWS'X		Dummy variable for the exchange rate mechanism of the European Monetary System, full participation = 1, non-participation = 0, otherwise in-between
IT_EX	11.I.17 (t.b.)	Exports of goods and services, at current prices, trillion lira, Series YAI005
IT_EXR	11.I.18 (t.b.)	Exports of goods and services, at 1990 prices, trillion lira, Series YAI105
IT_FH	I.14	Net lending of households, trillion lira, defined: $IT\_FH = IT\_YV - IT\_CP$
IT_FS	IV.8	Net lending of government, trillion lira, Series LJ9990
IT_FU	II.13	Net lending of firms, trillion lira, defined: $IT\_FU = -IT\_FH - IT\_FS + IT\_LBS$
IT_G	IV.7	Government demand, at current prices, trillion lira, Series (YAI009 + LJ2109)
IT_GAPQ	II.9	Capacity utilisation, per cent, defined: $IT\_GAPQ = 100 * \frac{IT\_BIPR}{IT\_BIPQ}$
IT_GR	IV.3	Government demand, at 1990 prices, trillion lira, Series (YAI109 + LJ2110)
IT_IAN	I.6	Gross private fixed capital investment, at current prices, trillion lira, Series (YAI011 - LJ2109)
IT_IANR	II.1	Gross private fixed capital investment, at 1990 prices, trillion lira, Series (YAI111 - LJ2110)
IT_IM	11.I.33 (t.b.)	Imports of goods and services, at current prices, trillion lira, Series YAI006
IT_IMAK	11.I.16 (t.b.)	World import demand for exports from Italy, definition
IT_IMR	II.4	Imports of goods and services, at 1990 prices, trillion lira, Series YAI106
IT_INF	III.2a	Domestic price inflation, per cent p. a., defined: $IT\_INF = 100\ \Delta_4 \ln(IT\_PINV)$

IT_INLV	I.16	Domestic demand, at current prices, trillion lira, defined: $IT\_INLV = IT\_CP + IT\_G + IT\_IAN + IT\_V$
IT_INVR	I.17	Domestic demand, at 1990 prices, trillion lira, defined: $IT\_INVR = IT\_CPR + IT\_GR + IT\_IANR + IT\_VR$
IT_KAB'X		Depreciation rate, per cent, defined: $IT\_KAB = 100 * \left(1 - \frac{IT\_KRP - IT\_IANR}{IT\_KRP_{-1}}\right)$
IT_KRP	II.8	Private capital stock, at 1990 prices, trillion lira, Series PJ03DJ
IT_L	I.13	Gross wage income, trillion lira, Series LQ1282
IT_LA	III.1	Gross wage income per employee, 1990 = 100, defined: $IT\_LA = \frac{IT\_L}{IT\_E1} * \frac{100}{6.951}$
IT_LAS	III.12	Long-term gross wage income per employee, 1990 = 100, defined: $IT\_LAS = \frac{1}{9.8915} * IT\_PCP * IT\_BPR^{0.84} * (1 - 0.01\, IT\_ARLQ)^{0.84}$
IT_LBS	I.15	Current account balance, trillion lira, Series LQ1372
IT_LPAC	11.II.26 (t.b.)	Foreign competitors' price deflator, definition
IT_M3	V.1	Money stock, trillion lira, Series VX8903
IT_PBIP	III.9	Price deflator of gross domestic product, 1990 = 100, defined: $IT\_PBIP = 100 * \frac{IT\_BIP}{IT\_BIPR}$
IT_PCP	III.3	Price deflator of private consumption, 1990 = 100, defined: $IT\_PCP = 100 * \frac{IT\_CP}{IT\_CPR}$
IT_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $IT\_PCPD = 0.9 * IT\_PCPD_{-1} + 0.1 * \Delta_4 \ln\left(IT\_PCP_{-1}\right) * 100$

IT_PEV	III.8	Price deflator of final demand, 1990 = 100, defined: $IT\_PEV = 100 * \frac{IT\_END}{IT\_ENDR}$
IT_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $IT\_PEVD = 0.9 * IT\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(IT\_PEV_{-1}\right) * 100$
IT_PEX	III.6	Price deflator of exports of goods and services, 1990 = 100, defined: $IT\_PEX = 100 * \frac{IT\_EX}{IT\_EXR}$
IT_PEXA	11.II.13 (t.b.)	World export price deflator for imports of Italy, definition
IT_PG	III.4	Price deflator of government demand, 1990 = 100, defined: $IT\_PG = 100 * \frac{IT\_G}{IT\_GR}$
IT_PIAN	III.5	Price deflator of private fixed capital investment, 1990 = 100, defined: $IT\_PIAN = 100 * \frac{IT\_IAN}{IT\_IANR}$
IT_PIM	11.II.14 (t.b.)	Price deflator of imports of goods and services, 1990 = 100, defined: $IT\_PIM = 100 * \frac{IT\_IM}{IT\_IMR}$
IT_PINV	III.2b	Price deflator of domestic demand, 1990 = 100, defined: $IT\_PINV = 100 * \frac{IT\_INLV}{IT\_INVR}$
IT_PSM3	V.7	Long-term price level (P-Star), 1990 = 100, definition
IT_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series LQ9980 and AU3305
IT_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
IT_RRS	V.8	Risk premium, per cent p.a., defined: $IT\_RRS = IT\_RS - GY\_RS - 100 * \ln\left(\frac{IT\_ERDM}{IT\_ERDM_{-4}}\right)$
IT_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series LU1371

IT_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
IT_SB	IV.4	Government transfers to households, trillion lira, Series LJ1643
IT_SDN'X		Statistical discrepancy of gross domestic product, at current prices, trillion lira, defined: $IT\_SDN = IT\_BIP - (IT\_CP + IT\_G + IT\_IAN + IT\_V + IT\_EX - IT\_IM)$
IT_SDR'X		Statistical discrepancy of gross domestic product, at 1990 prices, trillion lira, defined: $IT\_SDR = IT\_BIPR - \begin{pmatrix} IT\_CPR + IT\_GR + IT\_IANR \\ + IT\_VR + IT\_EXR - IT\_IMR \end{pmatrix}$
IT_TDB	IV.5	Direct taxes, trillion lira, defined: $IT\_TDB = IT\_G + IT\_SB + IT\_FS - IT\_TIS$
IT_TDBS	IV.1	Direct tax rate, per cent, defined: $IT\_TDBS = \frac{IT\_TDB}{IT\_VE} * 100$
IT_TIS	IV.6	Indirect taxes excluding subsidies, trillion lira, Series (LJ1284 - LJ1285)
IT_TISS	IV.2	Indirect tax rate, per cent, defined: $IT\_TISS = \frac{IT\_TIS}{IT\_END} * 100$
IT_U	I.4	Transfers to foreign countries, trillion lira, defined: $IT\_U = IT\_EX - IT\_IM - IT\_LBS$
IT_V	II.7	Inventory investment, at current prices, trillion lira, Series YAI010
IT_VE	I.11	National income, trillion lira, defined: $IT\_VE = IT\_BIP - IT\_TIS - IT\_D$
IT_VR	II.2	Inventory investment, at 1990 prices, trillion lira, Series YAI110
IT_WOBE	I.3	Population, million, Series YJI350
IT_YV	I.12	Disposable income of households, trillion lira, Series LJ1282

Canada

CA_ARL	II.10	Unemployment, million, Series YSK300
CA_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $CA\_ARLQ = 100 * \frac{CA\_ARL}{CA\_E1 + CA\_ARL}$
CA_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $CA\_ARLQN = 0.9 * CA\_ARLQN_{-1} + 0.1 * CA\_ARLQ$
CA_BIP	I.9	Gross domestic product, at current prices, Can. $ billion, Series YAK003
CA_BIPQ	II.6	Potential gross domestic product, at 1992 prices, Can. $ billion, definition
CA_BIPR	I.10	Gross domestic product, at 1992 prices, Can. $ billion, Series YAK103
CA_COSI	III.7	Index of production costs, 1992 = 100, defined: $CA\_COSI = \frac{100}{99.994} CA\_LA^{0.662} * CA\_PIM^{1-0.662}$
CA_CP	I.5	Private consumption, at current prices, Can. $ billion, Series YAK008
CA_CPR	I.1	Private consumption, at 1992 prices, Can. $ billion, Series YAK108
CA_D	II.5	Depreciation allowances, Can. $ billion, defined: $CA\_D = CA\_BIP - CA\_TDB - CA\_TIS - CA\_YV + CA\_SB$
CA_D881’X		Dummy variable, 1988 Q1 = 1, otherwise = 0
CA_D921’X		Dummy variable, until 1991 Q4 = 0, since 1992 Q1 = 1
CA_E1	II.3	Employment, million, Series YUK330
CA_END	I.7	Final demand, at current prices, Can. $ billion, defined: $CA\_END = CA\_CP + CA\_IAN + CA\_G + CA\_V + CA\_EX$

CA_ENDR	I.8	Final demand, at 1992 prices, Can. $ billion, defined: $CA\_ENDR = CA\_CPR + CA\_IANR + CA\_GR + CA\_VR + CA\_EXR$
CA_ER	V.6	Exchange rate of the Can. $ against the US$, Can. dollars per US$, defined: $CA\_ER = GY\_ER * WU5008$
CA_EW	I.2	Total labour force, million, defined: $CA\_EW = CA\_E1 + CA\_ARL$
CA_EX	11.I.20 (t.b.)	Exports of goods and services, at current prices, Can. $ billion, Series YAK005
CA_EXR	11.I.21 (t.b.)	Exports of goods and services, at 1992 prices, Can. $ billion, Series YAK105
CA_FH	I.14	Net lending of households, Can. $ billion, Series LQ0288
CA_FS	IV.8	Net lending of government, Can. $ billion, Series LJ9992
CA_FU	II.13	Net lending of firms, Can. $ billion, defined: $CA\_FU = - CA\_FH - CA\_FS + CA\_LBS$
CA_G	IV.7	Government demand, at current prices, Can. $ billion, Series (YAK009 + LQ0259)
CA_GAPQ	II.9	Capacity utilisation, per cent, defined: $CA\_GAPQ = 100 * \frac{CA\_BIPR}{CA\_BIPQ}$
CA_GR	IV.3	Government demand, at 1992 prices, Can. $ billion, Series (YAK109 + LQ0262)
CA_IAN	I.6	Gross private fixed capital investment, at current prices, Can. $ billion, Series (YAK011 - LQ0259)
CA_IANR	II.1	Gross private fixed capital investment, at 1992 prices, Can. $ billion, Series (YAK111 - LQ0262)
CA_IM	11.I.34 (t.b.)	Imports of goods and services, at current prices, Can. $ billion, Series YAK006
CA_IMAK	11.I.19 (t.b.)	World import demand for exports from Canada, definition

CA_IMR	II.4	Imports of goods and services, at 1992 prices, Can. $ billion, Series YAK106
CA_INF	III.2a	Domestic price inflation, per cent p. a., defined: $CA\_INF = 100\ \Delta_4 \ln\left(CA\_PINV\right)$
CA_INFT'X		Target inflation rate, per cent p.a., defined: $CA\_INFT = 2.5$
CA_KAB'X		Depreciation rate, per cent, defined: $CA\_KAB = 100 * \left(1 - \frac{CA\_KRP - CA\_IANR}{CA\_KRP_{-1}}\right)$
CA_KRP	II.8	Private capital stock, at 1992 prices, Can. $ billion, Series PJ01IS
CA_L	I.13	Gross wage income, Can. $ billion, Series LQ0279
CA_LA	III.1	Gross wage income per employee, 1992 = 100, defined: $CA\_LA = \frac{100}{7.550} * \frac{CA\_L}{CA\_E1}$
CA_LBS	I.15	Current account balance, Can. $ billion, Series KA0009
CA_LPAC	11.II.27 (t.b.)	Foreign competitors' price deflator, definition
CA_M	V.1	Money stock, Can. $ billion, Series LA3437
CA_PBIP	III.9	Price deflator of gross domestic product, 1992 = 100, defined: $CA\_PBIP = 100 * \frac{CA\_BIP}{CA\_BIPR}$
CA_PCP	III.3	Price deflator of private consumption, 1992 = 100, defined: $CA\_PCP = 100 * \frac{CA\_CP}{CA\_CPR}$
CA_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $CA\_PCPD = 0.9 * CA\_PCPD_{-1} + 0.1 * \Delta_4 \ln\left(CA\_PCP_{-1}\right) * 100$
CA_PEV	III.8	Price deflator of final demand, 1992 = 100, defined: $CA\_PEV = 100 * \frac{CA\_END}{CA\_ENDR}$

CA_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $CA\_PEVD = 0.9 * CA\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(CA\_PEV_{-1}\right) * 100$
CA_PEX	III.6	Price deflator of exports of goods and services, 1992 = 100, defined: $CA\_PEX = 100 * \frac{CA\_EX}{CA\_EXR}$
CA_PEXA	11.II.15 (t.b.)	World export price deflator for imports of Canada, definition
CA_PG	III.4	Price deflator of government demand, 1992 = 100, defined: $CA\_PG = 100 * \frac{CA\_G}{CA\_GR}$
CA_PIAN	III.5	Price deflator of private fixed capital investment, 1992 = 100, defined: $CA\_PIAN = 100 * \frac{CA\_IAN}{CA\_IANR}$
CA_PIM	11.II.16 (t.b.)	Price deflator of imports of goods and services, 1992 = 100, defined: $CA\_PIM = 100 * \frac{CA\_IM}{CA\_IMR}$
CA_PINV	III.2b	Price deflator of domestic demand, 1992 = 100, defined: $CA\_PINV = 100 * \frac{CA\_CP + CA\_IAN + CA\_G + CA\_V}{CA\_CPR + CA\_IANR + CA\_GR + CA\_VR}$
CA_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series LQ9982
CA_RLD	V.7	"Smoothed" long-term interest rate, per cent p. a., defined: $CA\_RLD = 0.9\, CA\_RLD_{-1} + 0.1\, CA\_RL$
CA_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
CA_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series AU3234
CA_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
CA_SB	IV.4	Government transfers to households, Can. $ billion, Series LJ1641

CA_SDN'X		Statistical discrepancy of gross domestic product, at current prices, Can. $ billion, defined: $CA\_SDN = CA\_BIP - \begin{pmatrix} CA\_CP + CA\_G + CA\_IAN \\ + CA\_V + CA\_EX - CA\_IM \end{pmatrix}$
CA_SDR'X		Statistical discrepancy of gross domestic product, at 1992 prices, Can. $ billion, defined: $CA\_SDR = CA\_BIPR - \begin{pmatrix} CA\_CPR + CA\_GR + CA\_IANR \\ + CA\_VR + CA\_EXR - CA\_IMR \end{pmatrix}$
CA_TDB	IV.5	Direct taxes, Can. $ billion, defined: $CA\_TDB = CA\_G + CA\_SB + CA\_FS - CA\_TIS$
CA_TDBS	IV.1	Direct tax rate, per cent, defined: $CA\_TDBS = \frac{CA\_TDB}{CA\_VE} * 100$
CA_TERM'X		Term premium on interest rates, per cent p. a., defined: $CA\_TERM = \text{mean}\left(CA\_RL - CA\_RS\right)$
CA_TIS	IV.6	Indirect taxes excluding subsidies, Can. $ billion, Series LQ0280
CA_TISS	IV.2	Indirect tax rate, per cent, defined: $CA\_TIS = \frac{CA\_TIS}{CA\_END} * 100$
CA_U	I.4	Transfers to foreign countries, Can. $ billion, defined: $CA\_U = CA\_EX - CA\_IM - CA\_LBS$
CA_V	II.7	Inventory investment, at current prices, Can. $ billion, Series YAK010
CA_VE	I.11	National income, Can. $ billion, defined: $CA\_VE = CA\_BIP - CA\_TIS - CA\_D$
CA_VR	II.2	Inventory investment, at 1992 prices, Can. $ billion, Series YAK110
CA_WOBE	I.3	Population, million, Series YJK350
CA_YV	I.12	Disposable income of households, Can. $ billion, defined: $CA\_YV = CA\_CP + CA\_FH$

Netherlands

NL_ARL	II.10	Unemployment, million, Series YSH300
NL_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $NL\_ARLQ = 100 * \frac{NL\_ARL}{NL\_E1 + NL\_ARL}$
NL_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $NL\_ARLQN = 0.9 * NL\_ARLQN_{-1} + 0.1 * NL\_ARLQ$
NL_BIP	I.9	Gross domestic product, at current prices, billion guilders, Series YAH003
NL_BIPQ	II.6	Potential gross domestic product, at 1995 prices, billion guilders, definition
NL_BIPR	I.10	Gross domestic product, at 1995 prices, billion guilders, Series YAH103
NL_COSI	III.7	Index of production costs, 1995 = 100, defined: $NL\_COSI = \frac{100}{101.36} NL\_LA^{0.524} * NL\_PIM^{1-0.524}$
NL_CP	I.5	Private consumption, at current prices, billion guilders, Series YAH008
NL_CPR	I.1	Private consumption, at 1995 prices, billion guilders, Series YAH108
NL_D	II.5	Depreciation allowances, billion guilders, defined: $NL\_D = NL\_BIP - NL\_TDB - NL\_TIS - NL\_YV + NL\_SB$
NL_D09’X		Dummy variable for structural break in labour market statistics, until 1987 Q4 = 0, since 1988 Q1 = 1
NL_E1	II.3	Employment, million, defined: $NL\_E1 = NL\_EW - NL\_ARL$
NL_EMU’X		Dummy variable for participation in European Monetary Union, until 1998 Q4 = 0, from 1999 Q1 = 1
NL_END	I.7	Final demand, at current prices, billion guilders, defined: $NL\_END = NL\_CP + NL\_IAN + NL\_G + NL\_V + NL\_EX$

NL_ENDR	I.8	Final demand, at 1995 prices, billion guilders, defined: $NL\_ENDR = NL\_CPR + NL\_IANR + NL\_GR + NL\_VR + NL\_EXR$
NL_ER	V.6	Exchange rate of the guilder against the US$, guilders per US$, defined: $NL\_ER = GY\_ER * NL\_ERDM$
NL_ERDM	V.9	Exchange rate of the guilder against the D-Mark, guilders per D-Mark, Series WU5000
NL_EW	I.2	Total labour force, million, Series YUH351
NL_EWS'X		Dummy variable for the exchange rate mechanism of the European Monetary System, full participation = 1, non-participation = 0, otherwise in-between
NL_EX	11.I.23 (t.b.)	Exports of goods and services, at current prices, billion guilders, Series YAH005
NL_EXR	11.I.24 (t.b.)	Exports of goods and services, at 1995 prices, billion guilders, Series YAH105
NL_FH	I.14	Net lending of households, billion guilders, defined: $NL\_FH = NL\_YV - NL\_CP$
NL_FS	IV.8	Net lending of government, billion guilders, Series LJ9998
NL_FU	II.13	Net lending of firms, billion guilders, defined: $NL\_FU = -NL\_FH - NL\_FS + NL\_LBS$
NL_G	IV.7	Government demand, at current prices, billion guilders, Series (YAH009 + LQ1508)
NL_GAPQ	II.9	Capacity utilisation, per cent, defined: $NL\_GAPQ = 100 * \frac{NL\_BIPR}{NL\_BIPQ}$
NL_GR	IV.3	Government demand, at 1995 prices, billion guilders, Series (YAH109 + LQ1509)
NL_IAN	I.6	Gross private fixed capital investment, at current prices, billion guilders, Series (YAH011 - LQ1508)
NL_IANR	II.1	Gross private fixed capital investment, at 1995 prices, billion guilders, Series (YAH111 - LQ1509)

NL_IM	11.I.35 (t.b.)	Imports of goods and services, at current prices, billion guilders, Series YAH006
NL_IMAK	11.I.22 (t.b.)	World import demand for exports from the Netherlands, definition
NL_IMR	II.4	Imports of goods and services, at 1995 prices, billion guilders, Series YAH106
NL_INF	III.2a	Domestic price inflation, per cent p. a., defined: $NL\_INF = 100\ \Delta_4 \ln(NL\_PINV)$
NL_INLV	I.16	Domestic demand, at current prices, billion guilders, defined: $NL\_INLV = NL\_CP + NL\_G + NL\_IAN + NL\_V$
NL_INVR	I.17	Domestic demand, at 1995 prices, billion guilders, defined: $NL\_INVR = NL\_CPR + NL\_GR + NL\_IANR + NL\_VR$
NL_KAB'X		Depreciation rate, per cent, defined: $NL\_KAB = 100 * \left(1 - \frac{NL\_KRP - NL\_IANR}{NL\_KRP_{-1}}\right)$
NL_KRP	II.8	Private capital stock, at 1995 prices, billion guilders, Series PJ03ZU
NL_L	I.13	Gross wage income, billion guilders, Series LQ1606
NL_LA	III.1	Gross wage income per employee, 1995 = 100, defined: $NL\_LA = \frac{100}{10.946} * \frac{NL\_L}{NL\_E1}$
NL_LBS	I.15	Current account balance, billion guilders, Series KA9100
NL_LPAC	11.II.28 (t.b.)	Foreign competitors' price deflator, definition
NL_M3	V.1	Money stock, billion guilders, Series AU5053
NL_PBIP	III.9	Price deflator of gross domestic product, 1995 = 100, defined: $NL\_PBIP = 100 * \frac{NL\_BIP}{NL\_BIPR}$

NL_PCP	III.3	Price deflator of private consumption, 1995 = 100, defined: $NL\_PCP = 100 * \frac{NL\_CP}{NL\_CPR}$
NL_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $NL\_PCPD = 0.9 * NL\_PCPD_{-1} + 0.1 * \Delta_4 \ln\left(NL\_PCP_{-1}\right) * 100$
NL_PEV	III.8	Price deflator of final demand, 1995 = 100, defined: $NL\_PEV = 100 * \frac{NL\_END}{NL\_ENDR}$
NL_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $NL\_PEVD = 0.9 * NL\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(NL\_PEV_{-1}\right) * 100$
NL_PEX	III.6	Price deflator of exports of goods and services, 1995 = 100, defined: $NL\_PEX = 100 * \frac{NL\_EX}{NL\_EXR}$
NL_PEXA	11.II.17 (t.b.)	World export price deflator for imports of the Netherlands, definition
NL_PG	III.4	Price deflator of government demand, 1995 = 100, defined: $NL\_PG = 100 * \frac{NL\_G}{NL\_GR}$
NL_PIAN	III.5	Price deflator of private fixed capital investment, 1995 = 100, defined: $NL\_PIAN = 100 * \frac{NL\_IAN}{NL\_IANR}$
NL_PIM	11.II.18 (t.b.)	Price deflator of imports of goods and services, 1995 = 100, defined: $NL\_PIM = 100 * \frac{NL\_IM}{NL\_IMR}$
NL_PINV	III.2b	Price deflator of domestic demand, 1995 = 100, defined: $NL\_PINV = 100 * \frac{NL\_CP + NL\_IAN + NL\_G + NL\_V}{NL\_CPR + NL\_IANR + NL\_GR + NL\_VR}$
NL_PSM3	V.7	Long-term price level (P-Star), 1995 = 100, definition
NL_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series AU3320
NL_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition

NL_RRS	V.8	Risk premium, per cent p. a., defined: $NL\_RRS = NL\_RS - GY\_RS - 100 * \ln\left(\frac{NL\_ERDM}{NL\_ERDM_{-4}}\right)$
NL_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series AU3249
NL_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
NL_SB	IV.4	Government transfers to households, billion guilders, Series LJ1645
NL_SDN'X		Statistical discrepancy of gross domestic product, at current prices, billion guilders, defined: $NL\_SDN = NL\_BIP - \begin{pmatrix} NL\_CP + NL\_G + NL\_IAN + NL\_V \\ + NL\_EX - NL\_IM \end{pmatrix}$
NL_SDR'X		Statistical discrepancy of gross domestic product, at 1995 prices, billion guilders, defined: $NL\_SDR = NL\_BIPR - \begin{pmatrix} NL\_CPR + NL\_GR + NL\_IANR \\ + NL\_VR + NL\_EXR - NL\_IMR \end{pmatrix}$
NL_TDB	IV.5	Direct taxes, billion guilders, defined: $NL\_TDB = NL\_G + NL\_SB + NL\_FS - NL\_TIS$
NL_TDBS	IV.1	Direct tax rate, per cent, defined: $NL\_TDBS = \frac{NL\_TDB}{NL\_VE} * 100$
NL_TIS	IV.6	Indirect taxes excluding subsidies, billion guilders, Series LQ1522
NL_TISS	IV.2	Indirect tax rate, per cent, defined: $NL\_TISS = \frac{NL\_TIS}{NL\_END} * 100$
NL_U	I.4	Transfers to foreign countries, billion guilders, defined: $NL\_U = NL\_EX - NL\_IM - NL\_LBS$
NL_V	II.7	Inventory investment, at current prices, billion guilders, Series YAH010
NL_VE	I.11	National income, billion guilders, defined: $NL\_VE = NL\_BIP - NL\_TIS - NL\_D$

NL_VR	II.2	Inventory investment, at 1995 prices, billion guilders, Series YAH110
NL_WOBE	I.3	Population, million, Series YJH350
NL_YV	I.12	Disposable income of households, billion guilders, Series LJ1680

Belgium

BE_ARL	II.10	Unemployment, million, Series YJB300
BE_ARLQ	II.11	Unemployment rate as a percentage of total labour force, per cent, defined: $BE\_ARLQ = 100 * \frac{BE\_ARL}{BE\_E1 + BE\_ARL}$
BE_ARLQN	II.12	"Smoothed" unemployment rate as a percentage of total labour force, per cent, defined: $BE\_ARLQN = 0.9 * BE\_ARLQN_{-1} + 0.1 * BE\_ARLQ$
BE_BIP	I.9	Gross domestic product, at current prices, billion Belgian francs, Series YJB003
BE_BIPQ	II.6	Potential gross domestic product, at 1990 prices, billion Belgian francs, definition
BE_BIPR	I.10	Gross domestic product, at 1990 prices, billion Belgian francs, Series YJB103
BE_COSI	III.7	Index of production costs, 1990 = 100, defined: $BE\_COSI = \frac{100}{99.9946} BE\_LA^{0.469} * BE\_PIM^{1-0.469}$
BE_CP	I.5	Private consumption, at current prices, billion Belgian francs, Series YJB008
BE_CPR	I.1	Private consumption, at 1990 prices, billion Belgian francs, Series YJB108
BE_D	II.5	Depreciation allowances, billion Belgian francs, defined: $BE\_D = BE\_BIP - BE\_TDB - BE\_TIS - BE\_YV + BE\_SB$

BE_E1	II.3	Employment, million, Series YJB330
BE_EMU'X		Dummy variable for participation in European Monetary Union, until 1998 Q4 = 0, from 1999 Q1 = 1
BE_END	I.7	Final demand, at current prices, billion Belgian francs, defined: $BE\_END = BE\_CP + BE\_IAN + BE\_G + BE\_V + BE\_EX$
BE_ENDR	I.8	Final demand, at 1990 prices, billion Belgian francs, defined: $BE\_ENDR = BE\_CPR + BE\_IANR + BE\_GR + BE\_VR + BE\_EXR$
BE_ER	V.6	Exchange rate of the Belgian franc against the US$, Belgian francs per US$, defined: $BE\_ER = GY\_ER * BE\_ERDM$
BE_ERDM	V.9	Exchange rate of the Belgian franc against the D-Mark, Belgian francs per D-Mark, Series WU5001
BE_EW	I.2	Total labour force, million, defined: $BE\_EW = BE\_E1 + BE\_ARL$
BE_EWS'X		Dummy variable for the exchange rate mechanism of the European Monetary System, full participation = 1, non-participation = 0, otherwise in-between
BE_EX	11.I.26 (t.b.)	Exports of goods and services, at current prices, billion Belgian francs, Series YJB005
BE_EXR	11.I.27 (t.b.)	Exports of goods and services, at 1990 prices, billion Belgian francs, Series YJB105
BE_FH	I.14	Net lending of households, billion Belgian francs, defined: $BE\_FH = BE\_YV - BE\_CP$
BE_FS	IV.8	Net lending of government, billion Belgian francs, Series LJ9991
BE_FU	II.13	Net lending of firms, billion Belgian francs, defined: $BE\_FU = -BE\_FH - BE\_FS + BE\_LBS$
BE_G	IV.7	Government demand, at current prices, billion Belgian francs, Series (YJB009 + LJ2009)

BE_GAPQ	II.9	Capacity utilisation, per cent, defined: $BE\_GAPQ = 100 * \frac{BE\_BIPR}{BE\_BIPQ}$
BE_GR	IV.3	Government demand, at 1990 prices, billion Belgian francs, Series (YJB109+ LJ2010)
BE_IAN	I.6	Gross private fixed capital investment, at current prices, billion Belgian francs, Series (YJB011 - LJ2009)
BE_IANR	II.1	Gross private fixed capital investment, at 1990 prices, billion Belgian francs, defined: $BE\_IANR = 100 * \left(\frac{BE\_IAN}{BE\_PIAN}\right)$
BE_IM	11.I.36 (t.b.)	Imports of goods and services, at current prices, billion Belgian francs, Series YJB006
BE_IMAK	11.I.25 (t.b.)	World import demand for exports of Belgium, definition
BE_IMR	II.4	Imports of goods and services, at 1990 prices, billion Belgian francs, Series YJB106
BE_INF	III.2a	Domestic price inflation, per cent p. a., defined: $BE\_INF = 100\ \Delta_4 \ln(BE\_PINV)$
BE_INLV	I.16	Domestic demand, at current prices, billion Belgian francs, defined: $BE\_INLV = BE\_CP + BE\_G + BE\_IAN + BE\_V$
BE_INVR	I.17	Domestic demand, at 1990 prices, billion Belgian francs, defined: $BE\_INVR = BE\_CPR + BE\_GR + BE\_IANR + BE\_VR$
BE_KAB'X		Depreciation rate, per cent, defined: $BE\_KAB = 100 * \left(1 - \frac{BE\_KRP - BE\_IANR}{BE\_KRP_{-1}}\right)$
BE_KRP	II.8	Private capital stock, at 1990 prices, billion Belgian francs, Series PJ01DQ
BE_L	I.13	Gross wage income, billion Belgian francs, Series LJ2018

BE_LA	III.1	Gross wage income per employee, 1990 = 100, defined: $BE\_LA = \frac{100}{225.978} * \frac{BE\_L}{BE\_E1}$
BE_LBS	I.15	Current account balance, billion Belgian francs, Series LQ2124
BE_LPAC	11.II.29 (t.b.)	Foreign competitors' price deflator, definition
BE_M3	V.1	Money stock, billion Belgian francs, Series VX8900
BE_PBIP	III.9	Price deflator of gross domestic product, 1990 = 100, defined: $BE\_PBIP = 100 * \frac{BE\_BIP}{BE\_BIPR}$
BE_PCP	III.3	Price deflator of private consumption, 1990 = 100, defined: $BE\_PCP = 100 * \frac{BE\_CP}{BE\_CPR}$
BE_PCPD	III.10	Adaptive expectation on consumer price inflation, per cent p.a., defined: $BE\_PCPD = 0.9 * BE\_PCPD_{-1} + 0.1 * \Delta_4 \ln\left(BE\_PCP_{-1}\right) * 100$
BE_PEV	III.8	Price deflator of final demand, 1990 = 100, defined: $BE\_PEV = 100 * \frac{BE\_END}{BE\_ENDR}$
BE_PEVD	III.11	Adaptive expectation on inflation rate of final demand, per cent p.a., defined: $BE\_PEVD = 0.9 * BE\_PEVD_{-1} + 0.1 * \Delta_4 \ln\left(BE\_PEV_{-1}\right) * 100$
BE_PEX	III.6	Price deflator of exports of goods and services, 1990 = 100, defined: $BE\_PEX = 100 * \frac{BE\_EX}{BE\_EXR}$
BE_PEXA	11.II.19 (t.b.)	World export price deflator for imports of Belgium, definition
BE_PG	III.4	Price deflator of government demand, 1990 = 100, defined: $BE\_PG = 100 * \frac{BE\_G}{BE\_GR}$
BE_PIAN	III.5	Price deflator of private fixed capital investment, 1990 = 100, Series LJ2117

BE_PIM	11.II.20	Price deflator of imports of goods and services, 1990 = 100, defined: $BE\_PIM = 100 * \frac{BE\_IM}{BE\_IMR}$
BE_PINV	III.2b	Price deflator of domestic demand, 1990 = 100, defined: $BE\_PINV = 100 * \frac{BE\_INLV}{BE\_INVR}$
BE_PSM3	V.7	Long-term price level (P-Star), 1990 = 100, definition
BE_RL	V.3	Yield on government bonds with residual maturities of ten years, per cent p. a., Series AU3300
BE_RLST	V.5	Long-term interest rate (long-run), per cent p.a., definition
BE_RRS	V.6	Risk premium, per cent p. a., defined: $BE\_RRS = BE\_RS - GY\_RS - 100 * \ln\left(\frac{BE\_ERDM}{BE\_ERDM_{-4}}\right)$
BE_RS	V.2	Money market interest rate for three-month funds, per cent p. a., Series AU3215
BE_RSST	V.4	Short-term interest rate (long-run), per cent p.a., definition
BE_SB	IV.4	Government transfers to households, billion Belgian francs, Series LJ1640
BE_SDN'X		Statistical discrepancy of gross domestic product, at current prices, billion Belgian francs, defined: $BE\_SDN = BE\_BIP - \begin{pmatrix} BE\_CP + BE\_G + BE\_IAN + BE\_V \\ + BE\_EX - BE\_IM \end{pmatrix}$
BE_SDR'X		Statistical discrepancy of gross domestic product, at 1990 prices, billion Belgian francs, defined: $BE\_SDR = BE\_BIPR - \begin{pmatrix} BE\_CPR + BE\_GR + BE\_IANR \\ + BE\_VR + BE\_EXR - BE\_IMR \end{pmatrix}$
BE_TDB	IV.5	Direct taxes, billion Belgian francs, defined: $BE\_TDB = BE\_G + BE\_SB + BE\_FS - BE\_TIS$
BE_TDBS	IV.1	Direct tax rate, per cent, defined: $BE\_TDBS = \frac{BE\_TDB}{BE\_VE} * 100$

BE_TIS	IV.6	Indirect taxes excluding subsidies, billion Belgian francs, Series (LJ2016 - LJ2017)
BE_TISS	IV.2	Indirect tax rate, per cent, defined: $BE\_TISS = \frac{BE\_TIS}{BE\_END} * 100$
BE_U	I.4	Transfers to foreign countries, billion Belgian francs, defined: $BE\_U = BE\_EX - BE\_IM - BE\_LBS$
BE_V	II.7	Inventory investment, at current prices, billion Belgian francs, Series YJB010
BE_VE	I.11	National income, billion Belgian francs, defined: $BE\_VE = BE\_BIP - BE\_TIS - BE\_D$
BE_VR	II.2	Inventory investment, at 1990 prices, billion Belgian francs, Series YJB110
BE_WOBE	I.3	Population, million, Series YJB350
BE_YV	I.12	Disposable income of households, billion Belgian francs, Series LJ2019

Euro area

EMU_BIPQ	I.4	Potential gross domestic product, at 1991 prices, € (ECU) billion, definition
EMU_BIPR	I.3	Gross domestic product, at 1991 prices, € (ECU) billion, definition
EMU_ER	II.8	Exchange rate of the euro (ECU) against the US$, US$ per euro (ECU), defined: $EMU\_ER = \frac{2.05586}{GY\_ER}$
EMU_GAPQ	I.5	Capacity utilisation, 1991 = 100, defined: $EMU\_GAPQ = 100 \frac{EMU\_BIPR}{EMU\_BIPQ}$
EMU_INF	I.7	Domestic price inflation, per cent p. a., defined: $EMU\_INF = 100\, \Delta_4 \ln(EMU\_PINV)$

EMU_INFT'X		Target inflation rate, per cent p. a., defined: $EMU\_INFT = 2.0$
EMU_INLV	I.1	Domestic demand, at current prices, € (ECU) billion, definition
EMU_INVR	I.2	Domestic demand, at 1991 prices, € (ECU) billion, definition
EMU_M3	II.2a	Money stock M3, € billion, end-of-quarter values, Series TUP986
EMU_MGR	II.2c	Money growth rate, per cent p.a., defined: $EMU\_MGR = 100 * \Delta_4 \ln(EMU\_M3)$
EMU_MTR	II.1	Money growth target rate, per cent p.a., definition
EMU_PINV	I.6	Price deflator of domestic demand, 1991 = 100, defined: $EMU\_PINV = 100 \frac{EMU\_INLV}{EMU\_INVR}$
EMU_PSM3	II.3	Long-term price level (P-Star), 1991 = 100, definition
EMU_RL	II.4	Yield on government bonds with residual maturities of nine to ten years, per cent p. a., defined: $EMU\_RL = 0.3767\ GY\_RL + 0.2633\ FR\_RL + 0.2523\ IT\_RL + 0.0636\ NL\_RL + 0.0441\ BE\_RL$
EMU_RLST	II.6	Long-term interest rate (long-run), per cent p.a., definition
EMU_RS	II.7	Interest rate for three-month funds, per cent p. a., defined: $EMU\_RS = 0.3767\ GY\_RS + 0.2633\ FR\_RS + 0.2523\ IT\_RS + 0.0636\ NL\_RS + 0.0441\ BE\_RS$
EMU_RSST	II.5	Short-term interest rate (long-run), per cent p.a., definition
EMU_TERM	II.9	Term premium on interest rates, per cent p. a., defined: $EMU\_TERM = mean\ (EMU\_RL - EMU\_RS)$

Foreign trade and total model

Q1'X		Seasonal dummy for the first quarter
Q2'X		Seasonal dummy for the second quarter
Q3'X		Seasonal dummy for the third quarter
REG_IM	11.I.37 (t.b.)	Imports of goods and services of other EU countries, at current prices, US$ billion
REG_PEX	11.II.1 (t.b.)	Price deflator of exports of other EU countries, 1990 = 100
ROE_IM	11.I.38 (t.b.)	Imports of goods and services of other OECD countries, at current prices, US$ billion
ROE_PEX	11.II.2 (t.b.)	Price deflator of exports of other OECD countries, 1990 = 100
T'X		Time trend, 1st quarter 1960 = 1
WE_POIL	11.II.30 (t.b.)	World oil price, 1991 = 100, Series YU0510