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The ECB-Multi Country Model. A semi-structural model for forecasting and policy analysis for the largest euro area countries

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Abstract

This paper introduces the European Central Bank's Multi Country model (ECB-MC), a coherent macroeconomic framework designed to support economic forecasting and policy analysis within the Eurosystem. The ECB-MC captures the economic dynamics of the five major economies in the euro area – Germany, France, Italy, Spain, and the Netherlands – which account for more than 80 percent of the euro area total GDP. By incorporating detailed structural features and data-driven insights, the model provides the main reference for the ECB's staff macroeconomic projections, acting as a disciplined tool for forecasting, enabling scenario, risk and sensitivity analyses, and giving a framework to understand the transmission channels of various economic shocks. The paper offers a detailed account of the structure, the estimation and the model properties, and provides a primer on the potential uses of the ECB-MC in the Eurosystem macroeconomic projections.

Key words: Semi-structural model, forecasting, euro area countries, monetary policy
JEL Classification: C3, C5, E5, E6

Non-technical summary

This paper presents the European Central Bank's Multi-Country Model (ECB-MC), a key component of the ECB's modelling framework. The ECB-MC is designed to capture the macroeconomic dynamics of major euro area economies—Germany, France, Italy, Spain, and the Netherlands—and plays a central role in the Eurosystem's quarterly (Broad) Macroeconomic Projection Exercises.

The model has been developed in the context of a larger project aiming at enriching the ECB's collection of analytical tools to bolster forecasting accuracy and policy analysis efficacy. The general modelling strategy of the ECB is grounded on a suite-of-models approach which aims at building core models complemented by 'satellite' tools. In this landscape, the ECB-MC stands as one of the core models, together with its euro area counterparts – the ECB-BASE model and the New Area Wide Model. The ECB-BASE model, described in Angelini et al. (2019), has provided critical benchmarks and methodological guidance for the development of a multi-country model that captures individual country specifics within the euro area while delivering a consolidated view at an aggregate level. The iterative refinement of model equations and estimation methodologies during the ECB-BASE development was instrumental in establishing a harmonized modelling environment for the ECB-MC.

It is important to note that the development of both the ECB-MC and ECB-BASE models drew inspiration from a well-established policy model, namely the FRB-US, which is the primary macroeconomic model used by the Federal Reserve Board (Brayton & Tinsley (1996)).This choice means that while adhering to conventional academic frameworks, the models also incorporate a degree of flexibility and adaptability to respond to shifts in the economic landscape. These models are typically categorized as "semi-structural", balancing data consistency, modeling adaptability, and fundamental theoretical principles.

To highlight the role of macroeconomic models, a dedicated workstream has been established during the 2020 ECB strategy review, which documented the models and tools available within the Eurosystem for constructing baseline economic projections and aiding the formulation of monetary policy decisions. This review confirmed that the majority of

the forecasting models employed are semi-structural, affirming their adequacy for policy scenario analysis and economic forecasting. Despite this, the review also pinpointed areas for potential enhancement. In this respect, the ECB-MC model introduces several advancements in line with the recommendations of that strategy review. Notably, it incorporates an expanded analytical framework for examining monetary policy transmission through a granular financial block. Furthermore, the model is constructed on a cutting-edge infrastructure that facilitates the efficient and flexible management of large datasets. Experts using the model in a forecasting context can now assess diverse scenarios and incorporate expert judgment seamlessly via a so-called add-factoring routines. The model's simulations are traceable and easy to replicate, while its upgraded infrastructure further supports the development of model-based forecasts to enhance the transparency of the baseline projections.

The ECB-MC is the main 'core' model for the Eurosystem forecasting process, which prioritizes robust modeling techniques to deliver accurate and reliable economic projections. The model's infrastructure not only facilitates the smooth incorporation of expert judgment but also provides a rigorous framework through its model-based indicators. These indicators enable forecasters to quantify and monitor the extent of judgment applied.

This paper introduces the role of the model in forecasting, scenario analysis, and policy evaluation. We reveal properties and uses under a country-by-country setup, namely the setup that matches the assumptions of the ECB forecasting process. Drawing from the foundational work of models like the ECB BASE model, the ECB-MC represents a significant advancement in capturing the complexities of the largest five euro area economies. By incorporating detailed expenditure and sectoral structure that replicates national accounts, international trade relationships, and monetary policy transmission mechanisms, the ECB-MC provides policymakers with a comprehensive framework for forecasting and analyzing the potential impact of various economic shocks and policy interventions.

The ECB Multi-Country Model demonstrates the ECB's commitment to transparently and accountably improve macroeconomic modeling to support its price stability mandate. As the Eurozone faces ongoing economic challenges, the ECB-MC with its flexibility and adherence to the data remains a key tool for policymakers, helping them make informed

decisions to strengthen and sustain the Eurozone economy.

1 Introduction

This paper introduces the European Central Bank's Multi Country model (ECB-MC), a pivotal component of the ECB's modelling toolbox, representing a focus on rigorous economic analysis and evidence-based policymaking. The ECB-MC is designed to model the macroeconomic dynamics of the major euro area economies — Germany, France, Italy, Spain, and the Netherlands — and serves as one of the main tools in the Eurosystem's quarterly (Broad) Macroeconomic Projection Exercises. The five countries are largely representative of the general and specific most important euro area characteristics and account for more than 80 percent of the euro area GDP. ECB-MC is the core model used for the projection exercises and provides a framework for the forecast narrative of these countries. The model structure is quite similar across countries with the main parameter estimates providing the necessary differences to capture country-specific elasticities. With its robust structural characteristics, well-founded assumptions, and intensive data integration, the model supports policymakers with a comprehensive framework to gain insights into the transmission channels of various shocks and policy interventions.

The model has been developed in the context of a larger project aiming at enriching the ECB's collection of analytical tools to bolster forecasting accuracy and policy analysis efficacy. The general modelling strategy of the ECB is grounded on a suite-of-models approach which aims at building core models complemented by 'satellite' tools.[1] In this landscape, the ECB-MC stands as one of the core models, together with its euro area counterparts – the ECB-BASE model and the New Area Wide Model.[2] The ECB-BASE model, described in Angelini et al. (2019), has provided critical benchmarks and methodological guidance for the development of a multi-country model that captures individual country specifics within the euro area while delivering a consolidated view at an aggregate level. The iterative refinement of model equations and estimation methodologies during the ECB-BASE development was instrumental in establishing a harmonized modelling environment for the ECB-MC.

It is important to say that the development of both the ECB-MC and ECB-BASE

[1] See Darracq Pariès et al. (2021) for a comprehensive review of the Euroststem's modelling framework.
[2] See Ciccarelli et al. (2024) for more information about the macroeconomic models used at ECB for projections and policy analysis.

models drew inspiration from a well-established policy model, namely the FRB-US, which is the primary macroeconomic model used by the Federal Reserve Board (Brayton & Tinsley (1996)). This choice means that while adhering to conventional academic frameworks, the models also incorporate a degree of flexibility and adaptability to respond to shifts in the economic landscape. These models are typically categorized as "semi-structural", balancing data consistency, modelling adaptability, and fundamental theoretical principles.

To highlight the role of macroeconomic models, a dedicated workstream has been established during the 2020 ECB strategy review, which documented the models and tools available within the Eurosystem for forecast analysis and monetary policy preparation.[3] This review confirmed that the majority of the forecasting models employed are semi-structural, affirming their adequacy for policy scenario analysis and economic forecasting. Despite this, the review also pinpointed areas for potential enhancement. In this respect, the ECB-MC model introduces several advancements in line with the recommendations of that strategy review. Notably, it incorporates an expanded analytical framework for examining monetary policy transmission through a granular financial block, and it features an extensive fiscal block that allows for the examination of various fiscal-monetary policy interactions and cross-country spillovers within the monetary union.

Furthermore, the model is constructed on a cutting-edge infrastructure that facilitates the efficient and flexible management of large datasets. Experts using the model in a forecasting context can now assess diverse scenarios and incorporate expert judgement seamlessly via a so-called add-factoring routines. The model's simulations are traceable and easy to replicate, while its upgraded infrastructure further supports the development of model-based forecasts to enhance the transparency of the baseline projections.

This paper presents the role of the model in forecasting, scenario analysis, and policy evaluation. The properties and uses of the model are examined under a "partial" or country-by-country setup, namely the setup that matches the assumptions of the ECB forecasting process. Other forthcoming papers will better illustrate the model properties and the propagation of shocks in a 'fully-fledged' setup, where trade linkages and the fiscal block will be entirely (and endogenously) exploited.

[3] See Darracq Pariès et al. (2021) for the complete report.

The remainder of this paper is organized as follows: Section 2 offers a concise overview of the ECB-MC model, its fundamental structure, the calibration and estimation techniques employed. It also describes the modalities under which the model can be operationalized, particularly emphasizing its application in the ECB's forecasting processes. Section 3 details the model's structural components and equations. Section 4 exemplifies how the model has been (or can be) used in the projections exercises, including also the basic model elasticities to standard 'shocks'. Finally, Section 5 concludes.

2 An overview of the model

The ECB multi-country model (ECB-MC) is a large-scale quarterly macroeconomic model for the five-largest euro area economies (Germany, France, Italy, Spain, and the Netherlands). It has been built following the ECB's modelling strategy to develop a robust suite of models for forecasting and policy analysis. The ECB-MC is one of the main models used in the ECB's forecasting process. It replaced the previous multi-country model, the NMCM, which was documented in Dieppe et al. (2011).

The foundational architecture of the ECB-MC model is derived from its euro area-level predecessor, the ECB-BASE model, which serves as a critical instrument for conducting policy and scenario analyses at the euro-area level. This paper reviews the essential frameworks of both models and emphasizes the bespoke adaptations implemented in the ECB-MC, particularly concerning country dimensions. For an in-depth exposition of the methodologies common to both the ECB-MC and ECB-BASE models, readers are directed to consult Angelini et al. (2019).

Both the ECB-BASE and ECB-MC models are constructed using methodologies similar to those employed in the FRB-US model of the Federal Reserve Board. The primary aim of this type of models is their suitability for forecasting. This requires that the models a) capture the interdependencies among critical macroeconomic variables, b) incorporate realistic channels for the transmission of monetary policy and various economic shocks, and c) provide a comprehensive accounting framework that aligns with the needs of the forecasting process.

Finally, the forecasting and policy analysis requirements necessitate various approaches for solving the model. For instance, the ECB-MC can operate in a "single-country version", which allows for individual country simulations. Alternatively, it can be executed in a "linked version" that simultaneously solves for all (Big-5) countries, integrating active trade connections, a unified monetary policy, and shared financial variables such as exchange rates and interest rate expectations. Furthermore, the model permits "partialization", whereby certain policy functions or variables are exogenised. This process eliminates feedback loops within a specific channel. This technique is particularly valuable during forecasting, where numerous assumptions are imposed exogenously. Further elaboration on these methodologies is available in Section 3.

2.1 Model's structure

To meet the analytical demands of the forecasting process and various policy applications, the ECB-MC model is structured into several interdependent blocks that effectively capture the dynamics of key macroeconomic variables and their interactions. As illustrated in Figure 1, for each of the Big-5 euro area countries, the model is organized into five distinct blocks. We report here the main characteristics of each block and in the appendix a more detailed account of the main equations, as well as a full list of model equations and variables.

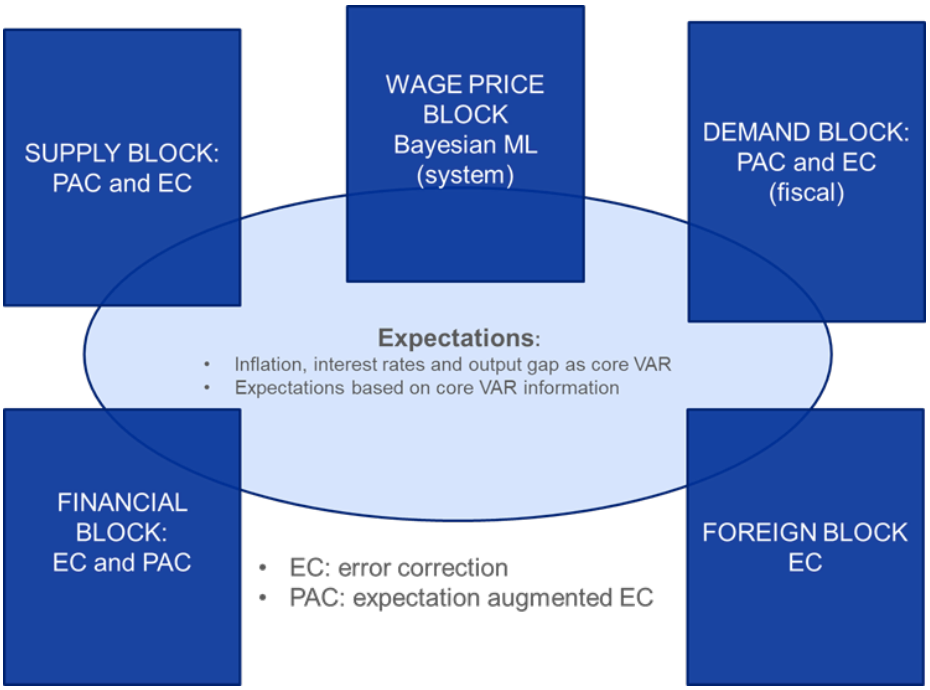
2.1.1 Domestic Demand Block

This block encompasses household consumption, business and residential investment, and variables related to fiscal policy. It is designed to provide a comprehensive view of the domestic economic activity driving demand within each country.

For consumption, we distinguish two types of households. Some households are liquidity constrained and follow a rule-of-thumb behaviour. Others have optimizing behaviour and maximize their expected lifetime utility subject to resource constraint. The consumption of liquidity constrained households moves in line with their labour and transfer income.

For investment, we also consider two types of agents (firms): cash-flow constrained and optimizing agents that maximize profits subject to capital accumulation constraint. The

Figure 1: Note: A schematic overview of the main building blocks of ECB-MC.



output of a firm is given by the Cobb-Douglas production function with constant returns to scale and two production inputs, capital and labour.

Finally, the government block provides a comprehensive representation of government revenues and expenditures and their interactions with the domestic economy. On the revenue side, the model incorporates implicit tax rates aligned with data from government finance statistics, covering taxes on income and wealth, as well as taxes on production and imports. On the expenditure side, it includes government consumption, investment, and social transfers.

2.1.2 Foreign Block

This segment accounts for intra- and extra-euro area trade, including the trade of commodities. It covers both volumes and prices, accounts for the role of exchange rates, and models the impact of external economic factors that influence the domestic economies of the euro area.

The modelling of extra-euro area trade volumes and prices is essential to analysing the

impact of the external shock that materialize outside the euro area. On the other hand, the intra-euro area variables enable the consistency of the euro-area dynamics as the demand for exports in one euro area country is automatically reflected in imports of other euro area countries, taking into account the respective trade shares. All trade volumes are modelled in real terms.

Trade deflators are also modelled using a 'top-down' approach. This means that we model total import and export deflators and the extra-euro area deflators, whereas the intra-euro area prices are re-computed in a consistent manner.

2.1.3 Supply Block

Central to this block is the labour market and the associated factor demands, which are derived from a Cobb-Douglas production function. This framework also allows for the analysis of how inputs such as labour and capital combine to produce output and assess the underlying growth potential of the economy. The labour market is centred around an equation for total employees. Furthermore the block features an equation for hours worked, a measure for unemployment and a separate modelling of self-employed and the labour force participation rate.

2.1.4 Wages and Prices Block

This block models wage dynamics and price adjustments, critical for understanding inflationary pressures and wage-price spirals within the economy. It also integrates the interplay between labour market conditions and inflation, essential for monetary policy considerations. Central to this block, as in the ECB-BASE model, is a small 'reduced-form' general equilibrium model called WAPRO (Wage-Price-Output gap). By 'reduce-form' we mean that, while some elements, including microfoundations and the explicit modelling of expectations, are borrowed from the dynamic stochastic general equilibrium literature, the economic restrictions are relaxed to improve the data fit. Therefore, even if the structure of the equations is guided by optimizing behaviour of the economic agents, the block is estimated without imposing cross-equation restrictions of the structural parameters. In this

sense the loading coefficients are estimated (or calibrated) in a 'reduced form'.

The block is centred around a wage-price and output gap specification, that determines jointly output gap, inflation, wages and unemployment. The key inflation indicator in the model is the GDP deflator that follows a New Keynesian Phillips Curve, with inflation depending both on a measure of expected inflation and on past inflation. The long-run values of HICP sub-components are modelled as weighted averages of GDP deflator and import prices, with weights given by the import content in the final use of the respective sector in the economy. The short-run sub-component dynamics follows the error correction model. The total HICP is then modelled as a weighted sum of the various components.

Finally, the wage inflation gap is also modelled with a reduced form of the New Keynesian Phillips Curve. It is a function of future wages, of past, present and future domestic price inflation, of present and future euro area price inflation, of the deviation of the labour share of income from its trend, of the deviation of trend output growth from its steady state, and of the deviation of the unemployment rate from its trend (Galì (2011).

2.1.5 Financial Sector Block

This block models the financial intermediation process, encompassing interest rates, banking lending rates, and broader financial market dynamics. Specifically, in the context of the monetary union, we model a common, area-wide, reference short-term rate and country-specific long-term market rates. The reference short-term interest rate is assumed to follow a simple monetary policy rule while the long-term rates are determined as the sum of the average of expected short-term rates, term premium, and country-specific risk premium. Expectations about the future short-term rates are derived from a VAR.[4] The term premium is modelled separately as a function of expected macroeconomic conditions on euro area level and external market developments. The country risk premium depends on the expected macroeconomic conditions and a country's fiscal position. Finally, the short-term rate and the long-term market rate, alongside the risk premia associated with particular debt and equity instruments, provide the basis for the construction of lending rates and financing cost measures used in other parts of the ECB-MC model.

[4]For more details see below definition of expectations and Appendix A.3.

2.1.6 Additional building blocks

Together, these blocks form a robust framework that enables a detailed examination of the economic mechanisms at play within the largest economies of the euro area, providing crucial insights for forecasting and policy-making. As in all semi-structural models, each block of the model can be decomposed into behavioural equations, bridging equations, and identities. The equation residuals play a crucial role in aligning the model with empirical data. This adjustment is vital for the forecasting process, where expert judgement is incorporated on top of model-based outcomes. This integration of expert analysis is further detailed in Section 3.

Behavioural Equations: These equations are derived from theoretical underpinnings and are primarily estimated to reflect the optimizing behaviours of firms, households, and financial markets, subject to polynomial adjustment costs (as in Tinsley (2002) and Kozicki & Tinsley (2002)). This framework encapsulates three core components:

- **Theory-based Target**: This element represents the ideal or goal that agents (firms, households, etc.) strive to achieve under perfect conditions.
- **Expectations about Future Targets**: Agents form expectations about future states of their targets based on available information, which guide their current decisions.
- **Dynamic Adjustment Mechanisms**: These are typically modelled using an error-correction approach. The dependent variable in these equations is influenced by its historical values, the deviation of its previous state from the theoretical target (error-correction term), and anticipations regarding future adjustments in the target variable.

The target variables are derived as:

$$x_t^* = argmax_x E_t \sum_{t=0}^{D} \beta^t f(x_t, u_t)$$

$$\text{s.t}$$

$$u_{t+1} = g(x_t, u_t),$$

$$x_t \in \Phi,$$

$$x_0 \text{ given and } D = (T \oplus \infty)$$

where u_t is the state variable, x_t is the control variable chosen for the optimisation problem, the constraint x_{t+1} specifies the influence that the control exerts on the state and the control variable takes values in a given set $\Phi \subseteq \mathbb{R}$. Loosely speaking, this is a generic representation for all optimising problems in the model, such as households' lifetime utility optimisation in consumption or profit maximisation by firms subject to capital accumulation, to determine investment and the optimal level of employment. However, the empirical success of the model crucially depends on the assumption that agents cannot adapt their behaviour instantaneously in line with optimal/theory-based conditions as they face adjustment costs. The assumption of the existence of adjustment costs implies rich short-run dynamic behaviour that resembles an error correction formulation for each modelled variable x_t. Formally:

$$\Delta x_t = a_0(x_{t-1}^\star - x_{t+1}) + \sum_{i=1}^{m-1} a_i \Delta x_{t-1} + E_{t-1} \sum_{j=0}^{\infty} d_j \Delta x_{t+1}^\star \tag{1}$$

where a_0 is the coefficient on the deviation of the variable of interest from its target and a_i gives the weights on the backward-looking terms. The term $E_{t-1} \sum_{j=0}^{\infty} d_j \Delta x_{t+1}^\star$ represents the expectations of weighted changes in future targets with d_j being weights on the forward-looking terms.

Polynomial Adjustment Costs (PAC): the main idea behind the PAC approach is that agents cannot change their behaviour to adapt the optimal conditions immediately. There are some adjustment costs, which the agents take into account when forming their expectations. Formally, it requires finding an admissible representation to the last term in Equation

1. Following Brayton et al. (2000) and Tinsley (2002), we do it by building a small-scale auxiliary VAR model for each behavioural equation that employs PAC approach. Those VARs consist of the specific variable for which expectations are being formed and a core set of macro variables: the policy rate (euro area), the GDP deflators (both euro area and country), and the output gaps (both euro area and country).[5] The general derivation of the PAC approach and its econometric implementation following Brayton et al. (2000) is described in Angelini et al. (2019).

Expectations are modelled explicitly and can be derived under a VAR framework or model-consistent approach. In the former approach, future values of the lead variables are replaced by forecasts from a VAR model and the model is then simulated. The VAR expectation case assumes only limited knowledge of the joint dynamics of the variables and corresponds to the same restricted information set used in the estimation of the model as detailed in the previous paragraph. This design may be interpreted as a limited form of rational expectations. Moreover, PAC expectations can be conformably rewritten so that the model can also be simulated using standard techniques for simulating models with forward-looking terms in a model-consistent manner (rational expectations) or as a combination of the two expectation formation processes.

Calibration and estimation: The parameters of the model are derived from a mix of calibration and estimation. The general rule is that the parameters of the target variables are mostly calibrated based on theory and micro evidence, while the coefficients of the dynamic adjustment are data driven and are estimated. We use a Dynare toolkit with features that have been specifically developed for the estimation and simulation of the ECB-MC model.[6] Regarding the estimation techniques, for various PAC blocks (notably consumption, private and residential investments and house prices) we employ a panel pooled FGLS estimation method to obtain initial conditions (mean) for the parameters of various country specific target variables. They are subsequently used as prior information in a Bayesian estimation to robustify the estimates. Important to point out is that the estimated VAR is an input

[5] In the specification of Country specific "core" VAR we allow country variable to be affect by the euro area counterpart but eliminate the direct feedback of the country variables to the euro area counterparts. In other words, we utilize so called block-exogenous approach.

[6] See the reference manual, Adjemian, Juillard, Karamé, Mutschler, Pfeifer, Ratto, Rion & Villemot (2024), for more details. See also Adjemian, Bokan, Darracq Pariès, Müller & Zimic (2024) for specific aspects related to the solution methods implemented for PAC based model within Dynare.

into the estimation of the PAC equations, whereby the expectation terms depend non-linearly on the coefficients of the underlying VAR model. That implies the need of using either iterative LS (as in FRB-US) or non-linear least square (our preferred option). Other blocks (except WAPRO), rely on standard error correction two-stage estimation techniques in combination with Bayesian estimation, or directly on single equation Bayesian methods. The Wage-Price-Output (WAPRO) gap block is estimated as a reduced form system using Bayesian techniques.

Model simulation is carried out using specific Dynare solution routines for backward-looking models. Given that each endogenous variable in the ECB-MC model can be associated with a particular equation and can be expressed as equal to some left-hand side expression, a Dynare solution algorithm is implemented which efficiently exploits these characteristics.

A selected sample of the estimated coefficients is reported in the Appendix where we also report the full list of model equations and variables.[7]

2.2 The forecasting version of the ECB-MC

The ECB-MC model can be used in two versions, a so-called 'forecasting' version and a 'linked' version. The former uses single country models to produce the projections taking as exogenous all main assumptions, including e.g., fiscal and monetary policy, and excluding possible spillover effects across countries. The linked version of the model, instead, links the country blocks with a trade matrix and allows to simultaneously cover the country dynamics, cross-border spillovers, common monetary policy and exchange rates.[8] All properties and uses of the model will be presented in this paper only for the single-country or 'forecasting'

[7] In an interactive web-type page of the model we will also report a list of codes from the ECB's Data Portal indicating, when available, the time series used for estimation. It should be noted that the statistical time series are continuously revised therefore the recent data snapshot might not fully reflect the same information as used during the estimation process. This interactive page is currently under construction.

[8] The Linked setup extends the model by accounting for intra-euro area bilateral trade flows and competitors' prices defining countries' competitiveness positions. These linkages are modelled following Hubrich & Karlsson (2010) whereby foreign demand is computed as a weighted average of import volumes of the trading partners and competitors' prices are measured as a weighted average of trading partners' export prices. Common monetary policy across all countries follows modified policy from Section A.3, with inflation and output gaps variables corresponding to a weighted average of the 'Big-5'economies and the weights correspond to GDP shares in the euro area normalized to 1. Nominal exchange rate is modelled in a similar fashion.

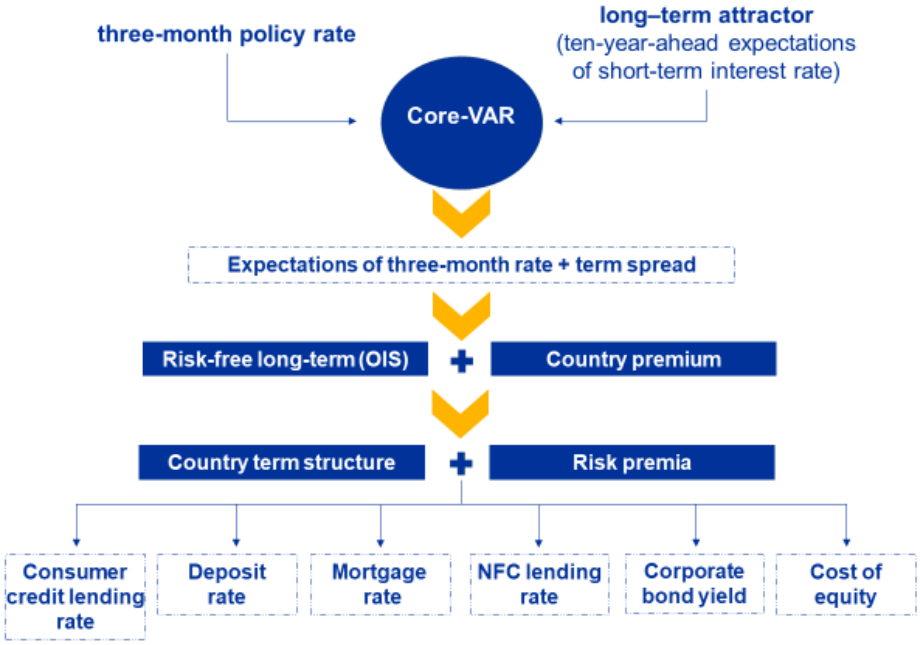
version. A more comprehensive analysis of the linked version is discussed in a separate forthcoming paper that will present properties and characteristics of the full model.

Despite sharing the same structural framework as the ECB-BASE, the ECB-MC model incorporates distinct features within its country-specific blocks, particularly in the trade and financial sectors. Moreover, the core-VAR component of the model integrates both national and euro area variables in the expectations formation, enhancing its analytical depth. The main novelties introduced into the ECB-MC structure can be summarized as follows:

The **Trade Block** is split in intra- and extra-euro area components. However, the estimation strategy for the countries is done on total trade directly and on extra-euro area trade, with intra-euro area being a residual. More precisely, the trade block includes error correction equations for total real exports and imports, and prices. The modelling approach for the trade block is quite traditional. We have chosen a highly aggregated approach with no split between goods and services. Moreover, bilateral trade flows are not directly considered. External indicators for demand and prices are the effective exchange rate based on weighted averages of main trading partners, world demand and competitors prices. The import demand indicator is calculated as a weighted average of final demand components and can be considered as an indicator of import absorption. The weights are determined by the import content derived from the input output tables.

The **Financial Sector** within the ECB-MC closely mirrors the architecture used in the ECB-BASE model, but it has been expanded to include the dynamics of country-specific risk premiums (see Figure 2). The central focus of the financial block is on interest rates, primarily structured around the risk-free term-structure. The euro area's long-term risk-free rate is derived from the short-term interest rate, the anticipated trajectory of this rate as forecasted by the core VAR, and the term premium. Country-specific premiums are then modelled as a function of macroeconomic fundamentals, such as expected output gap and fiscal positions. The sum of the euro area risk-free long term rates and the country premium determines the country-specific long-term interest rates. This methodology aligns with that used in the ECB-BASE model and serves as the foundation for constructing nominal lending rates, which are calculated as the sum of a weighted average of short-term and long-term rates, augmented by a risk spread.

Figure 2: A schematic overview of the financial sector in ECB-MC



The **Expectation Formation Mechanism** has been enhanced to incorporate both euro area and country-specific information. The VARs utilized for constructing expectations are structured into four blocks:

- **Target Variable**: This block includes the variable for which expectations are being formed, such as expected consumption. It consists solely of this variable and its own historical values, making it equation-specific.
- **Country Core/Base-VAR Variables**: This block comprises key domestic economic indicators like inflation, the output gap, and the interest rate. These variables, often referred to as core-VAR variables, represent the most significant state variables of the national economy and are consistent across all equations.
- **Euro Area Core/Base-VAR Variables**: These variables reflect broader euro area dynamics, including the common monetary policy and euro area-specific interest rates that are influenced by regional economic developments, rather than country-specific factors.
- **Long-term Attractors**: This final part includes variables that represent the perceived

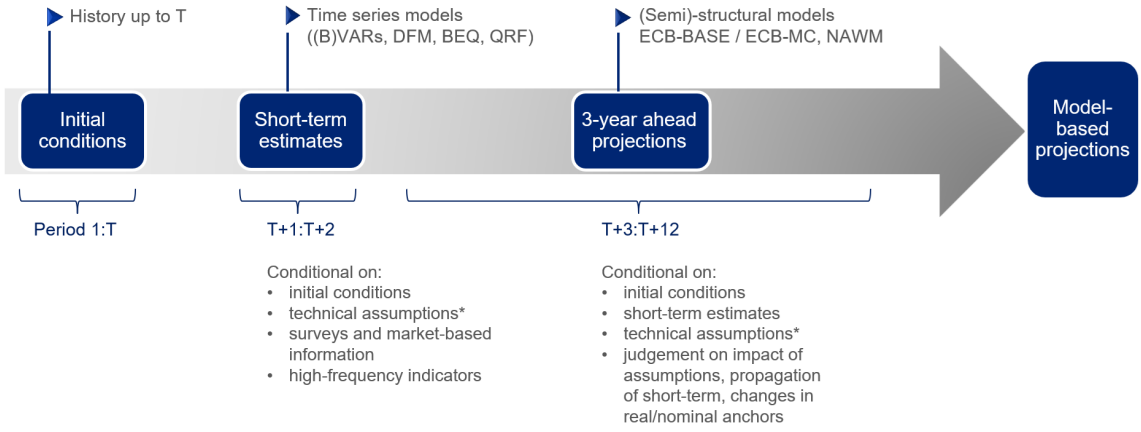
long-term equilibrium states, modelled using data on long-term trends in growth, inflation, and interest rate expectations.

For detailed exposition of the VAR setup and the estimation, please see Appendix B.

3 Forecasting with the ECB-MC model

This section describes how the ECB-MC model is (or can be) used in the quarterly macroeconomic projection exercises of the ECB. This process adopts a bottom-up methodology, initiating forecasts at the national level before aggregating the results to the euro area level. The ECB-MC is used to produce the forecast for the five largest euro area countries – Germany, France, Italy, Spain, and the Netherlands. The interested reader can check the Guide to the Eurosystem/ECB staff macroeconomic projection exercises (European Central Bank (2016)) to get a sense of the key characteristics of the projection exercises, the main actors involved, and the use of models and judgement in the preparation of the final numbers and scenarios.[9]

Figure 3: The projections steps



Note: The figure shows the various steps to obtain the final projections. Short-term estimates and three year ahead projections share a common set of exogenous assumptions.

The general projection steps are summarised in Figure 3, which inlvolve the use of several

[9] See also Ciccarelli et al. (2023), the blog on models and projections for a good understanding of the main models and of the model-based forecast augmented with judgement. The ECB Occasional Paper on Macroeconometric models for forecasting and policy analysis, Ciccarelli et al. (2024), also illustrates with details the policy and forecasting use of the modelling portfolio.

models and inputs. More details of these steps can be found in Ciccarelli et al. (2024). In what follows, we will focus on the ways the ECB-MC model is or can be used in the projection preparation. We would like to emphasize once more that the ECB/Eurosystem projections (like in most central banks and policy institutions) is not purely defined by the bounds of traditional statistical time series analysis. It is instead a nuanced exercise, perpetually calibrated via expert judgement to assimilate a plethora of information streams and inputs, mirroring the dynamic economic landscape. The process itself therefore relies less on purely mechanical usage of the economic-models, but rather uses economic models as a starting point, as an organizing and constraining device and finally as a cross-checking device.

This complexity is the inherent nature of the forecasting process in central banks, which is distinct in two fundamental ways from standard statistical exercise. Firstly, it is not a purely statistical endeavour but a judicious blend of data, models, and insights from diverse sectors, ensuring a reflection of the ever-changing economic context. Secondly, the forecasting is inherently continuous, building on a rich repository of insights from past iterations, and is primarily conducted as a sequence of updates. Given these features, semi-structural models emerge as flexible tools for forecasting within central banks, adept at harnessing the intricate balance between model-based consistency and the flexibility to incorporate judgemental adjustments.

The forecast-generation process with the ECB-MC model – schematically summarised in Table 4 – incorporates progressively the relevant information of a new forecasting round. It starts with an assessment of the impact of the new assumptions on the previous final forecast. It then continues with a projection update, namely an update of the previous forecasts which include not only the new assumptions but also the new data releases. It ends in a 'conditional' forecast as blend of model-based outputs (including the nowcast and the short term forecast of the main macroeconomic variables) and judgemental inputs. We will conclude with a short note on the inclusion of model-based uncertainty into the final forecast narrative. We describe each step in the following subsections.

Figure 4: The forecast-generation process with the ECB-MC model

Update starting from previous baseline:	(1) Impact of assumptions	(2) Projection update	(3) Conditional forecast
Technical assumptions update	Yes	Yes	Yes
Incoming data release	No	Yes	Yes
Short-term outlook update	No	Yes	Yes
Residuals	No	No	Yes

Note: 'Technical assumptions' include interest rates, external economic conditions affecting external demand and prices, energy and agricultural prices, fiscal plans. 'Incoming data release' refers to the release of new data or data revisions. 'Short-term outlook update' refers to the results of nowcasting models for GDP growth and inflation. 'Residuals' refers to the need to adjust the equation residuals to include judgmental input which is not directly captured in the model.

3.1 Impact of Assumptions

The technical assumptions are the forecasts of external factors – such as world demand, competitors' export and import prices, and energy prices – financial variables – like interest rates, lending rates, and asset prices – and fiscal parameters – including government consumption, investment, and taxation. The evaluation of the impact of assumptions in economic modelling is normally the first step when updating the forecast. Namely, the forecaster would like to understand how new external information for some variables affects the previous forecast. Such variables – typically used as conditioning assumptions in the new projection exercise – often include key economic indicators like interest rates, external economic conditions affecting external demand and prices, new fiscal plans, etc. By analysing the impact of these assumptions, one can gain insights on how new incoming information will affect the forecasts. This understanding is crucial for policymakers and analysts who need to anticipate only the effects of changes in external factors on the economy, abstracting from any other consideration. For instance, understanding how changes in expected interest rates or external demand will influence domestic economic conditions is a first step to help making informed policy decisions.

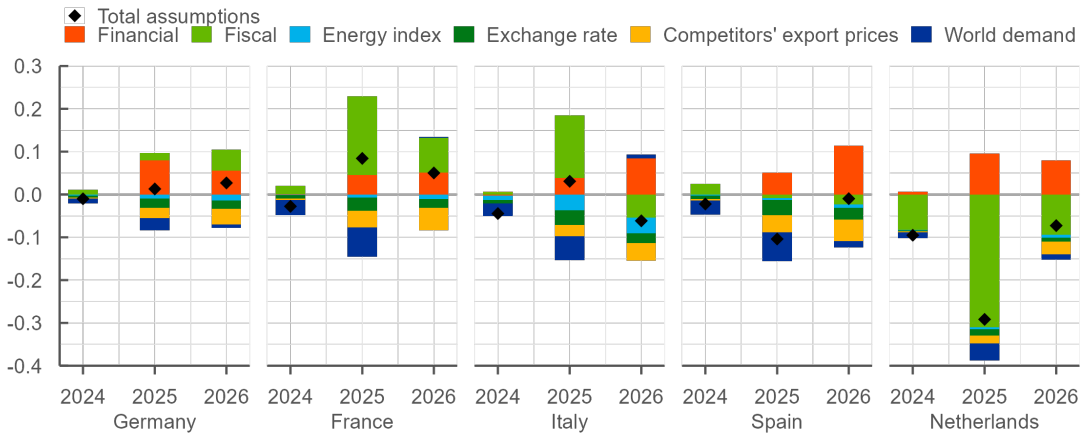
In the forecasting use of the ECB-MC model, most financial, fiscal and external variables are treated as exogenous variables, and the projection is usually a conditional forecast. This means that, while some of these variables might inherently have endogenous dynamics, and the model includes 'behavioural' or endogenous equations for them, namely dynamic

equations that could be used to forecast them (think of a simultaneous equation model or e.g. a VAR), their dynamics is not used over the forecast horizon. Instead, these variables are 'exogenized' and the forecast of the other variables is obtained conditionally to future paths of these assumptions (think of a conditional forecast à la Waggoner-Zha).

The impact of assumptions is therefore the result of a model simulation based on the change of the assumptions and it depicts the effect of information received since the previous round of our models' projections. In this simulation modality, historical data, short-term outlook and judgement (technically included by changing the assumption of non-zero mean of the residuals over the forecast horizon) are left unchanged from the previous iteration.

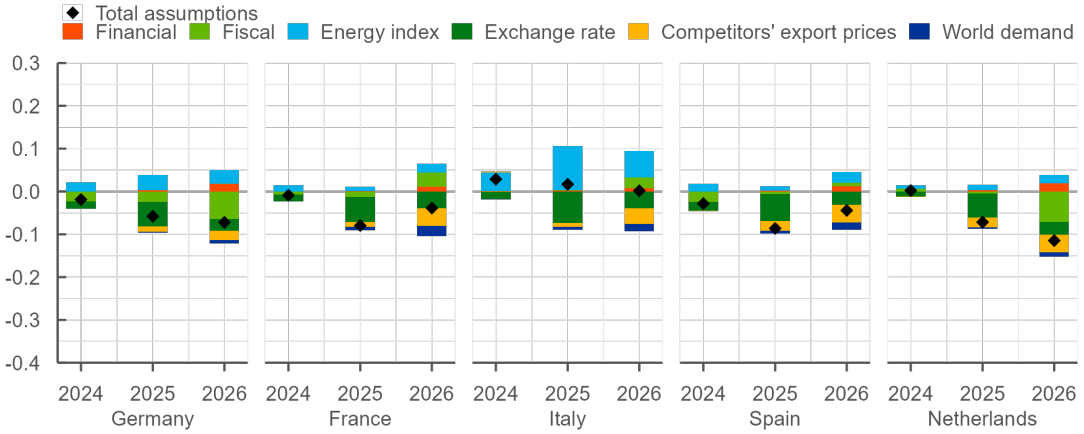
Two illustrative examples – which refer to one of the recent projection exercises – are reported in Figures 5 and 6. Figure 5 highlights the contributions of changes in assumptions to GDP growth across the five countries, while Figure 6 illustrates the corresponding impact on HICP annual inflation rate. Without entering in the economic content of the charts, the example demonstrates the depth and precision of the analysis provided to policymakers, effectively identifying the key drivers behind the projections for a given round. Naturally, the contributions of assumptions to the primary projections differ across rounds, reflecting evolving economic conditions.

Figure 5: Example of change in GDP projections due to change in the assumptions



Note: The figure depicts the impact of assumptions on real GDP growth, in percentage points. Financial assumptions include interest rates, asset prices and lending rates; the Energy index refers to Oil and gas prices which are in USD; exchange rates include USD and the euro effective exchange rate. Fiscal assumptions refer to fiscal measures, including net indirect taxes. The transmission of net indirect taxes is differentiated between energy measures and other net indirect taxes. World demand includes both intra- and extra-euro area trade.

Figure 6: Example of change in HICP projections due to change in the assumptions



Note: The figure depicts the impact of assumptions on HICP inflation, in percentage points. Financial assumptions include interest rates, asset prices and lending rates; the Energy index refers to Oil and gas prices which are in USD; exchange rates include USD and the euro effective exchange rate. Fiscal assumptions refer to fiscal measures, including net indirect taxes. The transmission of net indirect taxes is differentiated between energy measures and other net indirect taxes. World demand includes both intra- and extra-euro area trade.

The impact of assumptions can also be combined with the statistical carry-over effect derived from new data, serving as a model-based indicator of the forecast likely direction in the absence of additional information. While this indicator is relatively simplistic, it provides valuable insight into the extent of expert judgement applied beyond the main model, particularly in response to short-term updates from satellite models.

3.2 Projection Update

The forecasting process in central banks is characterized by the use of judgement and the continuity of (mostly quarterly) forecasts. While we do not delve into the reasons why judgement is used and how the continuity of forecasting exercises might affect the loss function of forecasters, it's important to understand the implications these practices have on the forecasting process.[10] Central banks often focus on specific statistics regularly used during the forecasting process, one of which is the 'Projection Update', significantly different from the 'Impact of Assumptions'. While the 'Impact of Assumptions' focuses on how changes in exogenous variables affect the forecast, the 'Projection Update' also considers how changes in conditioning endogenous variables influence the forecast. This inclusion

[10]For a discussion on why ECB projections are a combination of model-based computation and expert "judgement", see e.g. Ciccarelli et al. (2023).

of revised history and short-term forecasts enriches the forecasting process by providing a more comprehensive view of the current economic situation.

Through the 'Projection Update', the forecasting model integrates the latest changes in assumptions, revisions to historical data, and updates to short-term forecasts. The protocol for conducting a 'Projection Update' follows a sequence of steps. First, to preserve the implicit expert judgement from the previous forecasting exercise, model residuals consistent with the prior forecast are identified. In straightforward cases, these residuals can be directly extracted from the earlier model simulation results. However, in cases of significant historical data revisions (e.g., level shifts or benchmark updates), determining consistent residuals requires a process known as 'splicing'.

Splicing, in simple terms, uses the revised historical data levels as a new starting point, extending them with growth rates from the previous forecast. This reconstructed dataset is then used to "invert" the model, enabling the computation of residuals that align with the updated data. This approach is particularly suited to semi-structural models, such as ECB-MC, while fully structural models may require alternative methods. Exploring those alternatives, however, lies beyond the scope of this paper.

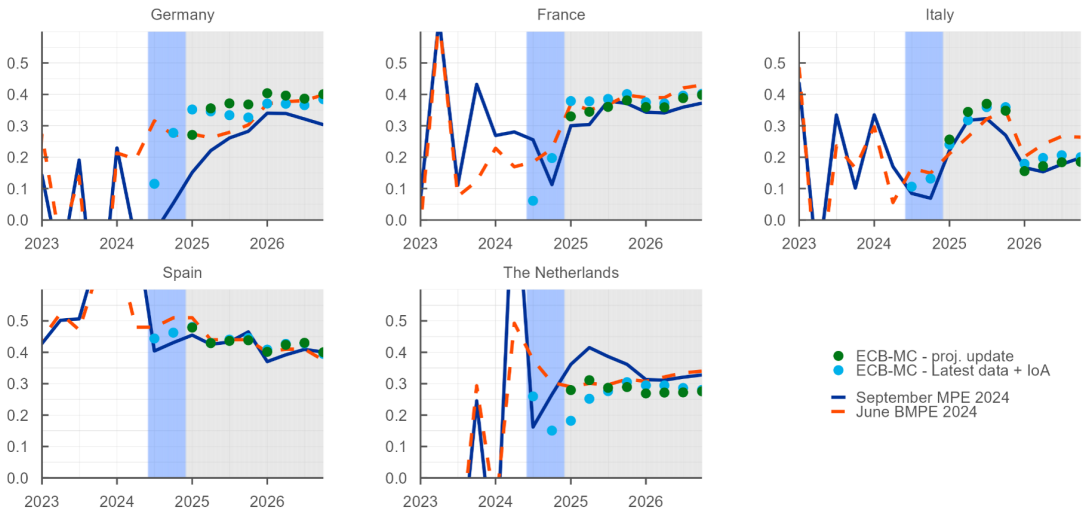
Continuing with the 'Projection Update' process, once the residuals are determined, a new simulation is run. This simulation incorporates: (i) the updated historical data and short-term outlook (obtained with satellite nowcasting models), and (ii) the revised assumptions. Conditioning the model on the short-term outlook is critical, as the main forecasting model, typically based on quarterly data, lacks the granular structure needed to process all incoming economic news. Instead, central banks often rely on satellite tools, such as now-casting and early-estimate models, for a better assessment of current economic conditions.

Integrating insights from these satellite tools into the main model enables this information to influence the medium-term horizon. Combined with the incorporation of new assumptions, this process results in a 'Projection Update', which serves as a reference indicator for evaluating the extent of expert judgement applied to the medium-term horizon within the main model.

Figure 7 illustrates two consecutive projections for GDP quarterly growth rates in the five major euro area countries, alongside the two model-based indicators described previously. The green dots represent the projection update, while the blue dots indicate a step where only new data and assumptions are integrated. In the short-term horizon (blue-shaded area), notable differences are observed between the model-based indicators and the final projection values. This discrepancy arises because, as explained above, the short-term outlook is primarily shaped by satellite models and external information not captured within the main model.

In the medium-term horizon, the gap between the final projection (blue line) and the projection update reflects expert judgement—adjustments made by experts to account for specific insights or considerations.

Figure 7: Projection update for GDP



Note: The figure depicts how the projection update can be used also as a cross check of the baseline forecast (blue line) for GDP growth. The blue dotted line shows the latest statistical data and the assumptions ("Latest data + IoA"). The green dotted line has the short-term outlook embedded in the new baseline and the assumptions and it shows how the model would propagate this information without any additional expert interventions.The red dashed line is the previous forecast.
Source: ECB/Eurosystem projections database and own calculations.

3.3 Conditional Forecast

As reminded several times, forecasts are rarely produced purely on the basis of a mechanical application of economic models. Instead, they integrate various off-model pieces of information that forecasters have in real time but cannot be easily integrated within the model's

structure. The final step in the forecasting process therefore involves incorporating expert judgement into the model-based projections. In semi-structural models like ECB-MC, this can be done in two main ways: either by exogenising certain variables and imposing a fixed path over the forecast horizon, or by adjusting selected model residuals—a method commonly referred to as "add-factoring". Fundamentally, both approaches achieve the same goal: modifying the model-based forecast to integrate off-model information.

This off-model information can originate from various sources. It might come from other, often smaller and more specialized models (referred to as satellite models) that focus on specific economic channels. It can also include soft indicators, such as survey results, or expert knowledge gained from previous forecasting rounds and experience with potential model misspecifications.

The "add-factoring" method is the most widely used because it is relatively straightforward to implement. It also enables the propagation of judgement throughout the forecast horizon. For instance, an adjustment to a residual in one quarter is propagated by the model's solution to subsequent quarters, ensuring consistency across the forecast. Examples of such procedures and the relative treatment of the residuals are provided in the paper by Angelini et al. (2019). The blue (continuous) and red (dashed) lines in figure 7 show a final (conditional) projection as a result of all previous steps. The differences between these lines and the dots roughly give an idea of the judgmental changes with respect to the previous or the current forecast.

3.4 Decomposing the Baseline

While it is challenging to quantify judgement precisely, it is instructive to examine how much of this judgement is contained in the forecast. The forecast decomposition presented here aims to do just that, leveraging the concept of the "Projection Update." It is essential to note that this decomposition is "relative" to the previous forecast, providing an analysis of changes rather than an absolute level of judgement. The decomposition of the baseline forecast into different components allows for a detailed understanding of the factors driving changes between forecast iterations. It is based on the quantities derived in the previous sections on "Impact of Assumptions" and "Projection Update" concepts and decomposes the

change in forecasts into the impact of assumptions, statistical carry-over, impact of history, and implied judgement. The (change in the) baseline forecast therefore can be decomposed as follows:

$$\Delta Forecast = IoA_t + SC_t + IH_t + IJ_t \tag{2}$$

where:

- IoA_t represents the impact of assumptions, calculated as the difference between updated and previous forecasts incorporating new external information for key economic indicators (e.g., interest rates, external demand, fiscal plans).
- SC_t denotes the statistical carry-over effect, capturing the purely statistical impact of data revisions and it is independent of the model. It's calculated to show the growth contribution from the previous year's level, assuming no change in the current year's quarterly growth rates:

  $$SC_t = \frac{Q_{t-1:4}}{\overline{Q}_{t-1}} - 1 \tag{3}$$

  Here, $Q_{t-1:4}$ represents the level of the variable of interest (e.g., GDP) in the fourth quarter of the previous year, and $\overline{Q}_{t-1}$ is the average level over the entire previous year. This calculation quantifies the extent to which the growth rate for the current year is influenced by the level attained at the end of the previous year, assuming no quarterly growth within the current year.
- IH_t stands for the impact of history. This component reflects the adjustments made to account for revised historical data and short-term forecasts, as identified in the "Projection Update" process. It is calculated by taking the final projection update and subtracting both the impact of assumptions and the statistical carry-over effect:

  $$IH_t = PU_t - IoA_t \tag{4}$$

  where PU_t denotes the final projection update. This calculation captures the changes due to historical data revisions and the updated short-term forecasts. It contains both statistical carry-over, but also endogenous model propagation from the lagged

dynamics.

- IJ_t captures the implied judgement, reflecting forecasters' subjective adjustments that go beyond the mechanical application of the model and the latest data.

  These components collectively explain the transition from the previous forecast to the updated baseline, highlighting the roles of new information, methodological updates, and forecaster judgement. The "Projection Update" protocol, involving steps from inverting the previous forecast to adjusting for new assumptions and history, underpins this decomposition by providing the mechanisms through which each component influences the overall forecast.

Figure 8: Forecast decomposition

Note: This figure depicts the factors driving the revision of projections for real GDP growth and HICP inflation, in percentage points.
Source: ECB/Eurosystem projections database and own calculations.

3.5 ECB-MC Properties - Basic Model Elasticities

This subsection presents the elasticities derived from the ECB-MC model as employed in the Eurosystem/ECB staff macroeconomic projections. These elasticities quantify how key model variables—such as GDP and its components, HICP and other price indices, and labour market indicators—respond to standardized changes in the underlying forecast assumptions. They are derived in accordance with the Basic Model Elasticities (BME) framework, which ensures consistency across the range of models used by the ECB and

national central banks (NCBs) in the projection process.[11]

The Eurosystem's forecasting framework is inherently complex, relying on the parallel use of multiple models—developed both centrally at the ECB and independently by NCBs—underpinned by a common set of forecast assumptions. To ensure alignment of these assumptions and comparability of model responses, the BME framework establishes a standardized set of procedures and conditions for incorporating key assumptions into all core projection models. The BME framework captures model responses to unit or standardized changes in conditioning assumptions such as short- and long-term interest rates, exchange rates, oil prices, global demand, and government spending. These elasticities are particularly informative, as they reveal how the model used for constructing the baseline forecast reacts to changes in assumptions—an intrinsic feature of every forecasting round. Accordingly, this section provides a transparent view of the structural sensitivities embedded in the projection process.

A key feature of the BME framework is its "partialization" approach, whereby policy variables—namely the monetary policy rule, exchange rate dynamics, and fiscal policy rule—are held constant in response to shocks. This ensures that the estimated responses reflect only the direct effects of the exogenous shocks, without contamination from feedback effects via policy responses. Moreover, the same exogenous shocks are applied uniformly across models, regardless of structural differences, to enable consistent cross-model comparisons. BMEs are therefore close in spirit to standard Impulse Response Functions (IRFs), with two fundamental differences: First, a sequence of shocks is assumed in the BMEs, as opposed to a one-time shock in an IRF; second, parts of the model are "switched off" when computing the BMEs, so that, e.g., one does not see how the model economy responds to a world demand shock (everything else being endogenously responding to it); instead one sees how the model economy responds to a world demand shock assuming that the exchange rate does not change, the central bank does not move the policy rate, the fiscal authority do not react, and so on.[12]

[11] For an extended description of the BMEs see European Central Bank (2016), section 3.4.

[12] Standard IRFs for this model will be included in a forthcoming companion paper which explores the behaviour of the full model, including its linked blocks, where monetary policy and exchange rates are endogenous. Only in that extended setting IRFs can be meaningfully interpreted, while in a forecasting mode (such as the one presented here) they would not make much sense.

Following this methodology, we present the ECB-MC model's responses to five standardized shocks: a monetary policy shock, a term premium shock, an exchange rate shock, a foreign demand shock, and a government consumption shock.

Each shock is assumed to persist for four years. This duration is appropriate for the semi-structural and often backward-looking nature of many Eurosystem models, where a four-year shock effectively mimics a permanent shift within the standard three-year forecast horizon. In more forward-looking models, such as DSGEs, the four-year persistence helps avoid artificial "news shocks" at the end of the horizon, maintaining model coherence. The elasticities presented in this section therefore offer a policy-invariant and internally consistent view of the ECB-MC model's dynamics that is operational when producing the baseline projections.

3.5.1 Monetary policy shock

A 'monetary policy shock' is designed as a 100-basis-point increase in the short-term policy rate sustained over a four-year horizon. The simulation deactivates the Taylor rule but allows other financial instruments to respond endogenously. Figure 9 illustrates the typical negative responses of key macroeconomic indicators to the monetary policy shock.

Real variables demonstrate stronger reactions compared to the relatively muted responses of nominal variables. With the short-term rate held constant for four years, the effects accumulate gradually, peaking at the end of the horizon without an immediate rebound. Among real variables, investment experiences the most pronounced effects, reflecting the significant sensitivity of capital expenditures to interest rate changes. Private consumption also declines albeit to a lesser extent. On the external side, the slowdown in domestic economic activity reduces imports, dampening demand for foreign goods. Meanwhile, the nominal effective exchange rate remains constant in this exercise, which positively influences extra-euro area exports. Overall, the policy shock results in a cumulative GDP loss in a range of 0.6 - 0.8% after four years. On the nominal side, key price deflators react more sluggishly with an overall reduction in HICP inflation amounting to about 0.3%.

The transmission of monetary policy shocks in the ECB-MC model occurs through

two primary channels: expectations and financial intermediation. As explained in section 2.2, expectations are modelled using a small-scale Vector Autoregression (VAR) system that includes the short-term interest rate, inflation, output gap, and a target variable for which expectations are formulated. These expectations influence key components of the model, including consumption, investment, wages, and income. A rise in the short-term rate negatively impacts the expected output gap, which subsequently reduces the present value of expected household income, exerting downward pressure on consumption and investment.

The financial intermediation channel amplifies these effects through changes in lending and deposit rates. These rates are modelled as weighted averages of short- and long-term interest rates, incorporating rate-specific risk spreads, as detailed in Section A.3. The short-run consumption equation directly links the consumer lending rate to the interest sensitivity of durable goods consumption. A composite measure of financing costs, which reflects changes in borrowing conditions, affects the user cost of capital and thereby influences business investment. Additionally, changes in the cost of equity, mortgage rates, and deposit rates alter total household wealth and property income, which are important determinants of consumption. These mechanisms ensure that monetary policy shocks propagate through the economy, influencing both real and nominal variables over the specified horizon.

3.5.2 Term premium shock

Figure 10 shows the model's responses to a 100-basis-point rise in the term premium, which immediately influences long-term interest rates. Primarily, the change in these rates affects financing costs and wealth, with business investment being particularly sensitive to such shifts. Both business and residential investments are heavily reliant on the user cost of capital, where financing conditions are crucial. For households, long-term interest rates impact consumption both directly through consumer lending rates and indirectly via wealth and property income effects. Specifically, wealth effects arise from the influence of long-term interest rates on bond prices, enhancing financial wealth, and on house prices, boosting household wealth. Additionally, property income is affected by the net interest income of households. However, the propensity to consume from property income and wealth is relatively minor when compared to the significant role of labour income in the consumption

equation. This keeps the overall effect of rising long-term interest rates on consumption subdued in contrast to their impact on real investment. Furthermore, the impact of a term premium increase is generally less pronounced than that of a monetary policy shock, as it does not directly affect expectation formation, which is governed by the short-term rate.

3.5.3 Exchange rate shock

Figure 11 illustrates the model's responses to a four-year, 10% appreciation of the euro nominal effective exchange rate. The transmission of this shock occurs primarily through its effects on trade deflators, which influence export and import volumes. The appreciation makes euro area exports more expensive on international markets, reducing export volumes, while also lowering the price of imports, which dampens inflationary pressures.

Private consumption and investment also respond negatively to the shock. The decline in private consumption is largely driven by a reduction in real wages, as the slowdown in economic activity constrains labour market dynamics. Investment reactions depend on the speed of exchange rate pass-through to domestic inflation. Firms' investment decisions are influenced by relative capital returns, which are determined by the ratio of investment goods prices to the GDP deflator. The appreciation weakens this ratio, discouraging investment, particularly in sectors sensitive to external demand.

As monetary policy remains unresponsive in this scenario, the initial loss of competitiveness is exacerbated by further reductions in investment and a sustained slowdown in private consumption. The lack of monetary accommodation prevents any offsetting effects that could stabilize domestic demand, aligning with the literature's findings that an appreciation shock without policy adjustment tends to amplify the contractionary impact on GDP and inflation.

3.5.4 World demand shock

This subsection analyzes the model's response to a four-year, 1% increase in foreign demand. Figure 12 shows that the ECB-MC model responds to this shock in a relatively straightforward way. The rise in global demand leads to an immediate and almost complete

transmission into higher exports. This export surge drives aggregate demand and widens the output gap, raising expectations for labour and transfer income, which, in turn, boosts private consumption. Aggregate investment also increases due to the output accelerator effect. Import levels are affected by the import content of both domestic demand and exports. Despite these shifts, the impact on domestic and export prices is moderate, enabling exports to remain permanently elevated in response to the sustained rise in world demand.

3.5.5 Government spending shock

This subsection examines the effects of a four-year increase in real government spending as modelled by the ECB-MC, with government consumption treated as exogenous. During this period, no fiscal rule is active to stabilize the debt ratio, and agents do not expect higher taxes to offset the debt-financed spending surge. Figure 13 shows that increased government spending has an immediate and significant positive effect on GDP. As government consumption is a direct component of GDP, it immediately boosts aggregate demand. Moreover, in the absence of expected tax increases and with largely backward-looking agents, there are minimal crowding-out effects. The initial rise in domestic demand puts upward pressure on wages and increases employment, which in turn supports higher private consumption in subsequent years. Inflation rises steadily, and with nominal interest rates held constant, real interest rates decline, further encouraging investment. This contributes to a positive feedback loop that amplifies demand, fueling a price spiral and deteriorating terms of trade.

On the nominal side, price dynamics peak around the fourth year, reflecting the interplay of rising domestic demand and international trade adjustments while keeping the short-term rates unchanged. This pattern aligns with the literature, which highlights that while government consumption shocks can deliver short-term boosts to output, their effects are moderated over time by inflationary pressures, monetary policy adjustments, and external trade dynamics.

4 Conclusion

The paper has introduced the ECB Multi-Country Model (ECB-MC), a key tool in the European Central Bank's efforts to analyze and forecast the complex dynamics of the Eurozone economy. As one of the primary models used in the ECB's Broad Macroeconomic Projection Exercises, the ECB-MC plays a vital role in shaping monetary policy decisions and promoting economic stability within the Eurosystem.

Drawing from the foundational work of models like the ECB BASE model, the ECB-MC represents a significant advancement in capturing the complexities of the largest five euro area economies. By incorporating detailed expenditure and sectoral structure that replicates national accounts, international trade relationships, and monetary policy transmission mechanisms, the ECB-MC provides policymakers with a comprehensive framework for forecasting and analyzing the potential impact of various economic shocks and policy interventions.

Moreover, the ECB-MC integrates seamlessly into the Eurosystem forecasting process, which prioritizes robust modeling techniques to deliver accurate and reliable economic projections. The model's infrastructure not only facilitates the smooth incorporation of expert judgement but also provides a rigorous framework through its model-based indicators. These indicators enable forecasters to quantify and monitor the extent of judgement applied.

In summary, the ECB Multi-Country Model demonstrates the ECB's commitment to transparently improving macroeconomic modeling in support of its price stability mandate. As the Eurozone faces ongoing economic challenges, the ECB-MC remains a key tool for policymakers, helping them make informed decisions to strengthen and sustain the Eurozone economy.

APPENDIX

A The model's structure

This section describes the main blocks and equations of the ECB-MC model. It aims at giving a comprehensive overview of the model. However, as the theoretical underpinnings are the same as described in Angelini et al. (2019), below we recall the main features only.

We use capital letters to denote the variables in levels, while small letters refer to logarithmic transformation. The estimated coefficients corresponding the the key equations presented in this section are reported in Technical Appendix.

A.1 The demand block

A.1.1 Household consumption

We distinguish two types of households: one type are the liquidity constrained households that follow a rule-of-thumb behaviour, and the other type are optimizing households that maximise their expected lifetime utility subject to resource constraint.
The consumption (c) of liquidity constrained households moves in line with their labour and transfer income (yh^L and yh_T, respectively):

$$\Delta c_t = \Delta(yh_t^L + yh_t^T) \tag{5}$$

Empirical implementation of the consumption behaviour of optimising households is, in turn, based on the PAC approach whereby we define the consumption target and we assume that agents face some adjustment costs that delay reaching the target.
The (log) consumption target (c^*) is then expressed as the sum of the different permanent income and wealth components with different propensities to consume:

$$c_t^* = \eta_0 + \eta_T eyh_t^T + \eta_P eyh_t^P + \eta_L eyh_t^L + \eta_D hw_t^D \tag{6}$$

where, eyh^L, eyh^T, eyh^P denote expected permanent labour, transfer and property incomes, respectively, and hw^D is financial and housing wealth of households. Note that, by construction , $\eta_T + \eta_P + \eta_D + \eta_L = 1$.

The short-run consumption dynamics of the unconstrained households is assumed to follow the error correction equation (PAC approach), which, combined with the spending of rule-of-thumb consumers, allows to derive the following dynamic behaviour of the aggregate consumption:

$$\Delta c_t = (1-\theta)\left(a_0\left(c^*_{t-1} - c_{t-1}\right) + \sum_{i=1}^{m-1} a_i \Delta c_{t-i} + \beta_1 x_t + \mathbb{E}_{t-1}\sum_{j=0}^{\infty} d_j \Delta c^*_{t+j}\right) + \theta\Delta(yh^L_t + yh^T_t) + \epsilon^C_t \tag{7}$$

where θ is the share of rule-of-thumb consumers, a_0 is the coefficient on the deviation of consumption from its target and a_i gives the weights on the backward looking terms. The term $\mathbb{E}_{t-1}\sum_{j=0}^{\infty} d_j \Delta c^*_{t+j}$ represents the expectations of future targets.
Finally, same as in the case of ECB-BASE model, also the country version dynamic equations have been arbitrarily augmented with an additional explanatory variable, x_t, which denotes the spread between the lending rate on consumption and the risk-free rate to account for direct effects of financial factors on durable consumption.

A.1.2 Investment

Business investment: We derive the business investment starting from the premise of two types of agents (firms): cash-flow constrained and optimizing agents that maximize profits subject to capital accumulation constraint.
The output of a firm is given by the Cobb-Douglas production function with constant returns to scale and two production inputs, capital K_t and labour N_t:

$$Y_t = F(N_t, K_t) = N_t^{\alpha} K_t^{1-\alpha} \tag{8}$$

The costs of the production inputs are relative price of investment good, RP_t, and wages, W_t.[13] The depreciation rate of capital is given by δ.

In this set-up, the solution of the firm's optimization problem yields a formula for the user cost of capital, UC, which can be expressed in terms of investment costs (determined by the depreciation rate, financing cost for business investments (R^{ib}_{t+1}) and net capital gains given by the relative price growth:

$$(1-\alpha)\frac{Y_{t+1}}{K_{t+1}} = RP_t\left\{R^{ib}_{t+1} + \delta - (1-\delta)\left(\frac{RP_{t+1}-RP_t}{RP_t}\right)\right\} \equiv UC_{t+1} \tag{9}$$

We then further derive the target capital stock as:

$$K^*_t = \frac{S^K_t Y_t}{UC_t} \tag{10}$$

where S^K_t denotes the capital to output share. Now, taking into account also the law of motion for capital, we can then derive the target for business investment:

$$IB^*_t = \left(G^{K^*}_{t+1} + \delta\right) K^*_t \tag{11}$$

where $G^{K^\star}_{t+1}$ is the growth rate of the (target) capital stock, which is approximated by the real GDP growth.

The short-run dynamics of aggregate investment are then given by the following equation:

$$\Delta ib_t = \left(1-\theta^{ib}\right)\left(a^{ib}_0\left(ib^*_{t-1} - ib_{t-1}\right) + \sum_{k=1}^{m-1} a^{ib}_k \Delta ib_{t-k} + \mathbb{E}_{t-1}\sum_{j=0}^{\infty} d^{ib}_j \Delta ib^*_{t+j}\right) + \theta^{ib}\Delta y_{t-1} + \epsilon^{ib}_t \tag{12}$$

where ib_t is the log of business investment, a^{ib}_0 is the mean reversion parameter associated with previous period deviations from the target investment, a^{ib}_k is an autoregressive coefficient associated with k quarters lagged business investment, and d_j reflects the effect of today's adjustment of investment decisions due to expected changes in the investment target by $\mathbb{E}_{t-1}\Delta ib_{t+j}$. Finally θ^{ib} represents the share of cash-flow constrained agents.

[13] To ease the description and without loss of generality we have dropped the technology progress term from the production function.

Residential investment The residential investment is modelled from the firm's side. We first derive the user cost of housing capital (UC^H)

$$(1-\alpha)\frac{Y^H_{t+1}}{KH_{t+1}} = RP^H_t \left\{ R^{NFC}_{t+1} + \delta^H - (1-\delta^H)\left(\frac{RP^H_{t+1} - RP^H_t}{RP^H_t}\right)\right\} \equiv UC^H_{t+1} \qquad (13)$$

where Y^H represents output in the residential sector, KH is the housing capital stock, RP^H are relative prices (house prices over the residential investment deflator), δ^H is a depreciation rate of housing capital and R^{NFC}_{t+1} is the lending rate for non-financial corporations.
We then assume that the target for residential investment can be expressed as a function of output, relative prices and pure user costs of housing capital (user costs excluding relative house prices):

$$IH^\star_t = Y_t (UC^H_{-RP^H_t})^{\beta^{ih}_1} (RP^H_t)^{\beta^{ih}_2} \qquad (14)$$

where a clear distinction between relative house prices and user costs of housing capital is made to allow the examination of different elasticities of investment to the two respective components.
The short-run equation for residential investment is derived using the PAC approach and additionally including the de-trended real GDP growth rate as an accelerator effect:

$$\Delta ih_t = a^{ih}_0 \left(ih^*_{t-1} - ih_{t-1}\right) + \sum_{i=1}^{2} a^{ih}_i \Delta ih_{t-i} + \mathbb{E}_{t-1} \sum_{j=0}^{\infty} d^{ih}_j \Delta ih^*_{t+j} + \theta^{ih} \left(\Delta y_t - \Delta \bar{y}_t\right) + e^{ih}_t \qquad (15)$$

Here a^{ih}_0 is a mean reversion parameter for residential investment, a^{ih}_i are autoregressive coefficients, θ^{ih} measures the accelerator effect, and the coefficients d_j are loadings on expected future target dynamics.

A.1.3 Government

The government block within the ECB-MC is an advanced component derived from the fiscal framework used in the ECB-BASE model. This block provides a comprehensive representation of government revenues and expenditures and their interactions with the domestic economy. On the revenue side, the model incorporates implicit tax rates aligned with data from government finance statistics, covering taxes on income and wealth, as

well as taxes on production and imports. On the expenditure side, it includes government consumption, investment, and social transfers. Government revenues are modelled using implicit rates, calculated as the ratio of revenue categories reported in the government finance statistics to the corresponding macroeconomic base (e.g., the macro base for taxes on production and imports includes final private consumption and government purchases). Expenditures are modelled as a proportion of potential output. The fiscal block encompasses variables related to nominal, real, and implicit deflators. Detailed modelling specifications for each variable are discussed in the ECB-BASE paper and will be further elaborated in the forthcoming paper.

For forecasting purposes at the ECB, the fiscal block is treated as exogenous, with its key inputs provided by the Fiscal Policy Division. As this paper focuses on the application of the ECB-MC for forecasting, further details of the fiscal model are omitted here. It is important to note that while the fiscal block influences macroeconomic outcomes, it does not exhibit feedback effects within the current forecasting framework.

A.1.4 Foreign trade

The ECB-MC trade block follows the traditional framework of Goldstein & Khan (1985). However, given the multi-country setup of the model, a special attention is paid to modelling separately intra- and extra-euro area flows. The modelling of extra-euro area trade volumes and prices is essential from the perspective of analysing the impact of the external shock that materialize outside the euro area. In turn, the intra-euro area variables enable the consistency of the euro-area dynamics as the demand for exports in one euro area country is automatically reflected in imports of other euro area countries, taking into account the respective trade shares. In the context of the ECB's Macroeconomic Projection Exercises when the "single-country version" of the model is employed, this trade consistency is ensured "ex-post" via a procedure described in Hubrich & Karlsson (2010).

Trade volumes For each country we model explicitly total imports and exports as well as their extra-euro area components. All trade volumes are modelled in real terms.

Starting with the total imports (MTR), we assume that in the long-run they are determined by the import demand and the differential between import and domestic prices:

$$mtr_t^{\star} = \alpha_0^{mtr^{\star}} + wer_t + \alpha_1^{mtr^{\star}}(meed_t - yed_t) + \alpha_2^{mtr^{\star}} trend_t \tag{16}$$

where $mtr^{\star}$ is the target (long-run) total import, α_0^{mtr} includes deterministic terms, $meed$ is the non-energy total import deflator, yed is the GDP deflator, and wer is the import demand proxied by the weighted average of import content of domestic final demand components, and can be considered as an indicator of import absorption.

The short-run dynamics of total import is governed by the speed of the mean reversion to the long-run optimal level, change in import demand and change in nominal non-energy import prices:

$$\Delta mtr_t = \alpha_0^{mtr} + y_t^{\star} + trend_t + \alpha_1^{mtr}(mtr_{t-1} - mtr_{t-1}^{\star}) + \alpha_2^{mtr}(\Delta wtr_t - y_t^{\star}) + \alpha_3^{mtr}\Delta meed_t \tag{17}$$

where $y^{\star}$ is an HP-filtered potential output of country, in logs.

The behavioural equations for the extra-euro area imports, MXR, mimics the specification for the total import with the only exception being the use of nominal exchange rates ($EENX$) instead of the non-energy import deflator.

$$\Delta mxr_t = y^{\star} + trend + \alpha_1^{mtr}(mxr_{t-1} - mxr_{t-1}^{\star}) + \alpha_2^{mtr}(\Delta wtr - y^{\star}) + \alpha_3^{mtr}\Delta eenx_{t-1} \tag{18}$$

On the exports side, total exports, XTR, are modelled with the long-run behaviour determined by the euro area world demand and relative export prices:

$$xtr_t^{\star} = \alpha_0^{xtr^{\star}} + wdr_t + \alpha_1^{xtr^{\star}}(xtd_t - cxd_t) + \alpha_2^{xtr^{\star}} trend_t \tag{19}$$

where $xtr_t^{\star}$ is the target (long-run) total exports, wdr is world demand (including intra-euro area demand), xtd is the export deflator, and cxd are the competitors' export prices. Similarly as in the case of imports, the long-run elasticity of export to world demand is assumed to be one.

The short-run dynamics of total exports is then governed by the dynamic error correction

term approach:

$$\Delta xtr_t = \alpha_0^{xtr} + y_t^\star + trend_t + \alpha_1^{xtr}(xtr_{t-1} - xtr_{t-1}^\star) + \alpha_2^{xtr}\Delta(wdr_t - y_t^\star) + \alpha_3^{xtr}\Delta(xtd_t - cxd_t) \tag{20}$$

The behavioural equations for the extra-euro area export, XXR, mimics the specification for the total exports with the only exception being the use of world demand which is computed based on non-euro area trading partners only and the change in nominal effective exchange rates, $EENX$, expressed as EUR against a bundle of foreign currencies.

$$\Delta xxr_t = y_t^\star + trend + \alpha_1^{xxr}(xxr_{t-1} - xxr_{t-1}^\star) + \alpha_2^{xxr}\Delta(wdr_t - y_t^\star) + \alpha_3^{xxr}\Delta eenx \tag{21}$$

The remaining trade volumes: intra-euro area imports, MNR, and intra-euro area exports, XNR are derived by accounting identities, i.e. $MNR = MTR - MXR$ and $XNR = XTR - XXR$, respectively.

Trade deflators Likewise trade volumes, we model trade deflators from a top-down approach, i.e. we explicitly model total import and export deflators and the extra-euro area deflators. The intra-euro area prices are then re-computed to match the model consistency. On the import side, the core deflator is the non-energy total import deflator ($MEED$). The prices for energy/oil and imported commodities, (MED) are taken from external models and are used as conditioning assumptions. Those prices are normally expressed in US dollars and therefore need to be converted into Euro in the model.
The equation for (log) target $MEED$:

$$meed_t^\star = \alpha_0^{meed^\star} + \alpha_1^{meed^\star} cmd_t + (1 - \alpha_2^{meed^\star}) yed_t + \alpha_3^{meed^\star} trend_t \tag{22}$$

where *cmd* is competitors' import prices and *yed* is GDP deflator, both expressed in logs.
Short-run dynamics of MEED:

$$\Delta meed_t = \pi_t^e + \alpha_0^{meed} + \alpha_1^{meed}(meed_{t-1} - meed_{t-1}^{star}) + \alpha_2^{meed}\Delta(cmd_t - {}_t^e) + \alpha_3^{meed}\Delta(yed_t - \pi_t^e) + \alpha_4^{meed} trend_t \tag{23}$$

where π^e is the long-term domestic inflation expectations.

Short-run dynamics of total import deflator (MTD) are then modelled as a weighted average of:

$$mtd_t = (1 - phi^{med}) * meed_t + phi^{meed} * (med_t - exr_t) \tag{24}$$

where exr is the nominal euro-US dollar exchange rate, in logs.

Derivation of target extra-euro area deflator is based on the indicator of the competitors' import prices ($CMDEX$), energy prices (MED), nominal euro-US dollar exchange rate (EXR) and GDP deflator (YED):

$$\Delta mxd_t^\star = cmdex_t + \alpha_0^{mxd^\star} + \alpha_1^{mxd^\star}(med_t - exr_t - cmdex_t) + \alpha_2^{mxd^\star}(yed_t - cmdex_t) + \alpha_3^{mxd^\star} trend_t \tag{25}$$

Short-run dynamics of extra-euro area import deflator (MXD) then follow:

$$\Delta mxd_t = \alpha_1^{mxd}(mtd_{t-1} - mtd_{t-1}^\star) + \alpha_2^{mxd}(\Delta(med_t - exr_t) - \Delta yed_t)) + \alpha_3^{mxd}(\Delta cmdex_t - \Delta yed_t) + \Delta yed_t + trend_t \tag{26}$$

Total target export deflator is modelled as a function competitors' export prices, domestic and import costs of export production, and energy prices expressed in euro.

$$xtd_t^\star = cxd_t + \alpha_0^{xtd^\star} + \alpha_1^{xtd^\star}(yed_t - cxd_t) + \alpha_2^{xtd^\star}(med_t - exr_t - cxd_t) + \alpha_3^{xtd^\star} trend_t \tag{27}$$

Short-run dynamics:

$$\Delta xtd_t = \alpha_0^{xtd} + \alpha_1^{xtd}(xtd_{t-1} - xtd_{t-1}^\star) + \alpha_2^{xtd}(\Delta cxd_t - \Delta yed_t) + \alpha_3^{xtd}(\Delta(med_t - exr_t) - \Delta yed_t) + \Delta yed_t + trend_t \tag{28}$$

Finally, the target for extra-euro area exports deflator is modelled as:

$$xxd_t^{star} = cxdex_t + \alpha_0^{xxd^{star}} + \alpha_1^{xxd^{star}}(yed_t - cxdex_t) + \alpha_2^{xxd^{star}} trend_t \tag{29}$$

while its short-run dynamics follow:

$$xxd_t = \alpha_1^{xxd}(xxd_{t-1} - xxd_{t-1}^{star}) + \alpha_2^{xxd}\Delta(cxdex_t - yed_t) + \Delta yed_t + trend_t \tag{30}$$

Having derived total and extra-euro area real volumens and prices, the remaining variable are obtained from identities.

Exchange Rate and Price/Interest Parity In the context of the Eurosystem Macroeconomic Projection Exercises, the exchange rates as well as a set of euro area and foreign interest rate is given as an assumptions. The paths for those variables are not determined by ECB-MC model.[14]

A.2 The supply block

The supply side of the model is centred around a standard Cobb-Douglas production function.

$$Y_t(i) = F^i\left(N_t(i), K_t(i)\right) = A_t\left(K_t\right)^{\alpha}\left(\zeta^t N_t\right)^{(1-\alpha)}$$

where K_t denotes aggregate capital stock and N_t denotes aggregate employment. A_t is total factor productivity and ζ_t is labour augmenting technology.
Firms choose optimal capital (K_t) and labour input (N_t) to minimize total input costs $R_{K,t}K_t + w_t N_t$ subject to a technology constraint given by the production function.

A.2.1 Production function

Based on the production function we can calculate the potential output, taking as input aggregated capital stock and trend employment. To derive the latter we replace aggregate employment by aggregate hours worked:

$$H_t = \frac{H_t}{N_t} * \underbrace{\frac{N_t + U_t}{WAP_t}}_{part.rate} * WAP_t * \underbrace{\frac{N_t}{LF_t}}_{empl.rate} \tag{31}$$

where N_t denotes employment headcount, WAP_t denotes working age population and LF_t is the labour force. Denoting the total hours per employee/employment headcount $\frac{H_t}{N_t}$ as HPE_t, the participation rate as $LFPR$ and the employment rate as $(1 - U_t)$ where U_t is

[14] In the linked version of the model we use the same UIP condition as defined in Angelini et al. (2019)

the unemployment rate, we can rewrite the production function as:

$$Y_t = A_t K_t^{\alpha} (HPE_t * LFPR_t * WAP_t * (1 - U_t))^{1-\alpha} \tag{32}$$

Taking logs and denoting variables in logs with small case letter, we obtain the formula for potential output:

$$y_t^* = a_t^* + \alpha * k_t + (1 - \alpha)(hpe_t^* + lfpr_t^* + wap_t^* + \log(1 - u_t^*)) \tag{33}$$

where '$*$' indicates the trend value of the corresponding variable.

A.2.2 Labour market

The Labour market block of the ECB-MC is centred around an equation for total employees. Furthermore the block features an equation for hours worked, a measure for unemployment and a separate modelling of self-employed and the labour force participation rate.

Employees We assume that firms reach the optimal employment target (N_t^*) only gradually, therefore we use a PAC approach to derive an equation for employees:

$$\Delta n_t = a_0^n \left(n_{t-1}^* - n_{t-1}\right) + a_1^n \Delta n_{t-1} + \mathbb{E}_{t-1} \sum_{j=0}^{\infty} d_j \Delta n_{t+j}^* + e^n \tag{34}$$

and the target variable is determined by:

$$n_t^* = mc + log(1 - \alpha) + y_t - w_t$$

where mc is the log of Lagrange multiplier on the technology constraint.

Self-employed The dynamics of employees and self-employed are not always well aligned, making a separate modelling of self-employed (n_t^{SE}) necessary, but ensuring that the ratio of self-employed to employee stays constant in steady state. Self-employed are related to

the growth in the target of employees and to an error correction term:

$$\Delta n_t^{SE} = \Delta n_{t-1}^{*} - \beta_{EC}(n_{t-1}^{SE} - n_{t-1}^{SE,*})$$

The target for self-employed is given by a constant fraction of the employees target.

Labour force participation rate The change in the labour force participation rate (lfp_t) is modelled as a function of an error correction term and the change in the unemployment rate:

$$\Delta lfp_t - \Delta lfp_t^T = -0.5(lfp_{t-1} - lfp_{t-1}^T) - \beta_u \Delta u_t$$

Unemployment rate Finally, we compute the unemployment rate as

$$U_t = 100\left(1 - \frac{Employment}{Labour\ force}\right) \tag{35}$$

where the labour force is calculated as the working age population multiplied by the labour market participation rate.

A.2.3 Prices and wages

Similar as in the ECB-BASE model, we use a small semi-structural general equilibrium model to determine jointly the output gap, inflation, wages and unemployment. The model is centred around a **Wa**ge-**Pr**ice and **O**utput gap specification hence thereafter referred to as WAPRO. Derivation and estimation technique for euro area WAPRO is described in Angelini et al. (2019). The only difference between WAPRO modelling applied to the counties (ECB-MC) vs the euro area (ECB-BASE) is the country coverage. In case of ECB-BASE the model is used to analyse intra- vs extra-euro area dynamics while in ECB-MC we model an euro area country vs the rest of the world. The model is estimated with Bayesian techniques.

Price inflation

The key inflation indicator in the ECB-MC is GDP deflator which is modelled via a reduced form of the New Keynesian Phillips Curve, as in Galì et al. (2012) combined with a variant of Cogley & Sbordone (2008). The equation shows that actual inflation depends both on a measure of expected inflation and on past inflation. Marginal costs are approximated via a combination of the output gap and the wage gap.

$$\pi_t = \frac{1}{1+\beta_\pi \delta_\pi} \quad \Big\{(1-\delta_\pi+\delta_\pi\beta_\pi-\beta_\pi)\,\bar{\pi}_t + \beta_\pi(\mathbb{E}_t\pi_{t+1}) + \delta_\pi\pi_{t-1} + \beta_{\hat{y}}^{\pi}\left(\hat{w}_t + \left(\tfrac{\alpha}{1-\alpha}\right)\hat{y}_t\right)\Big\} + e_t^{\pi} \tag{36}$$

where α is the capital share in the model.
Note that inflation is modelled with reference to an inflation attractor $\bar{\pi}$. To accommodate medium term deviation of inflation from the inflation target, we model the time-varying inflation attractors as follows:

$$\bar{\pi}_t = (1-\beta_{\bar{\pi}})\pi_{ss}^{EA} + \beta_{\bar{\pi}}\bar{\pi}_{t-1} + \delta_{\bar{\pi}}(\pi_{t-1}-\bar{\pi}_{t-1}) + e_{\bar{\pi},t} \tag{37}$$

HICP and demand deflators The modelling of HICP (and sub-aggregates) and the demand deflators essentially relies on two inputs, the GDP deflator and the import price deflator. The GDP deflator determined in equation (36) is the central domestic price deflator in the model. As described above it is closely linked to the output gap, unemployment and wages. The import price deflator is reflecting international factors such as foreign inflation, the exchange rate and oil prices. We follow a bottom-up approach wherein the total HICP is modelled as a weighted sum of the components.

The general long-run expression for HICP-based measures of prices takes the following form:

$$p^{\star} = (1-\omega)p^{y} + \omega p^{m} \tag{38}$$

where $p^{\star}$ represents a long-run level of a particular price measure, p^{y} is the GDP deflator, p^{m} is log of import deflator, and ω is the import content in the final use of respective sector

in the economy determined by 'Input/Output' tables.

In terms of model equations, this specificaltion translates into the following formulas for:

- long-run core inflation (HEF):

$$hef_t^\star = \alpha_0^{hef^\star} + (1-\omega^{hef})yed_t + \omega^{hef} meed_t + trend_t \tag{39}$$

- long-run energy inflation (HEG):

$$heg_t^\star = \alpha_0^{heg^\star} + (1-\omega^{heg})yed_t + \omega^{heg}(med_t - exr_t) + trend_t \tag{40}$$

- long-run food inflation (HIF):

$$hif_t^\star = yed_t + \alpha_0^{hif^\star} + \alpha_1^{hif^\star} trend_t \tag{41}$$

where yed denotes the GDP deflator, $meed$ are the import prices excluding energy costs, med are the exported energy prices, and exr are the euro-dollar exchange rates, all expressed in logs.

The short-run price dynamics follow the error correction model with the mean reversion constructed around the long-run price level and short run coefficient constrained in line with an imposed dynamic homogeneity. In practice implying the following equations:

- short-run core inflation:

$$\begin{aligned}\Delta hef_t = \pi_t^e/400 + \alpha_0^{hef} + \alpha_1^{hef}(hef_{t-1} - hef_{t-1}^\star) + \alpha_2^{hef}(\Delta yed_t - \pi_t^e/400) \\ + \alpha_3^{hef}(\Delta meed_t - \pi_t^e/400) + \alpha_4^{hef}(\Delta hef_{t-1} - \pi_{t-1}^e/400) + \alpha_5^{hef}(\Delta hef_{t-2} - \pi_{t-2}^e/400) \\ + \alpha_6^{hef}\Delta\tau_t^{hef} + \alpha_7^{hef}\Delta\tau_{t-1}^{hef}\end{aligned} \tag{42}$$

- short-run energy inflation:

$$\Delta heg = \alpha_0^{heg} + \pi_t^e/400 + \alpha_1^{heg}(heg_{t-1} - heg_{t-1}^{\star}) + \alpha_2^{heg}(\Delta(med_t - exr_t) - \pi_t^e/400) + \alpha_3^{heg}(\Delta(med_{t-1} - exr_{t-1}) - \pi_{t-1}^e/400) + \alpha_4^{heg}(\Delta heg_{t-1} - \pi_{t-1}^e/400) + \alpha_5^{heg}\Delta\tau_t^{heg} + \alpha_6^{heg}\Delta\tau_{t-1}^{heg} \quad (43)$$

- short-run food inflation:

$$\Delta hif_t = \pi_t^e/400 + \alpha_0^{hif} + \alpha_1^{hif}(hif_{t-1} - hif_{t-1}^{\star}) + \alpha_2^{hif}(\Delta yed - \pi_t^e/400) + \alpha_3^{hif}(\Delta yed_{t-1} - \pi_{t-1}^e/400) + \alpha_4^{hif}(\Delta hif_{t-1} - \pi_{t-1}^e/400) + \alpha_5^{hif}\tau_t^{hif} + \alpha_6^{hif}\tau_{t-1}^{hif} \quad (44)$$

where pi_{t-1}^e are the long-term inflation expectations and τ^{hef}, τ^{hef}, τ^{hif} are the indirect tax rates applied on consumption, energy, and food, respectively.

We then use total HICP measure as an anchoring indicator for modelling the private consumption deflator, which in the long-run is modelled as:

$$cod_t^{\star} = \alpha_0^{cod^{\star}} + \alpha_1^{cod^{\star}} trend_t + hicp_t \quad (45)$$

while its short-term dynamics follow the equation:

$$\Delta cod = \alpha_0^{cod} + \alpha_1^{cod}\Delta hicp_t + \alpha_2^{cod}(cod_{t-1} - cod_{t-1}^{\star}) + \alpha_3^{cod}\Delta yed_t + (1 - \alpha_1^{cod} - \alpha_2^{cod} - \alpha_3^{cod})\Delta med \quad (46)$$

Wage Inflation

The wage inflation gap is modelled via a reduced form of the New Keynesian Phillips Curve. The equation relates actual wage inflation gap to future wage inflation, past, present and future domestic price inflation, present and future euro area price inflation, the deviation of the labour share of income from its trend, the deviation of trend output growth from its

steady state and the deviation of the unemployment rate from its trend. In formula:

$$\pi_t^w + \pi_t^C = \frac{1}{1+\beta_w \delta_w} \Big\{ (1-\beta_\pi^w)\,(1-\delta_\pi^w)(\bar{\pi}_t + \Delta\bar{y}_t) + \beta_\pi^w \mathbb{E}_t(\pi_{t+1}^w + \pi_{t+1}^C) + \gamma_\pi^w(\pi_{t-1}^w + \pi_{t-1}^C) - \beta_{\hat{u}}^{\pi^w}\hat{u}_t \Big\} + \xi_w \hat{w}_t + e_t^{\pi^w} \tag{47}$$

Here we follow the approach by Galì et al. (2012) and relate the unemployment gap to the gap in the marginal rate of substitution and a variant of Cogley & Sbordone (2008).

A.3 The financial block

In the context of the individual country models, we take reference short-term rate as given and model the country-specific long-term market rates. The long-term rates are determined as the sum of the average of expected short-term rates, term premium, and country-specific risk premium. Expectations about the future short-term rates are derived from the Base VAR setting. In such setting, the VARs share a core set of macro variables: the policy rate, the GDP deflator, and the output gap. The system of the core VAR variables is augmented by the specific variable for which expectations are being formed.[15] The term premium is modelled separately as a function of expected macroeconomic conditions on euro area level and external market developments. The country risk premium depends on the expected macroeconomic conditions and a country's fiscal position. Finally, the short-term rate and the long-term market rate, alongside the risk premiums associated with particular debt and equity instruments, provide the basis for the construction of lending rates and financing cost measures used in other parts of the ECB-MC model.[16]

A.3.1 Lending rates

We model six particular lending rates/financing cost measures:

- the consumer loan rate, one of the determinants of consumption,

[15] For details on the Base VAR specification see Appendix A.2 page 62 Angelini et al. (2019).
[16] See figure 2 in section 2.1.

- the mortgage rate, a determinant of house prices and property income,
- the deposit rate, a determinant of property income,
- the lending rate for Non financial Corporations,
- the corporate bond yields,
- the cost of equity

We construct the lending rates/financing cost measures as a composite of the short-term reference rate and the long-term market interest rate, plus a residual risk spread corresponding to each financing instrument $i, i = 1:6$:

$$LR_t^i = v_s^i R_t(1) + v_l^i R_t(40) + RPR_t^i \tag{48}$$

where v_s^i and v_l^i are weights assigned to the short-term rate (3-month) and the long-term rate (10-year) and RPR denotes a country-specific risk spread associated with each particular financing instrument. The latter are modelled in the following way:

$$RPR_t^i = \alpha^{RPR^i} + \rho^{RPR^i} RPR_{t-1}^i + \beta^{RPR^i} \frac{1}{m} \mathbb{E}_t \sum_{i=0}^{m} \hat{y}_{t+i} + e_t^{RPR^i} \tag{49}$$

where $\hat{y}_{t+i}$ correspond to expected output gap for a given country and $e_t^{RPR^i}$ captures the idiosyncratic shocks.
Most of the corresponding data is directly observable within the MFI interest rate statistics (MIR) dataset published regularly by the ECB. The unobservable cost of equity is inferred from the Hasia-Fuller Dividends Discount Model.

A.3.2 Interest-bearing income and wealth

The interest-bearing income and wealth components play an important role in the ECB-MC as they are one of the key transmission channels of financial shocks in the model. Property income and wealth enter into the determination of target consumption. In addition, property income and several other interest-bearing instruments contribute to households' nominal disposable income. This explicit modelling of determinants of wealth in the ECB-MC results

in a rich set of transmission channels from changes in prices of different asset classes on consumption and therefore on the whole economy.

Households wealth

The households' wealth is defined as a sum of gross housing wealth GHW_t and the net financial wealth NFW_t. The stock of nominal housing depends on the house prices and nominal residential investment IH_t, the latter being driven by mortgage-related lending rates. In turn, the net financial wealth (NFW) is a function of the nominal net disposable income and a revaluation term, which depends on the households' financial portfolio. Empirically, we can write:

Households' wealth:

$$HHW_t = GHW_t + NFW_t \tag{50}$$

where GHW_t is the gross housing wealth and NFW_t is the net financial wealth, where both series are observed within the sector accounts statistics.[17]

The stock of nominal housing wealth :

$$GHW_t = IH_t + (1 - \delta^h)GHW_{t-1}(RPPI_t/RPPI_{t-1}) \tag{51}$$

where IH_t are nominal residential investments, where RPP_t is a house prices index (new and existing dwellings), and δ^h is the depreciation rate associated with the housing stock.

Household net financial wealth:

$$NFW_t = (Y_t - C_t - IH_t) + NFW_{t-1}REV_t \tag{52}$$

where Y_t is the Nominal Disposable Income, C_t is the Nominal (total) Consumption, IH_t is the Nominal Residential Investment (gross fixed capital formation, dwellings) and REV_t is the Revaluation Term[18].

[17] Other parts of the household wealth consist of inventories, other investments, non produced assets, capital transfers and adjustments for pensions. These components are assumed to be exogenous and are not modelled explicitly.

[18] For more details on the revaluation term, please see Angelini et al. (2019)

Property income

The property income ($DINP$) is the most interest-sensitive component of the nominal disposable income. In the ECB-MC it is expressed by the following identity:[19]

$$DINP_t = GOS_t + IRN_t + DDN_t + RIN_t + OIN_t + RTN_t + OCT_t - WTP_t - SCP_t \quad (53)$$

where we explicitly model household gross operating surplus (GOS_t), the net interest income (IRN_t), and the dividend income (DDR_t)[20], reinvested earnings (RIN_t), other investment income (OIN_t), non-residential property rents (RTN_t), and other capital transfers (OCT_t). Taxes (WTP_t) and social contributions (SCP_t) associated with the property income are modelled in the fiscal block. As implied above, all modelled variables, whose specification is provided in following subsections, are directly observable within the sector accounts statistics.

Gross operating surplus of households

The gross operating surplus of households is modelled as a share of nominal GDP (Y^N) and is assumed to be primarily determined by income from the residential housing capital:

$$\frac{GOS_t}{Y_t^N} = \alpha^{GS} + \beta_1^{GS}\frac{KH_t * IHD_t}{Y_t^N} + \beta_2^{GS}\frac{HPI_t}{P_t^c} + e_t^{GS} \quad (54)$$

where the first term represent the nominal housing stock, whereas the second term reflects house prices relative to the private consumption deflator. Real housing capital, KH, is specified in the Residential Investment block in Section A.1.2, while the residential investment deflator (IHD), the private consumption deflator (P^c) and the residential property price index ($RPPI$) are directly observed variables.

[19] All variables are expressed in net terms (credit - debit) and relate to the household sector.

[20] Household gross operating surplus is not including mixed income, which we assume to be a part of the labour income.

Net interest income

The net interest income of households is modelled as a share of GDP and depends on its own autoregressive term, previous period's net foreign assets (NFA) position relative to GDP, the general level of interest rates captured by STN, and a spread between mortgage rate (R^m) and deposit rate (R^d) that captures the net concept given by interest payable and receivable:

$$\begin{aligned}\frac{IRN_t}{Y^N_{t-1}} =& \alpha^{IRN} + \rho^{IRN}\frac{IRN_{HH,t-1}}{Y^N_{t-2}} + \beta_1^{IRN}\frac{NFA_{t-1}}{Y^N_{t-1}} \\ &+ \beta_2^{IRN} STN_t + \beta_3^{IRN}(R^m_t - R^d_t) + e^{IRN}\end{aligned} \tag{55}$$

In the estimation, the NFA series is observed in the sector accounts statistics, while mortgage and deposit rates are constructed as suggested by equation (48).

Dividends

The dividends are modelled within the PAC framework, implying a dependency of the real dividends growth on: (i) the degree to which dividends were out of equilibrium in the previous period, (ii) lagged dividend growth, and (iii) expected growth of desired dividend income. The desired (log-) level of dividend income is assumed to be a constant fraction of the (real) gross operating surplus and mixed income:

$$ddr^*_t = \alpha^D + gosmir_t + t \tag{56}$$

where we also include a linear trend to improve the empirical fit. The corresponding short-run PAC equation is then:

$$\Delta ddr_t = a^d_0(ddr^*_{t-1} - ddr_{t-1}) + \sum_{i=1}^{3} a^d_i \Delta ddr_{t-i} + \mathbb{E}_t \sum d^d_i \Delta ddr^*_{t+i} + e^{ddr}_t \tag{57}$$

House prices

The target of house prices is derived from an inverted demand curve resulting from the optimization problem of the consumer who chooses between different consumption subcomponents. The resulting equilibrium condition is the following:

$$RP_t^{H,*} = C_t^* \frac{1}{KH_t} \frac{1}{UC_t^{HP}} \chi \tag{58}$$

where RP are relative prices (House Prices over Consumption Deflator), C^* is the target consumption and UC^{HP} is user cost of housing ownership.[21] The condition in (58) is the basis for the following empirical specification:

$$rp_t^{H*} = \alpha^{H*} + \beta_1^{H*} yh_t - \beta_1^{H*} kh_t + \beta_3^{H*} uc_t^{HP} \tag{59}$$

where the user costs are defined as:

$$uc_t^{HP} = \alpha^{UC_hp} + \delta_t^H + r_t^{mt} - \pi_t^e + \tau_t - 0.4\Delta^e rp_t^H \tag{60}$$

with r_t^{mt} being the mortgage rate, π^e the inflation expectations, τ the taxes on housing and $\Delta^e rp^H$ the expectations on relative price growth.

The short-run equation for relative prices is the usual PAC equation:

$$\Delta rp_t^H = a_0^{rph}\left(rp_{t-1}^{H^*} - rp_{t-1}^H\right) + \sum_{i=1}^{1} a_i^{rph} \Delta rp_{t-i}^H + \mathbb{E}_{t-1} \sum_{j=0}^{\infty} d_j^{rph} \Delta rp_{t+j}^{H^*} + e_t^{rph} \tag{61}$$

Net foreign assets

Accumulation of the net foreign assets (NFA) is assumed to depend on the trade balance and a residual component capturing the net interest income and a revaluation term:

$$NFA_t - NFA_{t-1} = TB_t + REST_t \tag{62}$$

[21] Note that the user costs of housing ownership differ from the user costs of housing capital defined in the residential investment section.

The residual term, $REST$, is modelled relative to nominal GDP and is assumed to be driven by changes in the spread between interest rates on foreign liabilities (IR^{FL}) and interest rates on foreign assets (IR^{FA}), and by changes in domestic and world prices (P^y and P^W):

$$\frac{REST_t}{Y^N_{t-1}} = \alpha^{nfa} + \beta^{nfa}_1 \Delta(IR^{FL} - IR^{FA}) + \beta^{nfa}_2 \Delta(P^y_t) + \beta^{nfa}_3 \Delta(P^W_t) + e^{nfa}_t \tag{63}$$

The empirical interest rates used in (63) are observed implicitly as a ratio between property income of foreign assets/liabilities and total foreign assets/liabilities:

$$IR^{FA}_t = \frac{IPN^{FA}_t}{FA_t} \cdot 400; R^{FL}_t = \frac{IPN^{FL}_t}{FL_t} \cdot 400.$$

For modelling purposes the interest rate on foreign assets is expressed in terms of a foreign long-term rate ($R^{US_{10Y}}_t$), whereas foreign liabilities are determined by the domestic long-term rate ($R^{CC_{10Y}}_t$):

$$IR^{FA}_t = c^{FA}_t + \beta^{ifa} R^{US_{10Y}}_t + e^{ifa}_t \tag{64}$$

$$IR^{FL}_t = c^{FL}_t + \beta^{ifl} R^{CC_{10Y}}_t + e^{ifl}_t \tag{65}$$

All interest rate variables are demeaned and c is set to follow an autoregressive process, implying the interest rate parity in the long run.[22]

B VAR expectations

The ECB-MC model assumes that economic agents form expectations using a reduced-form structure based on VARs. In particular, expectations are formed using country-specific VARs that incorporate a common monetary policy channel through a shared "Base VAR" block. This setup allows agents to use limited information and preserves the modularity of the model.

[22] Namely: $c^{FA}_t = 0.99 c^{FA}_{t-1}; c^{FL}_t = 0.99 c^{FL}_{t-1}$

B.1 General VAR Structure:

Each expectation-relevant equation features a target variable (e.g. target consumption) and the Base VAR, which includes inflation, interest rate, and output gap. The Base VAR has two components, country specific one and the euro area wide. Euro area wide part is common across countries and is extended to reflect the euro area's common monetary policy by incorporating EA-wide aggregates.

The full VAR system includes both country-specific and EA-level variables. The structure of the system is represented below by a block-inclusion matrix (1 = variable included, 0 = not included):

$$\textbf{Final VAR} = \begin{bmatrix} \text{Target variable} \\ \text{EA Inflation} \\ \text{EA Output Gap} \\ \text{Interest Rate} \\ \text{Domestic Inflation} \\ \text{Domestic Output Gap} \\ \text{EA Inflation Target} \\ \text{Inflation Target} \\ \text{Interest Rate Target} \\ \text{Target's long-term Growth Rate} \end{bmatrix} \Longleftrightarrow \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

We assume that euro area aggregates (EA inflation and EA output gap) do not respond to country-specific variables. The interest rate is a function of EA aggregates only, reflecting the euro area's common monetary policy. Country-specific inflation and output gap affect interest rates only indirectly through their contribution to EA aggregates.

B.2 VAR form

The exact setup of the Base VAR is:

$$\Delta z_t = \Lambda_0(z_{t-1} - z^{\star}_{t-1}) + \sum_{k=1}^{K} \Lambda_k \Delta z_{t-k} + \varepsilon_t \tag{66}$$

where z_t is a $n \times 1$ vector of variables normally containing target variable, inflation, interest rate, and output gap as explained above. Λ_0 is $n \times n$ matrix containing coefficients that control how variables respond to the deviation of the lagged level from the long-term targets. Λ_k are $n \times n$ matrices that collect auto-regressive coefficients for K lags. The Base VAR does not contain any constant terms. Assuming the VAR is stable, one can show that in the long-term, VAR-based forecasts will converge to the long-term expectations $z_{t+h} \xrightarrow{h \to \infty} z^{\star}_{t-1+h}$.

To close the model, we assume that the long-term targets follow a random walk process, $z^{\star}_t = z^{\star}_{t-1} + \eta_t$, while the long-term target for the output gap is fixed at zero. Long-term expectations for inflation and interest rates are sourced from Consensus Forecasts and interest rate swaps, respectively. Target variables are constrained to grow at their assumed long term steady state growth rate (e.g. target consumption with long-term potential output growth rate), which also follows a random walk.

B.3 Estimation Strategy

The estimation of the VAR systems in ECB-MC is conducted using a Bayesian Seemingly Unrelated Regressions (SUR) framework. This approach allows for efficient estimation of the system while incorporating informative priors to address limited time-series length, especially at the country level.

The estimation sample spans from 1996Q1 to 2018Q4. Priors for all coefficients—both in country-specific and euro area-wide equations—are calibrated based on the Base VAR estimates in the ECB-BASE model.

The compact form of the SUR model is:

$$y = X\beta + u,$$

where:

- y is a $nT \times 1$ vector stacking observations for all dependent variables
- X is a block diagonal matrix of regressors
- β is the vector of coefficients
- $u \sim N(0; S \otimes I_T)$ is the vector of residuals

Likelihood Function:

Assuming normal errors, the likelihood function is:

$$L(y|\beta, X) = \frac{1}{(2\pi)^{NT/2}|S|^{T/2}} \exp\left(-\frac{1}{2}\text{tr}(RS^{-1})\right),$$

where R is the cross-product matrix of residuals.

Prior Distributions:

Independent priors are assumed for the coefficients and the covariance matrix. Specifically:

- $\beta \sim N(\beta_0, A)$, where β_0 is calibrated from ECB-BASE estimates, and A is calibrated on equation by equation basis.
- the prior on S is non-informative.

Posterior Distributions:

It can be shown that under these assumptions the conditional posteriors have the form of Normal and inverse Wishart distributions for β and S, respectively:

$$\beta|S, y, X \sim N(b, \Sigma), \quad S|\beta, y, X \sim \text{IW}(R, T),$$

with:

$$b = \left(X^T(S^{-1} \otimes I_T)X + A^{-1}\right)^{-1}\left(X^T(S^{-1} \otimes I_T)y + A^{-1}\beta_0\right),$$

$$\Sigma = \left(X^T(S^{-1} \otimes I_T)X + A^{-1}\right)^{-1}.$$

Gibbs Sampling:

The estimation proceeds via Gibbs sampling by cycling between the two conditional posterior distributions. Starting from an initial condition for S, the algorithm is :

- Drawing β conditional on S
- Drawing S conditional on β

until convergence is achieved. We use 100.000 draws and discard initial 10% of the draws. This produces draws from the joint posterior distribution of the model parameters.

C Estimation results of selected blocks

Table 1: Consumption

Target										
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
η_0	Constant of target consumption	0.551	0.0634	0.661	0.0659	0.077	0.5383	0.606	0.0891	0.613	0.0806
η_T	Weight of permanent transfer income	0.286	0.0010	0.303	0.0010	0.206	0.0092	0.285	0.0010	0.286	0.0010
η_P	Weight of permanent property income	0.098	0.0010	0.117	0.0010	0.106	0.0096	0.097	0.0010	0.097	0.0010
η_D	Weight of fin. and housing wealth	0.080*		0.037*		0.183*		0.081*		0.081*	
η_L	Weight of permanent labour income	0.537	0.0010	0.543	0.0010	0.505	0.0098	0.537	0.0010	0.537	0.0010
γ^T	Coeff. of time trend	-0.001	0.0000	-0.000	0.0000	-0.001	0.0000	-0.002	0.0000	-0.002	0.0000
Dynamic PAC Equation											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
a_0	Coeff. of past deviation from target consumption	0.106	0.0855	0.275	0.1290	0.108	0.0728	0.028	0.0360	0.206	0.0869
a_1	Coeff. of lagged consumption growth	0.174	0.2169	0.065	0.1306	0.200*		0.667	0.0963	-0.022	0.1470
β_x	Weight of spread on the lending rate on consumption	-0.002*		-0.000	0.0023	-0.002*		-0.001	0.0043	-0.002*	
θ	Share of liquidity constrained households	0.100*		0.073	0.0768	0.237	0.0943	0.100*		0.013	0.0456
R^2		0.022		0.173		0.495		0.523		0.178	

Note: Note that the estimation of the dynamic part is done using non-linear least squares of the non-linear model in a non-standard way, where the true distribution of standard errors of this estimation is not available. Instead we report the standard errors according to the linear OLS at the last iteration taking the expectation term as given.
This table contains estimation results for the Big-5 countries with the following abbreviations: DE for Germany, FR for France, IT for Italy, ES for Spain, and NL for the Netherlands. Furthermore, Est. stands for estimate and SE for standard error of the estimation results.
Estimates with a * are either calibrated or follow by construction identities. Thus, other estimates are conditional on these calibrations.

Table 2: Business Investment

Dynamic PAC Equation											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
a_0^{ib}	Coeff. of past deviation from target investment	0.283	0.0870	0.118	0.0533	0.115	0.0337	0.138	0.0486	0.405	0.0992
a_1^{ib}	Coeff. of one-period lagged investment growth	-0.127	0.1905	0.674	0.2008	0.156	0.2405	0.573	0.3734	-0.393	0.1705
a_2^{ib}	Coeff. of two-period lagged investment growth	0.426	0.2337	0.345	0.1912	0.385	0.1453	-0.039	0.1449	0.012	0.1340
R^2		0.440		0.602		0.494		0.341		0.251	

Note: This table contains estimation results for the Big-5 countries with the following abbreviations: DE for Germany, FR for France, IT for Italy, ES for Spain, and NL for the Netherlands. Furthermore, Est. stands for estimate and SE for standard error of the estimation results.
Estimates with a * are either calibrated or follow by construction identities. Thus, other estimates are conditional on these calibrations.

Table 3: Residential Investment

Dynamic PAC Equation											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
a_0^{ih}	Coeff. of past deviation from target residential investment	0.057	0.0248	0.035	0.0149	0.211	0.0543	0.084	0.0462	0.006	0.0280
a_1^{ih}	Coeff. of one-period lagged investment growth	-0.014	0.1011	0.770	0.1051	-0.000	0.0809	0.315	0.1133	0.054	0.0995
a_2^{ih}	Coeff. of two-period lagged investment growth	-0.084	0.0897	0.086	0.1005	0.143	0.0857	0.275	0.1053	0.239	0.0800
a_3^{ih}	Coeff. of three-period lagged investment growth	0.175	0.1546	-0.195	0.0841	0.064	0.0928	0.157	0.1176	0.215	0.1084
R^2		0.089		0.742		0.325		0.416		0.144	

Note: This table contains estimation results for the Big-5 countries with the following abbreviations: DE for Germany, FR for France, IT for Italy, ES for Spain, and NL for the Netherlands. Furthermore, Est. stands for estimate and SE for standard error of the estimation results.
Estimates with a * are either calibrated or follow by construction identities. Thus, other estimates are conditional on these calibrations.

Table 4: Total Import Volumes

Target											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
$\alpha_0^{mtr\star}$	Constant of target import	-0.272	0.0061	-0.382	0.0069	-0.409	0.0050	-0.135	0.0048	0.264	0.0066
$\alpha_1^{mtr\star}$	Coeff. of relative import prices	-0.296	0.0246	-0.301	0.0240	-0.305	0.0243	-0.343	0.0215	-0.283	0.0227
$\alpha_2^{mtr\star}$	Coeff. of import trend	0.004	0.0000	0.003	0.0000	0.003	0.0000	0.001	0.0000	0.002	0.0000
Dynamic Error Correction Equation											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
α_0^{mtr}	Constant of import growth	-0.004	0.0079	-0.005	0.0079	-0.004	0.0079	-0.003	0.0079	-0.008	0.0079
α_1^{mtr}	EC Coeff. related to target deviations	-0.094	0.1982	-0.094	0.1976	-0.097	0.1944	-0.096	0.1945	-0.094	0.1971
α_2^{mtr}	Coeff. related to import demand changes	1.496	0.2049	1.496	0.2050	1.497	0.2048	1.497	0.2048	1.498	0.1988
α_3^{mtr}	Coeff. related to non-energy prices changes	0.002	0.1004	0.002	0.1004	0.001	0.1004	0.001	0.1003	0.002	0.1004
R^2		-0.767		-0.415		-0.263		-0.226		0.887	

Note: Note that the estimation of the dynamic part is done using non-linear least squares of the non-linear model in a non-standard way, where the true distribution of standard errors of this estimation is not available. Instead we report the standard errors according to the linear OLS at the last iteration taking the expectation term as given.
This table contains estimation results for the Big-5 countries with the following abbreviations: DE for Germany, FR for France, IT for Italy, ES for Spain, and NL for the Netherlands. Furthermore, Est. stands for estimate and SE for standard error of the estimation results.
Estimates with a * are either calibrated or follow by construction identities. Thus, other estimates are conditional on these calibrations.

Table 5: Total Export Volumes

Target											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
$\alpha_0^{xtr\star}$	Constant of target export	1.073	0.0048	0.638	0.0039	0.425	0.0052	-0.366	0.0075	0.161	0.0039
$\alpha_1^{xtr\star}$	Coeff. of relative export prices	-1.028	0.1604	-1.151	0.1656	-1.148	0.1520	-1.135	0.1575	-1.157	0.1697
$\alpha_2^{xtr\star}$	Coeff. of export trend	0.001	0.0000	-0.005	0.0000	-0.006	0.0000	0.001	0.0000	0.001	0.0000
Dynamic Error Correction Equation											
		DE		FR		IT		ES		NL	
Parameter	Description	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
α_0^{xtr}	Constant of export growth	-0.011	0.0013	-0.009	0.0013	-0.010	0.0013	-0.008	0.0013	-0.010	0.0013
α_1^{xtr}	EC Coeff. related to target deviations	-0.104	0.0988	-0.100	0.0917	-0.098	0.0894	-0.098	0.0932	-0.100	0.0987
α_2^{xtr}	Coeff. related to export demand changes	0.909	0.4364	0.886	0.4403	0.918	0.4373	0.898	0.4457	0.893	0.4409
α_3^{xtr}	Coeff. related to export prices changes	-0.164	0.1940	-0.159	0.1950	-0.164	0.1943	-0.160	0.1959	-0.165	0.1947
R^2		0.272		-0.492		0.073		-0.175		-0.004	

Note: Note that the estimation of the dynamic part is done using non-linear least squares of the non-linear model in a non-standard way, where the true distribution of standard errors of this estimation is not available. Instead we report the standard errors according to the linear OLS at the last iteration taking the expectation term as given.
This table contains estimation results for the Big-5 countries with the following abbreviations: DE for Germany, FR for France, IT for Italy, ES for Spain, and NL for the Netherlands. Furthermore, Est. stands for estimate and SE for standard error of the estimation results.
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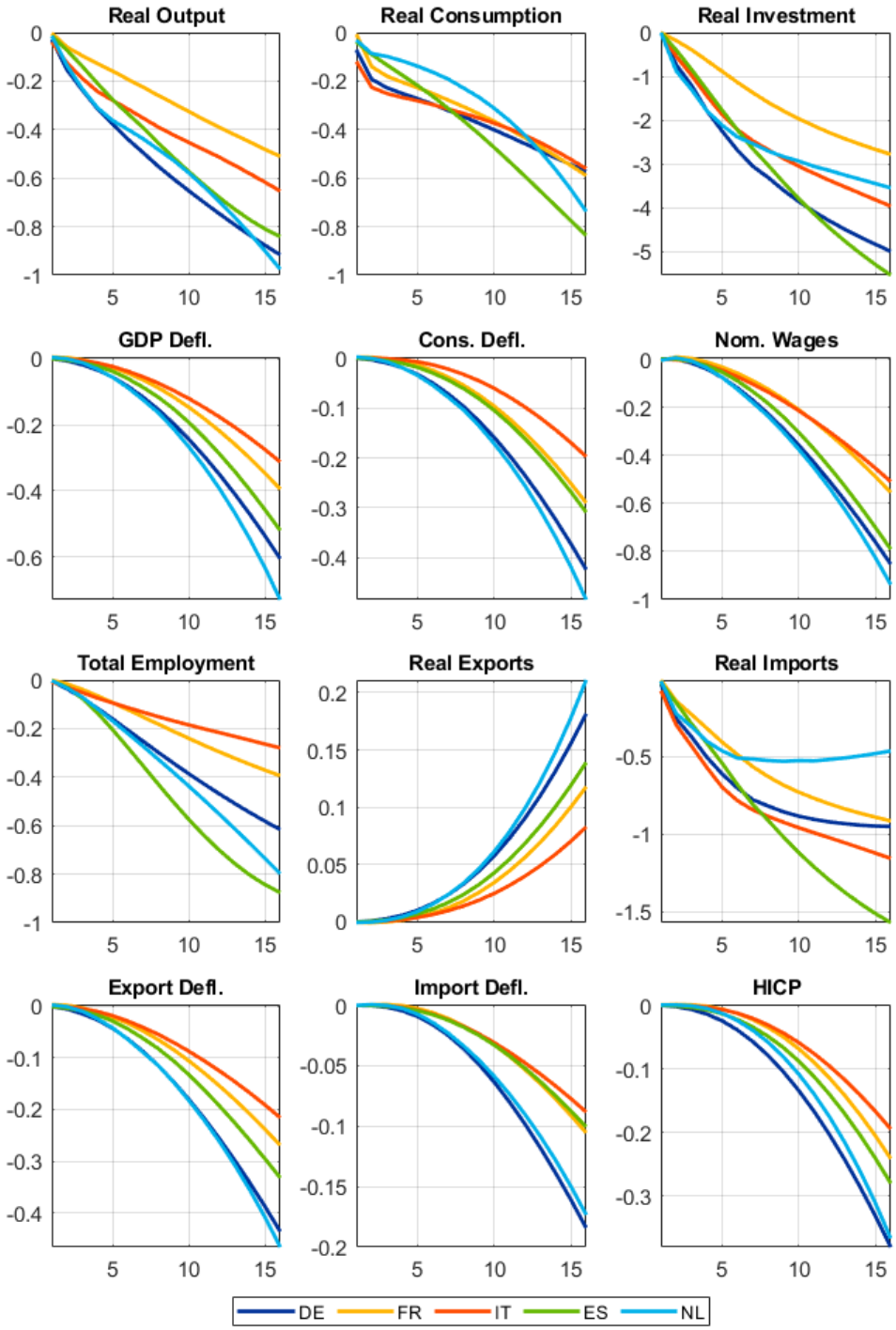
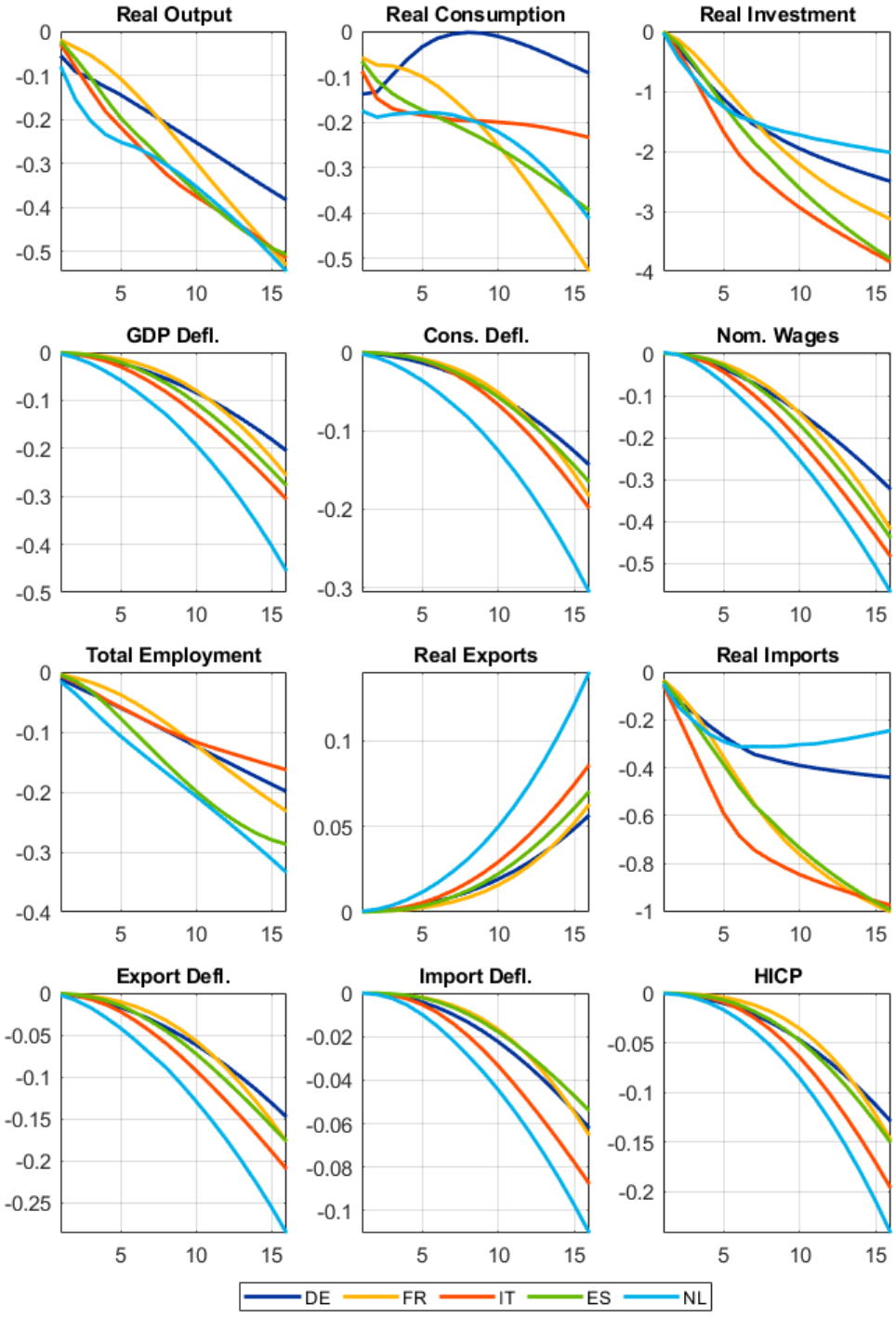
D Basic Model Elasticities

Figure 9: Response to a monetary policy shock



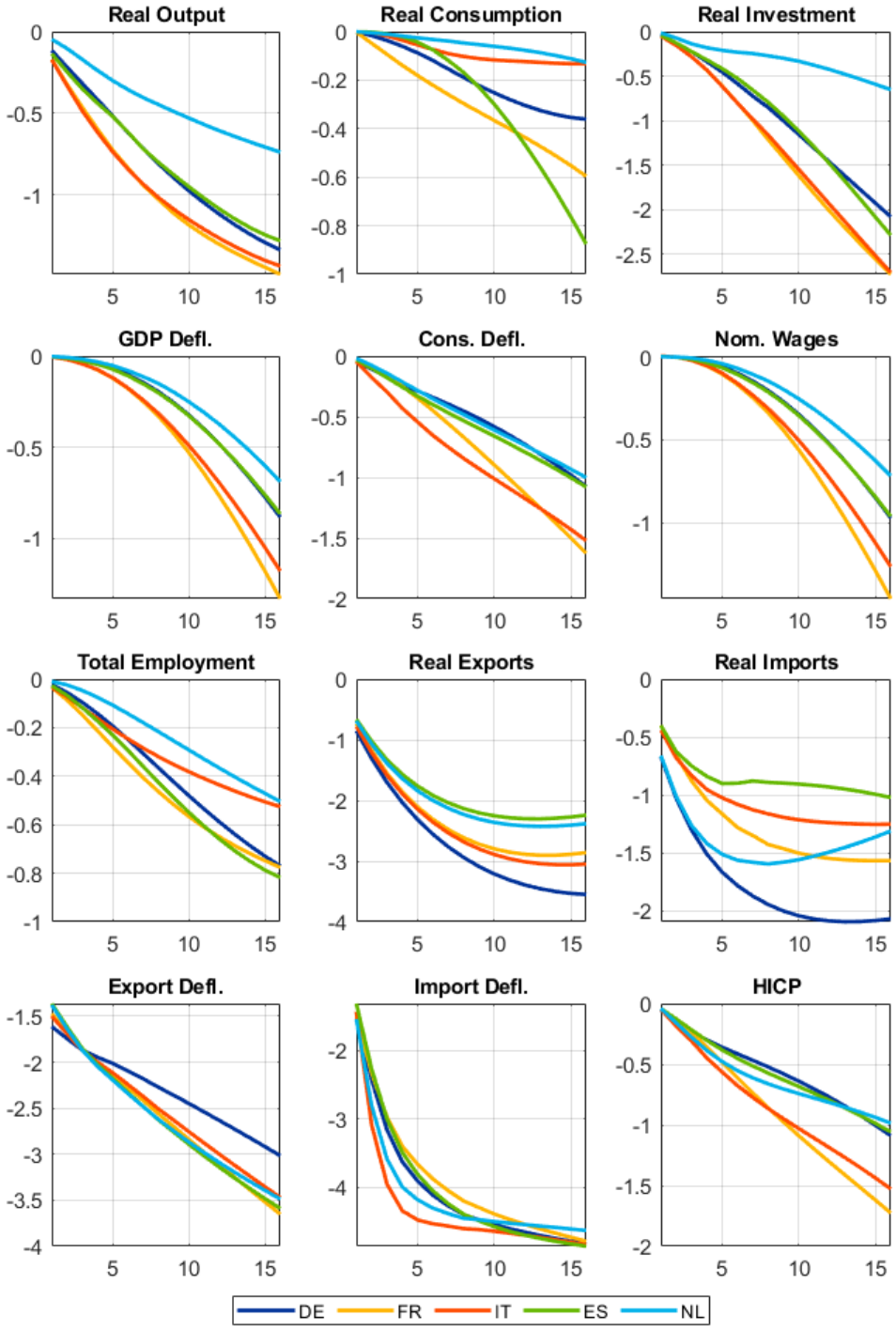
Note: The figure shows model responses to a four-year increase in the short-term nominal rate equal to 100 bp. All impulse responses are reported as percentage deviations from the steady state.

Figure 10: Response to a term premium shock



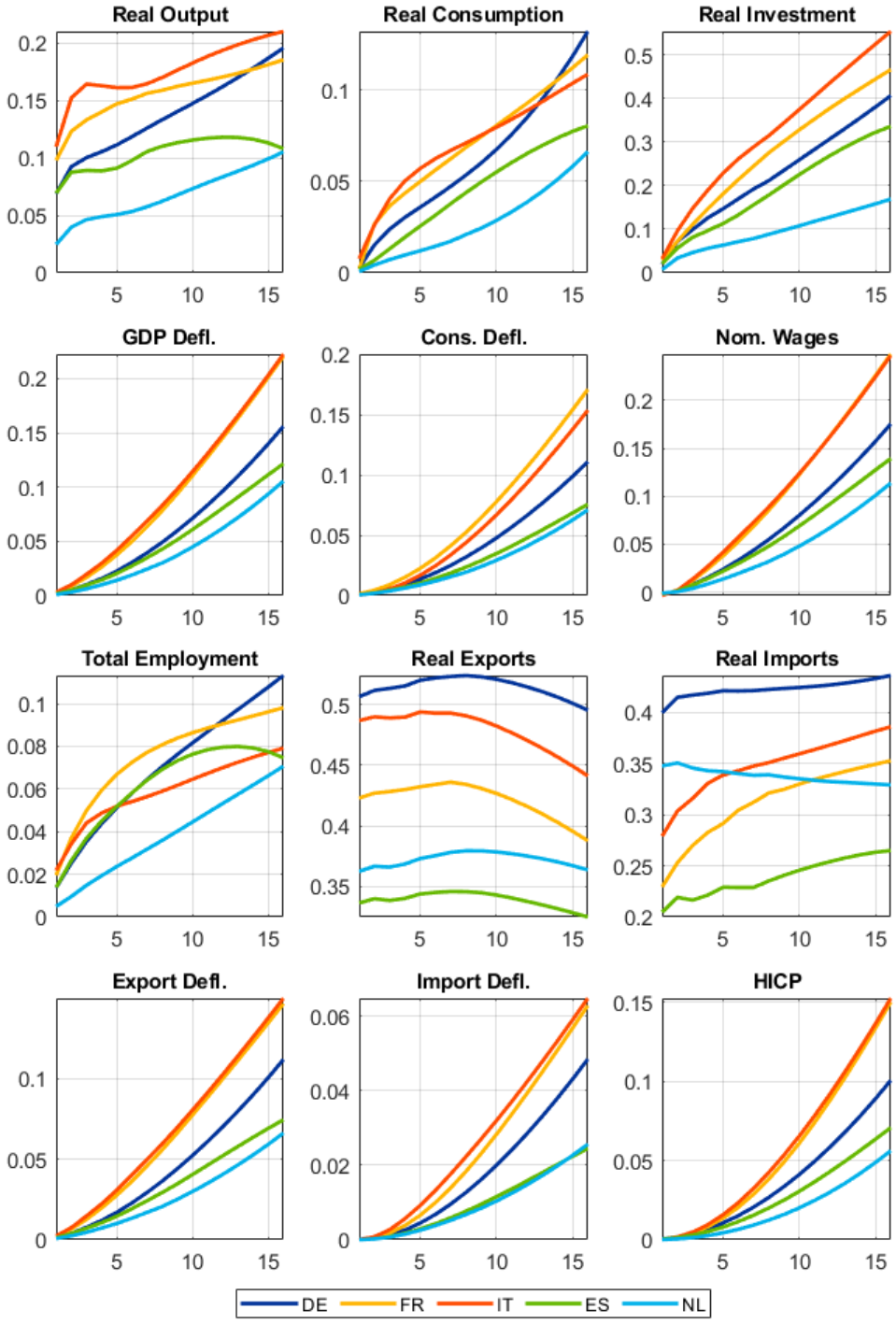
Note: The figure shows model responses to a four-year increase in 10-year term-premium equal to 100 bp. All impulse responses are reported as percentage deviations from the steady state.

Figure 11: Response to an exchange rate shock



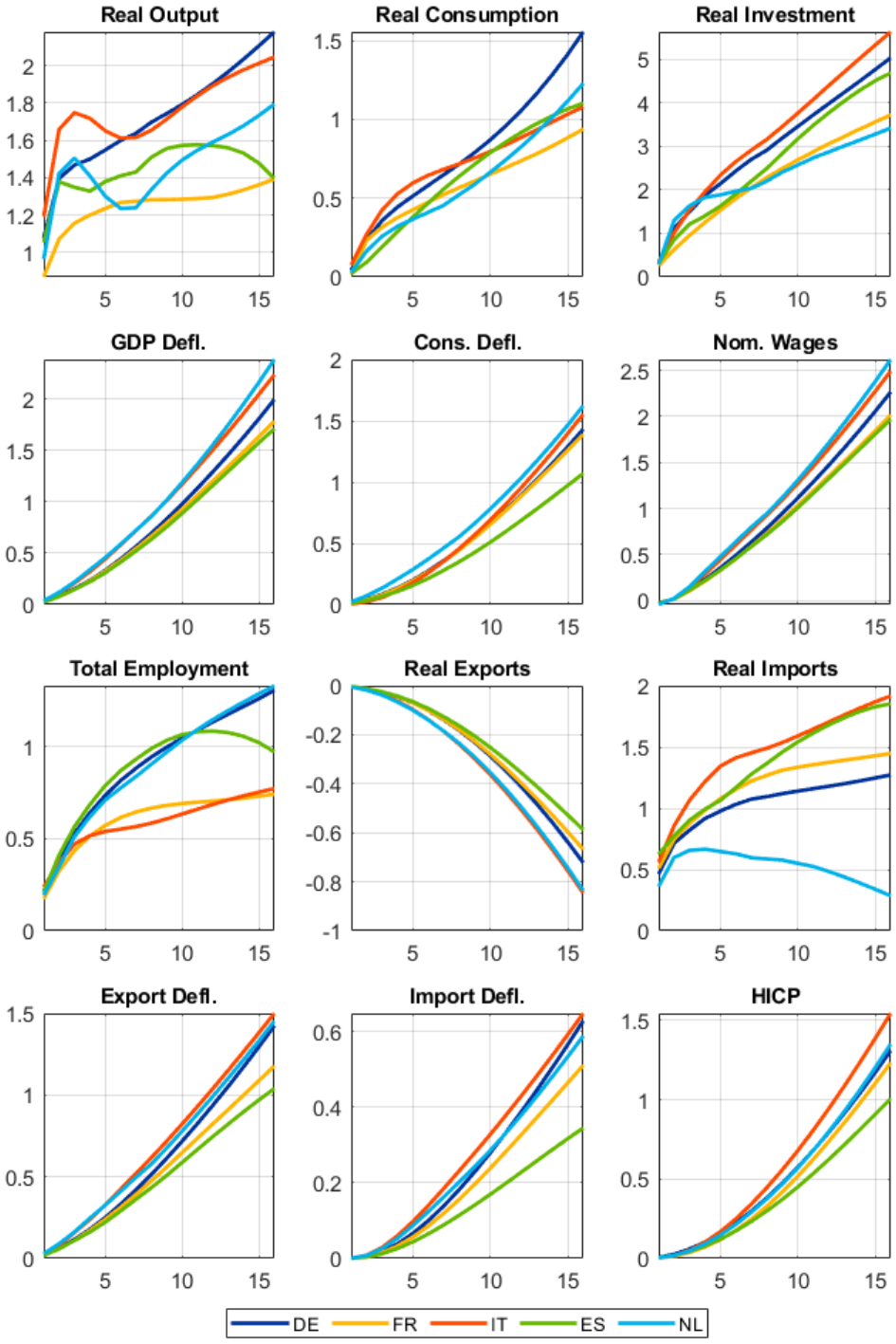
Note: The figure shows model responses to a 10% appreciation in the nominal effective exchange rate. All impulse responses are reported as percentage deviations from the steady state.

Figure 12: Response to a world demand shock



Note: The figure shows model responses to a four-year increase in world demand for euro area goods and services by 1%. All impulse responses are reported as percentage deviations from the steady state.

Figure 13: Response to a government consumption shock



Note: The figure shows model responses to a permanent increase in government consumption equal to 1% of GDP. All impulse responses are reported as percentage deviations from the steady state.

E List of Model Equations

As a way of example of the model structure and its richness, in the next pages we report the full list of equations of the German block (DE). The other country-blocks are structurally identical (possibly with minor country-specific characteristics reflected in some equations) and differ clearly in the parameter estimates.

Table of Contents

BUSINESS

DE_BUSINESS_PAC_PE = h1_pac_business_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_business_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_business_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_business_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_business_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_business_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_business_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_business_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_business_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_business_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_business_eq0_var_AUX_DIFF_279_lag_1*diff(log(DE_BU_OITR(-1)))
+h1_pac_business_eq0_var_DE_T_Q_YER_100_lag_1*DE_T_Q_YER_100(-1)
+h1_pac_business_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_business_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_business_eq0_var_U2_STN_lag_2*U2_STN(-2)
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+h1_pac_business_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
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+h1_pac_business_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_business_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_business_eq0_var_AUX_DIFF_279_lag_2*diff(log(DE_BU_OITR(-2)))
+h1_pac_business_eq0_var_DE_T_Q_YER_100_lag_2*DE_T_Q_YER_100(-2)

diff(log(DE_BU_ITR)) = gamma_business*(de_ecm_pac_business*(log(DE_BU_OITR(-1))-log(DE_BU_ITR(-1)))
+de_bu_itr_pac_de_bu_itr_L1*diff(log(DE_BU_ITR(-1)))
+de_bu_itr_pac_de_bu_itr_L2*diff(log(DE_BU_ITR(-2)))
+DE_BUSINESS_PAC_PE+pac_business_pac_growth_neutrality_correction*DE_BU_OITR_T(-1))
+(1-gamma_business)*de_business_aux*DE_BUSINESS_AUX+res_DE_BU_ITR

DE_BUSINESS_AUX = DE_T_BU_Y_Q_ITR_100+diff(log(DE_YER))

DE_BU_OITR_T = DE_T_Q_YER_100+DE_T_BU_Y_Q_ITR_100

DE_T_BU_Y_Q_ITR_100 = DE_T_BU_Y_Q_ITR_100(-1)
+res_DE_T_BU_Y_Q_ITR_100

DE_T_Q_YER_100 = DE_T_Q_YER_100(-1)
+res_DE_T_Q_YER_100

DE_T_BU_Y_Q_ITR = 0.95*DE_T_BU_Y_Q_ITR(-1)
+0.05*log(DE_BU_Y_ITR/DE_BU_Y_ITR(-1))
+res_DE_T_BU_Y_Q_ITR

DE_BU_OITR = DE_BU_Y_ITR*DE_YER*(DE_H_Q_YER/100+DE_BU_D_ITR/100)

DE_BU_Y_ITR = DE_BU_Y_MIBR/(DE_BU_U_ITR/400)

DE_BU_U_ITR = 400*DE_Y_ITD(-1)*(DE_BU_D_ITR/100+DE_BU_L_ITR/400-(1-DE_BU_D_ITR/100)*DE_HGPDR/400)/(1-DE_BU_S_DTN)

DE_Y_ITD = DE_ITD/DE_YED

DE_HGPDR = 0.975*DE_HGPDR(-1)
+2.5*(log(DE_Y_ITD)-log(DE_Y_ITD(-1)))
+res_DE_HGPDR

DE_BU_L_ITR = DE_BU_L_ITN-DE_EHIC

CLOSURE

DE_HH_CON = DE_HH_COR*DE_HH_COD

DE_BU_ITN = DE_BU_ITR*DE_BU_ITD

log(DE_YEN) = log(DE_YED)
+log(DE_YER)

diff(log(DE_YER)) = de_yer_de_hh_cor*log(DE_HH_COR/DE_HH_COR(-1))
+de_yer_de_go_cor*log(DE_GO_COR/DE_GO_COR(-1))
+de_yer_de_bu_itr*log(DE_BU_ITR/DE_BU_ITR(-1))
+de_yer_de_hh_ihr*log(DE_HH_IHR/DE_HH_IHR(-1))
+de_yer_de_go_itr*log(DE_GO_ITR/DE_GO_ITR(-1))
+de_yer_de_xtr*log(DE_XTR/DE_XTR(-1))
+de_yer_de_mtr*log(DE_MTR/DE_MTR(-1))
+de_yer_de_sivr_l1*log(DE_SIVR/DE_SIVR(-1))
+de_yer_de_sivr_l2*log(DE_SIVR(-1)/DE_SIVR(-2))
+res_DE_YER

DE_GOSMIN = DE_YEN-DE_CEN-DE_TIN+res_DE_GOSMIN

log(DE_TIN) = log(DE_TIN(-1))
+diff(log(DE_GO_TIN-DE_GO_SIN))
+res_DE_TIN

DE_G_YER = 100*(log(DE_YER)-log(DE_T_YER))
+res_DE_G_YER

DE_ITN = DE_BU_ITN+DE_HH_IHN+DE_GO_ITN

DE_ITR = DE_GO_ITR+DE_BU_ITR+DE_HH_IHR

log(DE_ITD) = log(DE_ITN)-log(DE_ITR)

log(DE_CEN) = log(DE_C_CEN)
+log(DE_LEN)

DE_IVN = DE_YEN-DE_HH_CON-DE_GO_CON-DE_ITN-DE_XTN+DE_MTN+res_DE_IVN

CONSUMPTION

DE_G_VYER_VE = var_expectation_model_DE_G_YER_CONS_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_YER_CONS_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_G_YER_CONS_U2_STN
1)
+var_expectation_model_DE_G_YER_CONS_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_YER_CONS_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_YER_CONS_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_YER_CONS_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_YER_CONS_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_YER_CONS_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_YER_CONS_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_YER_CONS_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_YER_CONS_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_G_YER_CONS_DE_G_HH_Y_DIR_1*DE_G_HH_Y_DIR(-1)
+var_expectation_model_DE_G_YER_CONS_DE_G_HH_S_DIRL_1*DE_G_HH_S_DIRL(-1)
+var_expectation_model_DE_G_YER_CONS_DE_G_HH_S_DIRT_1*DE_G_HH_S_DIRT(-1)
+var_expectation_model_DE_G_YER_CONS_DE_G_HH_S_DIRP_1*DE_G_HH_S_DIRP(-1)

DE_G_VYER = (1-de_beta_discount_cons)*DE_G_VYER_VE

DE_G_HH_Y_VDIR_VE = var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_G_H
1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_G_HH_Y_DIR_1*DE_G_HH_Y_DIR(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_G_HH_S_DIRL_1*DE_G_HH_S_DIRL(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_G_HH_S_DIRT_1*DE_G_HH_S_DIRT(-1)
+var_expectation_model_DE_G_HH_Y_DIR_CONS_DE_G_HH_S_DIRP_1*DE_G_HH_S_DIRP(-1)

DE_G_HH_Y_VDIR = (1-de_beta_discount_cons)*DE_G_HH_Y_VDIR_VE

DE_G_HH_S_VDIRL_VE = var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_
1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_G_HH_Y_DIR_1*DE_G_HH_Y_DIR(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_G_HH_S_DIRL_1*DE_G_HH_S_DIRL(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_G_HH_S_DIRT_1*DE_G_HH_S_DIRT(-1)
+var_expectation_model_DE_G_HH_S_DIRL_CONS_DE_G_HH_S_DIRP_1*DE_G_HH_S_DIRP(-1)

DE_G_HH_S_VDIRL = (1-de_beta_discount_cons)*DE_G_HH_S_VDIRL_VE

DE_G_HH_S_VDIRT_VE = var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_
1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_G_HH_Y_DIR_1*DE_G_HH_Y_DIR(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_G_HH_S_DIRL_1*DE_G_HH_S_DIRL(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_G_HH_S_DIRT_1*DE_G_HH_S_DIRT(-1)
+var_expectation_model_DE_G_HH_S_DIRT_CONS_DE_G_HH_S_DIRP_1*DE_G_HH_S_DIRP(-1)

DE_G_HH_S_VDIRT = (1-de_beta_discount_cons)*DE_G_HH_S_VDIRT_VE

DE_G_HH_S_VDIRP_VE = var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_
1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_G_HH_Y_DIR_1*DE_G_HH_Y_DIR(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_G_HH_S_DIRL_1*DE_G_HH_S_DIRL(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_G_HH_S_DIRT_1*DE_G_HH_S_DIRT(-1)
+var_expectation_model_DE_G_HH_S_DIRP_CONS_DE_G_HH_S_DIRP_1*DE_G_HH_S_DIRP(-1)

DE_G_HH_S_VDIRP = (1-de_beta_discount_cons)*DE_G_HH_S_VDIRP_VE

DE_HH_EDIR = DE_H_HH_Y_DIR*DE_T_YER*exp(DE_G_HH_Y_VDIR/100+DE_G_VYER/100)

log(DE_HH_EDIRL) = log(DE_H_HH_S_DIRL)
+log(DE_H_HH_Y_DIR)
+log(DE_T_YER)
+DE_G_VYER/100+DE_G_HH_Y_VDIR/100+DE_G_HH_S_VDIRL/100

log(DE_HH_EDIRT) = log(DE_T_YER)
+log(DE_H_HH_Y_DIR)
+log(DE_H_HH_S_DIRT)
+DE_G_VYER/100+DE_G_HH_Y_VDIR/100+DE_G_HH_S_VDIRT/100

log(DE_HH_EDIRP) = log(DE_T_YER)
+log(DE_H_HH_Y_DIR)
+log(DE_H_HH_S_DIRP)
+DE_G_VYER/100+DE_G_HH_Y_VDIR/100+DE_G_HH_S_VDIRP/100

DE_CONS_PAC_PE = h1_pac_consumption_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_consumption_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_consumption_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_consumption_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_consumption_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_consumption_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_consumption_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_consumption_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_consumption_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_consumption_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_consumption_eq0_var_AUX_DIFF_532_lag_1*diff(log(DE_HH_OCOR(-1)))
+h1_pac_consumption_eq0_var_DE_H_Q_YER400_lag_1*DE_H_Q_YER400(-1)
+h1_pac_consumption_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_consumption_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_consumption_eq0_var_U2_STN_lag_2*U2_STN(-2)
+h1_pac_consumption_eq0_var_U2_G_EYER_lag_2*U2_G_EYER(-2)
+h1_pac_consumption_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
+h1_pac_consumption_eq0_var_U2_ESTN_lag_2*U2_ESTN(-2)
+h1_pac_consumption_eq0_var_DE_A_YED_lag_2*DE_A_YED(-2)
+h1_pac_consumption_eq0_var_DE_G_YER_lag_2*DE_G_YER(-2)
+h1_pac_consumption_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_consumption_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_consumption_eq0_var_AUX_DIFF_532_lag_2*diff(log(DE_HH_OCOR(-2)))
+h1_pac_consumption_eq0_var_DE_H_Q_YER400_lag_2*DE_H_Q_YER400(-2)

diff(log(DE_HH_COR)) = de_gamma_cons*(de_ecm_pac_cons*(log(DE_HH_OCOR(-1))-log(DE_HH_COR(-1)))
+de_hh_cor_pac_de_hh_cor_L1*diff(log(DE_HH_COR(-1)))
+DE_CONS_PAC_PE+pac_consumption_pac_growth_neutrality_correction*DE_H_Q_YER400(-1))
+de_hh_cor_pac_de_hh_dsl_con_lt_10y*diff(DE_HH_L_CON)
+(1-de_gamma_cons)*de_dlyhlt*DE_DLYHLT+res_DE_HH_COR

log(DE_HH_OCOR) = log(DE_HH_TWR)
+de_c_cons_tar+de_beta_cons_l*(log(DE_HH_EDIRL)-log(DE_HH_TWR))
+de_beta_cons_t*(log(DE_HH_DIRT)-log(DE_HH_TWR))
+de_beta_cons_p*(log(DE_HH_EDIRP)-log(DE_HH_TWR))
+de_beta_cons_trend*DE_TTREND+res_DE_HH_COR_tmp

DE_G_HH_Y_EDIR = 0

DE_G_HH_S_EDIRL = 0

DE_G_HH_S_EDIRT = 0

DE_G_HH_S_EDIRP = 0

DE_DLYHLT = log((DE_HH_DIRL+DE_HH_DIRT)/(DE_HH_DIRL(-1)
+DE_HH_DIRT(-1)))

DE_T_Q_YER = 100*(log(DE_T_YER)-log(DE_T_YER(-1)))

DE_H_Q_YER = DE_H_Q_YER(-1)
+0.05*(DE_T_Q_YER(-1)-DE_H_Q_YER(-1))
+res_DE_H_Q_YER

DE_H_HH_Y_DIR = DE_H_HH_Y_DIR(-1)
+0.05*(DE_HH_DIR/DE_YER-DE_H_HH_Y_DIR(-1))
+res_DE_H_HH_Y_DIR

DE_H_HH_S_DIRL = DE_H_HH_S_DIRL(-1)
+0.05*(DE_HH_DIRL/DE_HH_DIR-DE_H_HH_S_DIRL(-1))
+res_DE_H_HH_S_DIRL

DE_H_HH_S_DIRT = DE_H_HH_S_DIRT(-1)
+0.05*(DE_HH_DIRT/DE_HH_DIR-DE_H_HH_S_DIRT(-1))
+res_DE_H_HH_S_DIRT

log(DE_W0_CEN) = log(DE_W0_CEN(-1))
+diff(log(DE_CEN))
+res_DE_W0_CEN

log(DE_MIN) = log(DE_MIN(-1))
+diff(log(DE_W0_CEN))
+res_DE_MIN

log(DE_HH_DTN) = log(DE_HH_DTN(-1))
+diff(log(DE_GO_HH_DTN))
+res_DE_HH_DTN

log(DE_HH_B_SBN) = log(DE_HH_B_SBN(-1))
+diff(log(DE_GO_SBCN))
+res_DE_HH_B_SBN

DE_HH_DINL = DE_W0_CEN+DE_MIN-DE_S_SCNL*DE_HH_B_SCN-DE_HH_DTN*DE_S_DTNL

DE_HH_DINT = DE_HH_B_SBN-DE_HH_B_SCN*DE_S_SCNT-DE_HH_DTN*DE_S_DTNT

DE_HH_DIN = DE_HH_DINT+DE_HH_DINL+DE_HH_DINP

log(DE_HH_DIRL) = log(DE_HH_DINL)-log(DE_HH_COD)

log(DE_HH_DIRT) = log(DE_HH_DINT)-log(DE_HH_COD)

log(DE_HH_DIR) = log(DE_HH_DIN)-log(DE_HH_COD)

DE_G_HH_Y_DIR = 100*(DE_HH_DIR/DE_YER/DE_H_HH_Y_DIR-1)

DE_G_HH_S_DIRL = 100*(DE_HH_DIRL/DE_HH_DIR/DE_H_HH_S_DIRL-1)

DE_G_HH_S_DIRT = 100*(DE_HH_DIRT/DE_HH_DIR/DE_H_HH_S_DIRT-1)

DE_S_DTNL = (1-de_s_dtnl_l1)*de_s_dtnl_lr+de_s_dtnl_l1*DE_S_DTNL(-1)
+res_DE_S_DTNL

DE_S_DTNT = (1-de_s_dtnt_l1)*de_s_dtnt_lr+de_s_dtnt_l1*DE_S_DTNT(-1)
+res_DE_S_DTNT

DE_H_Q_YER400 = DE_H_Q_YER/100

log(DE_HH_B_SCN) = log(DE_HH_B_SCN(-1))
+diff(log(DE_GO_SCN))
+res_DE_HH_B_SCN

log(DE_HH_PYN) = log(DE_HH_PYN(-1))
+diff(log(DE_HH_DIN))
+res_DE_HH_PYN

COUNTRY-PREMIUM

DE_CP_10Y = de_cp_10y_constant+de_cp_10y_L1*DE_CP_10Y(-1)
+de_cp_10y_de_g_yer_e10y*DE_G_YER_E10Y+de_cp_10y_de_yer_var*DE_YER_VAR+de_cp_10y_de_yer_var_db2yen*DE_YER_VAR_DB+de_cp_10y_L1_de_db2yen_dm*DE_DB2YEN_DM+de_cp_10

DE_YER_VAR = (diff(log(DE_YER))*100-DE_H_Q_YER)^2

DE_DB2YEN_DM = 100*DE_GO_MAL/(4*DE_YEN)-de_db2yen_m

DE_DB2YEN_DM_SQ = DE_DB2YEN_DM^2

DE_DF2YEN = 100*DE_GO_B9N/(4*DE_YEN)

DE_YER_VAR_DB = DE_YER_VAR*DE_DB2YEN_DM

FINANCIAL-NFA

U2_G_YER_E10Y_VE = var_expectation_model_U2_G_YER_FIN_U2_A_YED_0*U2_A_YED+var_expectation_model_U2_G_YER_FIN_U2_G_YER_0*U2_G_YER+var_expectation_model_U2_G_YER_FIN_U2_STN_0*
1)
+var_expectation_model_U2_G_YER_FIN_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_U2_G_YER_FIN_U2_STN_1*U2_STN(-1)
+var_expectation_model_U2_G_YER_FIN_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_U2_G_YER_FIN_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_U2_G_YER_FIN_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_U2_G_YER_FIN_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_U2_G_YER_FIN_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_U2_G_YER_FIN_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_U2_G_YER_FIN_DE_EHIC_1*DE_EHIC(-1)

U2_G_YER_E10Y = 1/(1+maturity_val)*U2_G_YER_E10Y_VE

U2_STN_E10Y_VE = var_expectation_model_U2_STN_FIN_U2_A_YED_0*U2_A_YED+var_expectation_model_U2_STN_FIN_U2_G_YER_0*U2_G_YER+var_expectation_model_U2_STN_FIN_U2_STN_0*U2_STN+va
1)
+var_expectation_model_U2_STN_FIN_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_U2_STN_FIN_U2_STN_1*U2_STN(-1)
+var_expectation_model_U2_STN_FIN_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_U2_STN_FIN_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_U2_STN_FIN_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_U2_STN_FIN_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_U2_STN_FIN_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_U2_STN_FIN_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_U2_STN_FIN_DE_EHIC_1*DE_EHIC(-1)

U2_STN_E10Y = 1/(1+maturity_val)*U2_STN_E10Y_VE

U2_TP_10Y = u2_tp_10y_constant+u2_tp_10y_L1*U2_TP_10Y(-1)
+U2_G_YER_E10Y*u2_tp_10y_u2_g_yer_e10y+u2_tp_10y_L1_u2_dustp_10y*U2_dUSTP_10Y+res_U2_TP_10Y

U2_OIS_10Y = U2_STN_E10Y+U2_TP_10Y

U2_USTP_10Y = u2_ustp_10y_constant+u2_ustp_10Y_L1*U2_USTP_10Y(-1)
+res_U2_USTP_10Y

U2_dUSTP_10Y = U2_USTP_10Y-u2_ustp_10y_constant/(1-u2_ustp_10Y_L1)

DE_HH_SL_CON = de_hh_sl_con_L1*DE_HH_SL_CON(-1)
+DE_G_YER_E10Y*de_hh_sl_con_de_g_yer_e10y+de_hh_sl_con_constant+res_DE_HH_SL_CON

DE_HH_SL_IHN = de_hh_sl_ihn_L1*DE_HH_SL_IHN(-1)
+DE_G_YER_E10Y*de_hh_sl_ihn_de_g_yer_e10y+de_hh_sl_ihn_constant+res_DE_HH_SL_IHN

DE_SLRN = de_slrn_L1*DE_SLRN(-1)
+DE_G_YER_E10Y*de_slrn_de_g_yer_e10y+de_slrn_constant+res_DE_SLRN

DE_SCB = de_scb_L1*DE_SCB(-1)
+DE_G_YER_E10Y*de_scb_de_g_yer_e10y+de_scb_constant+res_DE_SCB

DE_SCOE = de_scoe_L1*DE_SCOE(-1)
+DE_G_YER_E10Y*de_scoe_de_g_yer_e10y+de_scoe_constant+res_DE_SCOE

DE_HH_SL_DEP = de_hh_sl_dep_L1*DE_HH_SL_DEP(-1)
+DE_G_YER_E10Y*de_hh_sl_dep_de_g_yer_e10y+de_hh_sl_dep_constant+res_DE_HH_SL_DEP

DE_HH_L_CON = U2_STN*(1-de_hh_l_con_de_yrb_10y)
+de_hh_l_con_de_yrb_10y*DE_YRB_10Y+DE_HH_SL_CON+res_DE_HH_L_CON

DE_HH_L_IHN = U2_STN*(1-de_hh_l_ihn_de_yrb_10y)
+DE_YRB_10Y*de_hh_l_ihn_de_yrb_10y+DE_HH_SL_IHN+res_DE_HH_L_IHN

DE_LRN = U2_STN*(1-de_lrn_de_yrb_10y)
+DE_YRB_10Y*de_lrn_de_yrb_10y+DE_SLRN+res_DE_LRN

DE_HH_L_DEP = U2_STN*(1-de_hh_l_dep_de_yrb_10y)
+DE_YRB_10Y*de_hh_l_dep_de_yrb_10y+DE_HH_SL_DEP+res_DE_HH_L_DEP

DE_CB = U2_STN*(1-de_cb_de_yrb_10y)
+DE_YRB_10Y*de_cb_de_yrb_10y+DE_SCB+res_DE_CB

DE_COE = U2_STN*(1-de_coe_de_yrb_10y)
+DE_YRB_10Y*de_coe_de_yrb_10y+DE_SCOE+res_DE_COE

DE_YRB_10Y = U2_OIS_10Y+DE_CP_10Y

DE_G_YER_E10Y_VE = var_expectation_model_DE_G_YER_FIN_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_YER_FIN_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_G_YER_FIN_U2_STN_0*U2_STN+var_expectation_model_DE_G_YER_FIN_U2_G_EYER_0*U2_G_EYER+var_expectation_model_DE_G_YER_FIN_U2_EHIC_0*U2_EHIC+var_expectation_model_DE_G_YER_FIN_U2_ESTN_0*U2_ESTN+var_expectation_model_DE_G_YER_FIN_DE_A_YED_0*DE_A_YED+var_expectation_model_DE_G_YER_FIN_DE_G_YER_0*DE_G_YER+var_expectation_model_DE_G_YER_FIN_DE_G_EYER_0*DE_G_EYER+var_expectation_model_DE_G_YER_FIN_DE_EHIC_0*DE_EHIC+var_expectation_model_DE_G_YER_FIN_DE_ESTN_0*DE_ESTN+var_expectation_model_DE_G_YER_FIN_U2_A_YED_1*U2_A_YED(-1)
+var_expectation_model_DE_G_YER_FIN_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_YER_FIN_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_YER_FIN_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_YER_FIN_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_YER_FIN_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_YER_FIN_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_YER_FIN_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_YER_FIN_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_YER_FIN_DE_EHIC_1*DE_EHIC(-1)

DE_G_YER_E10Y = 1/(1+maturity_val)*DE_G_YER_E10Y_VE

DE_BU_L_ITN = de_bu_l_itn_de_cb*DE_CB+de_bu_l_itn_de_lm*DE_LRN+de_bu_l_itn_de_coe*DE_COE

HICP

diff(log(DE_HEF)) = DE_EHIC/400+de_hef_constant+de_hef_ecm*(log(DE_HEF(-1))-log(DE_OHEF(-1)))
+de_hef_de_yed*(diff(log(DE_YED))-DE_EHIC/400)
+de_hef_de_meed*(diff(log(DE_MEED))-DE_EHIC/400)
+de_hef_de_lag*(diff(log(DE_HEF(-1)))-DE_EHIC(-1)/400)
+de_hef_de_lag2*(diff(log(DE_HEF(-2)))-DE_EHIC(-2)/400)
+0.5*diff(DE_GO_R_TIN_HEF)-de_hef_de_lag*0.5*diff(DE_GO_R_TIN_HEF(-1))
+res_DE_HEF

DE_HEF_NSA = DE_HEF/DE_HEF(-4)*DE_HEF_NSA(-4)
+res_DE_HEF_NSA

diff(log(DE_HEG)) = de_heg_constant+DE_EHIC/400+de_heg_ecm*(log(DE_HEG(-1))-log(DE_OHEG(-1)))
+de_heg_med*(diff(log(DE_MED)-log(U2_EXR))-DE_EHIC/400)
+de_heg_med_lag*(diff(log(DE_MED(-1))-log(U2_EXR(-1)))-DE_EHIC(-1)/400)
+de_heg_lag*diff(log(DE_HEG(-1))-DE_EHIC(-1)/400)
+1.0*diff(DE_GO_R_TIN_HEG)-de_heg_lag*1.0*diff(DE_GO_R_TIN_HEG(-1))
+res_DE_HEG

DE_HEG_NSA = DE_HEG/DE_HEG(-4)*DE_HEG_NSA(-4)
+res_DE_HEG_NSA

log(DE_HEX) = de_hex_constant+log(DE_HEF)*(1-de_hex_hif)
+log(DE_HIF)*de_hex_hif+res_DE_HEX

DE_HEX_NSA = DE_HEX/DE_HEX(-4)*DE_HEX_NSA(-4)
+res_DE_HEX_NSA

DE_HICP_NSA = DE_HICP/DE_HICP(-4)*DE_HICP_NSA(-4)
+res_DE_HICP_NSA

diff(log(DE_HIF)) = DE_EHIC/400+de_hif_constant+de_hif_ecm*(log(DE_HIF(-1))-log(DE_OHIF(-1)))
+(diff(log(DE_YED))-DE_EHIC/400)*de_hif_de_yed+de_hif_de_yed_lag*(diff(log(DE_YED(-1)))-DE_EHIC(-1)/400)
+de_hif_de_lag*(diff(log(DE_HIF(-1)))-DE_EHIC(-1)/400)
+diff(DE_GO_R_TIN_HEF)*0.6-0.5*diff(DE_GO_R_TIN_HEF(-1))*de_hif_de_lag+res_DE_HIF

DE_HIF_NSA = DE_HIF/DE_HIF(-4)*DE_HIF_NSA(-4)
+res_DE_HIF_NSA

log(DE_OHEG) = de_oheg_constant+(1-de_oheg_med)*log(DE_YED)
+de_oheg_med*(log(DE_MED)-log(U2_EXR))
+DE_TTREND*de_oheg_trend

log(DE_OHEF) = de_ohef_constant+de_ohef_dummy_crisis*DUMMY_CRISIS+log(DE_YED)*(1-de_s_c_wer)
+de_s_c_wer*log(DE_MEED)
+DE_TTREND*de_ohef_trend

log(DE_OHIF) = log(DE_YED)
+de_ohif_constant+DE_TTREND*de_ohif_trend

log(DE_HICP) = DE_ZHICP+de_hicp_we*log(DE_HEG)
+(1-de_hicp_we)*log(DE_HEX)
+res_DE_HICP

DE_ZHICP = DE_ZHICP(-1)*DYN_H_HICP+res_DE_ZHICP

HOUSEPRICE

DE_HOUSEPRICE_PAC_PE = h1_pac_houseprice_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_houseprice_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_houseprice_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_houseprice_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_houseprice_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_houseprice_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_houseprice_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_houseprice_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_houseprice_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_houseprice_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_houseprice_eq0_var_AUX_DIFF_268_lag_1*diff(log(DE_OS_RPPD(-1)))
+h1_pac_houseprice_eq0_var_DE_OS_RPPD_T_lag_1*DE_OS_RPPD_T(-1)
+h1_pac_houseprice_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_houseprice_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_houseprice_eq0_var_U2_STN_lag_2*U2_STN(-2)
+h1_pac_houseprice_eq0_var_U2_G_EYER_lag_2*U2_G_EYER(-2)
+h1_pac_houseprice_eq0_var_U2_ESTN_lag_2*U2_ESTN(-2)
+h1_pac_houseprice_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
+h1_pac_houseprice_eq0_var_DE_A_YED_lag_2*DE_A_YED(-2)
+h1_pac_houseprice_eq0_var_DE_G_YER_lag_2*DE_G_YER(-2)
+h1_pac_houseprice_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_houseprice_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_houseprice_eq0_var_AUX_DIFF_268_lag_2*diff(log(DE_OS_RPPD(-2)))
+h1_pac_houseprice_eq0_var_DE_OS_RPPD_T_lag_2*DE_OS_RPPD_T(-2)

diff(log(DE_S_RPPD)) = de_ecm_pac_houseprice*(log(DE_OS_RPPD(-1))-log(DE_S_RPPD(-1)))
+de_s_rppd_pac_de_s_rppd_L1*diff(log(DE_S_RPPD(-1)))
+DE_HOUSEPRICE_PAC_PE+pac_houseprice_pac_growth_neutrality_correction*DE_OS_RPPD_T+res_DE_S_RPPD

log(DE_OS_RPPD) = de_c_houseprice_tar+de_beta_houseprice_hh_dir*(log(DE_HH_DIR)-log(DE_SKHR))
+de_beta_houseprice_hh_u_ihr*log(DE_HH_U_IHR)
+res_DE_S_RPPD_tmp

DE_RPPD = DE_S_RPPD*DE_HH_COD

DE_Q16_S_RPPD = (log(DE_S_RPPD)-log(DE_S_RPPD(-1)))*100/16+0.9375*DE_Q16_S_RPPD(-1)

DE_HH_U_IHR = 400*(0.034+DE_HH_L_IHN/400-DE_EHIC/400+DE_S_TIH/4-DE_Q16_S_RPPD*0.4/100)

DE_SKHR = DE_SKHR(-1)*(1-DE_D_IHR/100)
+DE_HH_IHR

INVENTORIES

diff(log(DE_SIVR)) = de_ecm_sivr*(log(DE_T_Y_SIVR(-1))-log(DE_Y_SIVR(-1)))
+de_sivr_L1*(log(DE_SIVR(-1))-log(DE_SIVR(-2)))
+(1-de_sivr_L1)*(log(DE_YER(-1))-log(DE_YER(-2)))
+res_DE_SIVR

DE_Y_SIVR = DE_SIVR/DE_YER

DE_T_Y_SIVR = DE_T_Y_SIVR(-1)*de_y_sivr_L1+de_y_sivr_de_t_y_sivr*(DE_Y_SIVR-DE_T_Y_SIVR(-1))
+res_DE_T_Y_SIVR

DE_IVR = DE_SIVR-DE_SIVR(-1)

LABOUR

DE_LABOUR_PAC_PE = h1_pac_labor_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_labor_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_labor_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_labor_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_labor_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_labor_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_labor_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_labor_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_labor_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_labor_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_labor_eq0_var_AUX_DIFF_337_lag_1*diff(log(DE_OLNN(-1)))
+h1_pac_labor_eq0_var_DE_Q_TAU_lag_1*DE_Q_TAU(-1)
+h1_pac_labor_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_labor_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_labor_eq0_var_U2_STN_lag_2*U2_STN(-2)
+h1_pac_labor_eq0_var_U2_G_EYER_lag_2*U2_G_EYER(-2)
+h1_pac_labor_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
+h1_pac_labor_eq0_var_U2_ESTN_lag_2*U2_ESTN(-2)
+h1_pac_labor_eq0_var_DE_A_YED_lag_2*DE_A_YED(-2)
+h1_pac_labor_eq0_var_DE_G_YER_lag_2*DE_G_YER(-2)
+h1_pac_labor_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_labor_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_labor_eq0_var_AUX_DIFF_337_lag_2*diff(log(DE_OLNN(-2)))
+h1_pac_labor_eq0_var_DE_Q_TAU_lag_2*DE_Q_TAU(-2)

diff(log(DE_LNN)) = de_ecm_pac_labor*(log(DE_OLNN(-1))-log(DE_LNN(-1)))
+de_lnn_pac_de_lnn_L1*diff(log(DE_LNN(-1)))
+de_lnn_pac_de_lnn_L2*diff(log(DE_LNN(-2)))
+de_lnn_de_g_yer*(diff(log(DE_YER))-DE_H_Q_YER400)
+DE_LABOUR_PAC_PE+pac_labor_pac_growth_neutrality_correction*DE_Q_TAU(-1)
+res_DE_LNN

diff(log(DE_C_LNH)) = de_ecm_lnh*(log(DE_T_C_LNH(-1))-log(DE_C_LNH(-1)))
+de_c_lnh_a1*(diff(DE_G_YER)-diff(DE_G_LNN))
+diff(log(DE_T_C_LNH))
+res_DE_C_LNH

log(DE_OLSN) = log(DE_OLNN)
+de_olsn_constant

diff(log(DE_LSN)) = de_lsn_lsn*diff(log(DE_LSN(-1)))
+de_lsn_ecm*(log(DE_OLSN(-1))-log(DE_LSN(-1)))
+res_DE_LSN

diff(DE_R_LFP) = de_ecm_r_lfp*(DE_T_R_LFP(-1)-DE_R_LFP(-1))
+de_r_lfp_r_lun_L1*(DE_R_LUN(-1)/100-DE_T_R_LUN(-1)/100)
+diff(DE_T_R_LFP)
+res_DE_R_LFP

log(DE_OLNN) = (-0.015)*DE_G_C_CER+log(DE_T_LNN)

diff(log(DE_TAU)) = diff(log(DE_TAU(-1)))*dummy_long_run+log(1+u2_annual_pop_growth_rate/100)/4*(1-dummy_long_run)
+res_DE_TAU

DE_Q_TAU = (DE_TAU-DE_TAU(-1))/DE_TAU(-1)

DE_G_LNN = 100*(log(DE_LNN)-log(DE_T_LNN))

DE_T_LNN = DE_T_R_LFP/100*DE_WAP*(1-DE_T_R_LUN/100)

DE_LEN = DE_LNN-DE_LSN

DE_LFN = DE_WAP*DE_R_LFP/100

DE_T_R_LUN = (1-de_t_r_lun_l1)*de_t_r_lun_lr+de_t_r_lun_l1*DE_T_R_LUN(-1)
+res_DE_T_R_LUN

DE_R_LUN = 100*(1-DE_LNN/DE_LFN)

DE_G_R_LUN = DE_R_LUN-DE_T_R_LUN

DE_T_R_LFP = (1-de_t_r_lfp_l1)*de_t_r_lfp_lr+de_t_r_lfp_l1*DE_T_R_LFP(-1)
+res_DE_T_R_LFP

DE_T_C_LNH = (1-de_t_c_lnh_l1)*de_t_c_lnh_lr+de_t_c_lnh_l1*DE_T_C_LNH(-1)
+res_DE_T_C_LNH

NFA

U2_G_YER_E10Y_VE = var_expectation_model_U2_G_YER_FIN_U2_A_YED_0*U2_A_YED+var_expectation_model_U2_G_YER_FIN_U2_G_YER_0*U2_G_YER+var_expectation_model_U2_G_YER_FIN_U2_STN_0*
1)
+var_expectation_model_U2_G_YER_FIN_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_U2_G_YER_FIN_U2_STN_1*U2_STN(-1)
+var_expectation_model_U2_G_YER_FIN_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_U2_G_YER_FIN_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_U2_G_YER_FIN_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_U2_G_YER_FIN_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_U2_G_YER_FIN_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_U2_G_YER_FIN_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_U2_G_YER_FIN_DE_EHIC_1*DE_EHIC(-1)

U2_G_YER_E10Y = 1/(1+maturity_val)*U2_G_YER_E10Y_VE

U2_STN_E10Y_VE = var_expectation_model_U2_STN_FIN_U2_A_YED_0*U2_A_YED+var_expectation_model_U2_STN_FIN_U2_G_YER_0*U2_G_YER+var_expectation_model_U2_STN_FIN_U2_STN_0*U2_STN+va
1)
+var_expectation_model_U2_STN_FIN_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_U2_STN_FIN_U2_STN_1*U2_STN(-1)
+var_expectation_model_U2_STN_FIN_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_U2_STN_FIN_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_U2_STN_FIN_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_U2_STN_FIN_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_U2_STN_FIN_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_U2_STN_FIN_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_U2_STN_FIN_DE_EHIC_1*DE_EHIC(-1)

U2_STN_E10Y = 1/(1+maturity_val)*U2_STN_E10Y_VE

U2_TP_10Y = u2_tp_10y_constant+u2_tp_10y_L1*U2_TP_10Y(-1)
+U2_G_YER_E10Y*u2_tp_10y_u2_g_yer_e10y+u2_tp_10y_L1_u2_dustp_10y*U2_dUSTP_10Y+res_U2_TP_10Y

U2_OIS_10Y = U2_STN_E10Y+U2_TP_10Y

U2_USTP_10Y = u2_ustp_10y_constant+u2_ustp_10Y_L1*U2_USTP_10Y(-1)
+res_U2_USTP_10Y

U2_dUSTP_10Y = U2_USTP_10Y-u2_ustp_10y_constant/(1-u2_ustp_10Y_L1)

DE_HH_SL_CON = de_hh_sl_con_L1*DE_HH_SL_CON(-1)
+DE_G_YER_E10Y*de_hh_sl_con_de_g_yer_e10y+de_hh_sl_con_constant+res_DE_HH_SL_CON

DE_HH_SL_IHN = de_hh_sl_ihn_L1*DE_HH_SL_IHN(-1)
+DE_G_YER_E10Y*de_hh_sl_ihn_de_g_yer_e10y+de_hh_sl_ihn_constant+res_DE_HH_SL_IHN

DE_SLRN = de_slrn_L1*DE_SLRN(-1)
+DE_G_YER_E10Y*de_slrn_de_g_yer_e10y+de_slrn_constant+res_DE_SLRN

DE_SCB = de_scb_L1*DE_SCB(-1)
+DE_G_YER_E10Y*de_scb_de_g_yer_e10y+de_scb_constant+res_DE_SCB

DE_SCOE = de_scoe_L1*DE_SCOE(-1)
+DE_G_YER_E10Y*de_scoe_de_g_yer_e10y+de_scoe_constant+res_DE_SCOE

DE_HH_SL_DEP = de_hh_sl_dep_L1*DE_HH_SL_DEP(-1)
+DE_G_YER_E10Y*de_hh_sl_dep_de_g_yer_e10y+de_hh_sl_dep_constant+res_DE_HH_SL_DEP

DE_HH_L_CON = U2_STN*(1-de_hh_l_con_de_yrb_10y)
+de_hh_l_con_de_yrb_10y*DE_YRB_10Y+DE_HH_SL_CON+res_DE_HH_L_CON

DE_HH_L_IHN = U2_STN*(1-de_hh_l_ihn_de_yrb_10y)
+DE_YRB_10Y*de_hh_l_ihn_de_yrb_10y+DE_HH_SL_IHN+res_DE_HH_L_IHN

DE_LRN = U2_STN*(1-de_lrn_de_yrb_10y)
+DE_YRB_10Y*de_lrn_de_yrb_10y+DE_SLRN+res_DE_LRN

DE_HH_L_DEP = U2_STN*(1-de_hh_l_dep_de_yrb_10y)
+DE_YRB_10Y*de_hh_l_dep_de_yrb_10y+DE_HH_SL_DEP+res_DE_HH_L_DEP

DE_CB = U2_STN*(1-de_cb_de_yrb_10y)
+DE_YRB_10Y*de_cb_de_yrb_10y+DE_SCB+res_DE_CB

DE_COE = U2_STN*(1-de_coe_de_yrb_10y)
+DE_YRB_10Y*de_coe_de_yrb_10y+DE_SCOE+res_DE_COE

DE_YRB_10Y = U2_OIS_10Y+DE_CP_10Y

DE_G_YER_E10Y_VE = var_expectation_model_DE_G_YER_FIN_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_G_YER_FIN_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_G_YER_FIN_U2_STN_0
1)
+var_expectation_model_DE_G_YER_FIN_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_G_YER_FIN_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_G_YER_FIN_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_G_YER_FIN_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_G_YER_FIN_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_G_YER_FIN_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_G_YER_FIN_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_G_YER_FIN_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_G_YER_FIN_DE_EHIC_1*DE_EHIC(-1)

DE_G_YER_E10Y = 1/(1+maturity_val)*DE_G_YER_E10Y_VE

DE_BU_L_ITN = de_bu_l_itn_de_cb*DE_CB+de_bu_l_itn_de_lrn*DE_LRN+de_bu_l_itn_de_coe*DE_COE

DE_NFANRV_S = de_nfanrv_s_de_ywd*(log(DE_CXEDEX)-log(DE_CXEDEX(-1))-0.25*log(1+u2_annual_inflation_rate/100))
+de_nfanrv_s_de_yed*(log(DE_YED)-log(DE_YED(-1))-0.25*log(1+u2_annual_inflation_rate/100))
+de_nfanrv_s_de_eenx*diff(log(DE_EENX))
+de_nfanrv_s_constant*dummy_long_run+de_nfanrv_s_de_ir*(DE_IR_TLN-DE_IR_TLN(-1)-(DE_IR_TAN-DE_IR_TAN(-1)))
+res_DE_NFANRV_S

DE_IR_TAN = de_ir_tln_tmp_ir_const+de_cp_10y_constant/(1-de_cp_10y_L1)
+coeff_one*DE_IR_TAN_RV+de_ir_tan_us_10y*(U2_US_10Y-3.2-de_cp_10y_constant/(1-de_cp_10y_L1))

DE_IR_TLN = de_ir_tln_tmp_ir_const+de_cp_10y_constant/(1-de_cp_10y_L1)
+coeff_one*DE_IR_TLN_RV+de_ir_tln_de_yrb_10y*(DE_YRB_10Y-3.2-de_cp_10y_constant/(1-de_cp_10y_L1))

DE_Y_DNFAN = (DE_XTN-DE_MTN)/DE_YEN(-1)
+DE_NFANRV_S+res_DE_NFAN

DE_NFAN = DE_Y_DNFAN*DE_YEN(-1)
+DE_NFAN(-1)

DE_IR_TAN_RV = 0.99*DE_IR_TAN_RV(-1)
+res_DE_IR_TAN_RV

DE_IR_TLN_RV = 0.99*DE_IR_TLN_RV(-1)
+res_DE_IR_TLN_RV

DE_NFANRV = DE_YEN(-1)*DE_NFANRV_S

DE_TBR = DE_XTR-DE_MTR

DE_TBN = DE_XTN-DE_MTN

PRICE

diff(log(DE_HH_COD)) = de_hh_q_cod_c+de_hh_cod_de_hicp*diff(log(DE_HICP))
+ecm_hh_cod*(log(DE_HH_COD(-1))-log(DE_HH_OCOD(-1)))
+de_hh_cod_de_q_yed*diff(log(DE_YED))
+(1-de_hh_cod_de_q_yed-de_hh_cod_de_hicp)*diff(log(DE_MED))
+res_DE_HH_Q_COD

diff(log(DE_BU_ITD)) = de_bu_q_itd_c+DUMMY_CRISIS*de_bu_q_itd_dummy_crisis+ecm_bu_itd*(log(DE_BU_ITD(-1))-log(DE_BU_OITD(-1)))
+diff(log(DE_YED))*de_bu_q_itd_de_q_yed+de_bu_q_itd_de_q_itd*diff(log(DE_BU_ITD(-1)))
+(1-de_bu_q_itd_de_q_itd-de_bu_q_itd_de_q_yed)*diff(log(DE_YED(-1)))
+res_DE_BU_Q_ITD

diff(log(DE_HH_IHD)) = de_hh_q_ihd_c+DUMMY_CRISIS*de_hh_q_ihd_dummy_crisis+de_hh_ihd_de_mxd*diff(log(DE_MTD))
+ecm_hh_ihd*(log(DE_HH_IHD(-1))-log(DE_HH_OIHD(-1)))
+diff(log(DE_YED))*de_hh_q_ihd_de_q_yed+de_hh_q_ihd_de_q_ihd*diff(log(DE_HH_IHD(-1)))
+diff(log(DE_YED(-1)))*(1-de_hh_q_ihd_de_q_yed-de_hh_ihd_de_mxd-de_hh_q_ihd_de_q_ihd)
+res_DE_HH_Q_IHD

log(DE_HH_OCOD) = de_ocod_c+de_ocod_ttrend*DE_TTREND+log(DE_HICP)
+res_DE_HH_COD_tmp

log(DE_BU_OITD) = de_oitd_c+DE_TTREND*de_oitd_ttrend+de_oitd_dummy_crisis*DUMMY_CRISIS+log(DE_YED)*(1-de_s_i_wer)
+de_s_i_wer*log(DE_MTD)
+res_DE_BU_ITD_tmp

log(DE_HH_OIHD) = de_s_i_wer*log(DE_MTD)
+log(DE_YED)*(1-de_s_i_wer)
+de_oihd_c+DE_TTREND*de_oihd_ttrend+DUMMY_CRISIS*de_oihd_dummy_crisis+res_DE_HH_IHD_tmp

DE_HOUSEPRICE_PAC_PE = h1_pac_houseprice_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_houseprice_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_houseprice_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_houseprice_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_houseprice_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_houseprice_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_houseprice_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_houseprice_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_houseprice_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_houseprice_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_houseprice_eq0_var_AUX_DIFF_268_lag_1*diff(log(DE_OS_RPPD(-1)))
+h1_pac_houseprice_eq0_var_DE_OS_RPPD_T_lag_1*DE_OS_RPPD_T(-1)
+h1_pac_houseprice_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_houseprice_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_houseprice_eq0_var_U2_STN_lag_2*U2_STN(-2)
+h1_pac_houseprice_eq0_var_U2_G_EYER_lag_2*U2_G_EYER(-2)
+h1_pac_houseprice_eq0_var_U2_ESTN_lag_2*U2_ESTN(-2)
+h1_pac_houseprice_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
+h1_pac_houseprice_eq0_var_DE_A_YED_lag_2*DE_A_YED(-2)
+h1_pac_houseprice_eq0_var_DE_G_YER_lag_2*DE_G_YER(-2)
+h1_pac_houseprice_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_houseprice_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_houseprice_eq0_var_AUX_DIFF_268_lag_2*diff(log(DE_OS_RPPD(-2)))
+h1_pac_houseprice_eq0_var_DE_OS_RPPD_T_lag_2*DE_OS_RPPD_T(-2)

diff(log(DE_S_RPPD)) = de_ecm_pac_houseprice*(log(DE_OS_RPPD(-1))-log(DE_S_RPPD(-1)))
+de_s_rppd_pac_de_s_rppd_L1*diff(log(DE_S_RPPD(-1)))
+DE_HOUSEPRICE_PAC_PE+pac_houseprice_pac_growth_neutrality_correction*DE_OS_RPPD_T+res_DE_S_RPPD

log(DE_OS_RPPD) = de_c_houseprice_tar+de_beta_houseprice_hh_dir*(log(DE_HH_DIR)-log(DE_SKHR))
+de_beta_houseprice_hh_u_ihr*log(DE_HH_U_IHR)
+res_DE_S_RPPD_tmp

DE_RPPD = DE_S_RPPD*DE_HH_COD

DE_Q16_S_RPPD = (log(DE_S_RPPD)-log(DE_S_RPPD(-1)))*100/16+0.9375*DE_Q16_S_RPPD(-1)

DE_HH_U_IHR = 400*(0.034+DE_HH_L_IHN/400-DE_EHIC/400+DE_S_TIH/4-DE_Q16_S_RPPD*0.4/100)

DE_SKHR = DE_SKHR(-1)*(1-DE_D_IHR/100)
+DE_HH_IHR

PRODUCTION

log(DE_T_YER) = de_alpha*log(DE_SKFR)
+(1-de_alpha)*log(DE_T_PRO)
+(1-de_alpha)*(log(DE_T_R_LFP/100)
+log(DE_WAP)
+log(1-DE_T_R_LUN/100))
+DE_EPS_L_DE_T_YER

DE_T_PRO = DE_Q_T_PRO*DE_T_PRO(-1)

DE_SKFR = DE_SKFR(-1)*(1-DE_D_ITR/100)
+DE_ITR

DE_Q_T_PRO = (1+u2_annual_tfp_growth_rate/100)^0.25+res_DE_Q_T_PRO

DE_EPS_L_DE_T_YER = 0.9782*DE_EPS_L_DE_T_YER(-1)

PROPERTY-INCOME

DE_HH_GOS = de_beta_hh_gos_de_skhr_de_hh_ihd*DE_SKHR*DE_HH_IHD+de_beta_hh_gos_de_s_rppd_de_yen*(DE_S_RPPD-1)*DE_YEN+de_beta_hh_gos_trend*DE_YEN*DE_TTREND+res_DE_HH_GOS

DE_HH_GOSMIN = DE_HH_GOS+DE_MIN

DE_HH_B_IRN = DE_YEN*de_hh_b_irn_de_yen+DE_YEN*DE_TTREND*de_hh_b_irn_de_ttrend+de_hh_b_irn_de_dummy*DE_YEN*DUMMY_CRISIS+de_hh_b_irn_de_L1_de_yen*DE_YEN*DE_HH_B_IRN(-1)/DE_YEN(-1)
+de_hh_b_irn_de_s_rw_nfan_de_yen*DE_YEN*0.01*DE_S_RW_NFAN(-1)
+de_hh_b_irn_de_stn_de_yen*U2_STN*DE_YEN+de_hh_b_irn_de_hh_l_ihn_de_hh_l_dep_de_yen*DE_YEN*(DE_HH_L_IHN-DE_HH_L_DEP)
+res_DE_HH_B_IRN

DE_PROPERTY_PAC_PE = h1_pac_property_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_property_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_property_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_property_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_property_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_property_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_property_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_property_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_property_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_property_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_property_eq0_var_AUX_DIFF_365_lag_1*diff(log(DE_HH_C_ODDR(-1)))
+h1_pac_property_eq0_var_DE_H_Q_YER400_lag_1*DE_H_Q_YER400(-1)
+h1_pac_property_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_property_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_property_eq0_var_U2_STN_lag_2*U2_STN(-2)
+h1_pac_property_eq0_var_U2_G_EYER_lag_2*U2_G_EYER(-2)
+h1_pac_property_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
+h1_pac_property_eq0_var_U2_ESTN_lag_2*U2_ESTN(-2)
+h1_pac_property_eq0_var_DE_A_YED_lag_2*DE_A_YED(-2)
+h1_pac_property_eq0_var_DE_G_YER_lag_2*DE_G_YER(-2)
+h1_pac_property_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_property_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_property_eq0_var_AUX_DIFF_365_lag_2*diff(log(DE_HH_C_ODDR(-2)))
+h1_pac_property_eq0_var_DE_H_Q_YER400_lag_2*DE_H_Q_YER400(-2)

diff(log(DE_HH_C_DDR)) = de_ecm_pac_property*(log(DE_HH_C_ODDR(-1))-log(DE_HH_C_DDR(-1)))
+de_hh_c_ddr_de_hh_c_ddr_L1*diff(log(DE_HH_C_DDR(-1)))
+de_hh_c_ddr_de_hh_c_ddr_L2*diff(log(DE_HH_C_DDR(-2)))
+de_hh_c_ddr_de_hh_c_ddr_L3*diff(log(DE_HH_C_DDR(-3)))
+DE_PROPERTY_PAC_PE+pac_property_pac_growth_neutrality_correction*DE_H_Q_YER400(-1)
+res_DE_HH_C_DDR

DE_HH_B_OPPN = DE_HH_B_OPPN(-1)*((1+u2_annual_inflation_rate/100)*(1+u2_annual_pop_growth_rate/100)*(1+u2_annual_tfp_growth_rate/100))^0.25+res_DE_HH_B_OPPN

log(DE_HH_C_ODDR) = de_hh_c_ddr_const+DUMMY_CRISIS*de_hh_c_ddr_dummy+log(DE_HH_GOSMIN)-log(DE_HH_COD)
+DE_TTREND*de_beta_hh_c_ddr_trend+res_DE_HH_C_DDR_tmp

DE_H_HH_S_DIRP = DE_H_HH_S_DIRP(-1)
+0.05*(DE_HH_DIRP/DE_HH_DIR-DE_H_HH_S_DIRP(-1))
+res_DE_H_HH_S_DIRP

log(DE_HH_DIRP) = log(DE_HH_DINP)-log(DE_HH_COD)

DE_G_HH_S_DIRP = 100*(DE_HH_DIRP/DE_HH_DIR/DE_H_HH_S_DIRP-1)

DE_HH_C_DDN = DE_HH_C_DDR*DE_HH_COD

DE_HH_DINP = DE_HH_C_DDN+DE_HH_GOS+DE_HH_B_IRN+DE_HH_B_OPPN-(1-DE_S_SCNL-DE_S_SCNT)*DE_HH_B_SCN-(1-DE_S_DTNL-DE_S_DTNT)*DE_HH_DTN

RESIDENTIAL

DE_RESIDENTIAL_PAC_PE = h1_pac_residential_eq0_var_U2_A_YED_lag_1*U2_A_YED(-1)
+h1_pac_residential_eq0_var_U2_G_YER_lag_1*U2_G_YER(-1)
+h1_pac_residential_eq0_var_U2_STN_lag_1*U2_STN(-1)
+h1_pac_residential_eq0_var_U2_G_EYER_lag_1*U2_G_EYER(-1)
+h1_pac_residential_eq0_var_U2_EHIC_lag_1*U2_EHIC(-1)
+h1_pac_residential_eq0_var_U2_ESTN_lag_1*U2_ESTN(-1)
+h1_pac_residential_eq0_var_DE_A_YED_lag_1*DE_A_YED(-1)
+h1_pac_residential_eq0_var_DE_G_YER_lag_1*DE_G_YER(-1)
+h1_pac_residential_eq0_var_DE_G_EYER_lag_1*DE_G_EYER(-1)
+h1_pac_residential_eq0_var_DE_EHIC_lag_1*DE_EHIC(-1)
+h1_pac_residential_eq0_var_AUX_DIFF_317_lag_1*diff(log(DE_HH_OIHR(-1)))
+h1_pac_residential_eq0_var_DE_H_Q_YER400_lag_1*DE_H_Q_YER400(-1)
+h1_pac_residential_eq0_var_U2_A_YED_lag_2*U2_A_YED(-2)
+h1_pac_residential_eq0_var_U2_G_YER_lag_2*U2_G_YER(-2)
+h1_pac_residential_eq0_var_U2_STN_lag_2*U2_STN(-2)
+h1_pac_residential_eq0_var_U2_G_EYER_lag_2*U2_G_EYER(-2)
+h1_pac_residential_eq0_var_U2_EHIC_lag_2*U2_EHIC(-2)
+h1_pac_residential_eq0_var_U2_ESTN_lag_2*U2_ESTN(-2)
+h1_pac_residential_eq0_var_DE_A_YED_lag_2*DE_A_YED(-2)
+h1_pac_residential_eq0_var_DE_G_YER_lag_2*DE_G_YER(-2)
+h1_pac_residential_eq0_var_DE_G_EYER_lag_2*DE_G_EYER(-2)
+h1_pac_residential_eq0_var_DE_EHIC_lag_2*DE_EHIC(-2)
+h1_pac_residential_eq0_var_AUX_DIFF_317_lag_2*diff(log(DE_HH_OIHR(-2)))
+h1_pac_residential_eq0_var_DE_H_Q_YER400_lag_2*DE_H_Q_YER400(-2)

diff(log(DE_HH_IHR)) = de_ecm_pac_residential*(log(DE_HH_OIHR(-1))-log(DE_HH_IHR(-1)))
+de_hh_ihr_pac_de_ihr_L1*diff(log(DE_HH_IHR(-1)))
+de_hh_ihr_pac_de_ihr_L2*diff(log(DE_HH_IHR(-2)))
+de_hh_ihr_pac_de_ihr_L3*diff(log(DE_HH_IHR(-3)))
+DE_RESIDENTIAL_PAC_PE+pac_residential_pac_growth_neutrality_correction*DE_H_Q_YER400(-1)
+res_DE_HH_IHR

log(DE_HH_OIHR) = res_DE_HH_OIHR+de_residential_tar_const+de_beta_residential_trend*DE_TTREND+de_beta_residential_de_yer*log(DE_YER)
+de_beta_residential_de_hh_u_ihr2*log(DE_HH_U_IHR2)
+de_beta_residential_de_s_rppd_ihd*log(DE_S_RPPD_IHD)

DE_S_RPPD_IHD = DE_RPPD/DE_HH_IHD

DE_Q_S_RPPD_IHD = diff(log(DE_S_RPPD_IHD))*100

DE_ES_RPPD_IHD = 0.875*DE_ES_RPPD_IHD(-1)
+DE_Q_S_RPPD_IHD*0.125

DE_HH_U_IHR2 = 400*(0.034+DE_LRN/400-DE_EHIC/400-DE_ES_RPPD_IHD/100)

DE_HH_S_IHD = DE_HH_IHN/DE_HH_IHR/DE_HH_COD

DE_HH_IHN = DE_HH_IHD*DE_HH_IHR

TRADE

diff(log(DE_MEED)) = DE_EHIC/400+de_meed_constant+de_meed_ecm*(log(DE_MEED(-1))-log(DE_OMEED(-1)))
+de_meed_de_cmd*(diff(log(DE_CMD))-DE_EHIC/400)
+de_meed_de_yed*(diff(log(DE_YED))-DE_EHIC/400)
+DE_TTREND*de_meed_trend+res_DE_MEED

log(DE_MTD) = log(DE_MEED)*(1-de_s_mtd_med)
+de_s_mtd_med*(log(DE_MED)-log(U2_EXR))
+res_DE_MTD

diff(log(DE_MTR)) = de_mtr_constant+DE_H_Q_YER/100+DE_TREND_MTR_AUX+de_mtr_ecm*(log(DE_MTR(-1))-log(DE_OMTR(-1)))
+de_mtr_de_wer*(diff(log(DE_WER))-DE_H_Q_YER/100)
+de_mtr_de_mtd*diff(log(DE_MEED))
+res_DE_MTR

diff(log(DE_MXD)) = de_mxd_ecm*(log(DE_MTD(-1))-log(DE_OMXD(-1)))
+(diff(log(DE_MED)-log(U2_EXR))-diff(log(DE_YED)))*de_mxd_de_med+de_mxd_de_cmdex*(diff(log(DE_CMDEX))-diff(log(DE_YED)))
+diff(log(DE_YED))
+DE_TREND_MXD_AUX+res_DE_MXD

diff(log(DE_MXR)) = DE_H_Q_YER/100+DE_TREND_MXR_AUX+de_mxr_ecm*(log(DE_MXR(-1))-log(DE_OMXR(-1)))
+(diff(log(DE_WER))-DE_H_Q_YER/100)*de_mxr_de_wer+de_mxr_de_eenx_L1*diff(log(DE_EENX(-1)))
+res_DE_MXR

diff(log(DE_XTD)) = de_xtd_constant+de_xtd_ecm*(log(DE_XTD(-1))-log(DE_OXTD(-1)))
+de_xtd_de_cxd*(diff(log(DE_CXD))-diff(log(DE_YED)))
+de_xtd_de_med*(diff(log(DE_MED)-log(U2_EXR))-diff(log(DE_YED)))
+diff(log(DE_YED))
+DE_TREND_XTD_AUX+res_DE_XTD

diff(log(DE_XTR)) = de_xtr_constant+DE_H_Q_YER/100+DE_TREND_XTR_AUX+de_xtr_ecm*(log(DE_XTR(-1))-log(DE_OXTR(-1)))
+de_xtr_de_wdr*diff(log(DE_WDR)-DE_H_Q_YER/100)
+de_xtr_de_xtd*diff(log(DE_XTD/DE_CXD))
+res_DE_XTR

diff(log(DE_XXD)) = de_xxd_ecm*(log(DE_XXD(-1))-log(DE_OXXD(-1)))
+de_xxd_de_cxdex*(diff(log(DE_CXDEX))-diff(log(DE_YED)))
+diff(log(DE_YED))
+DE_TREND_XXD_AUX+res_DE_XXD

diff(log(DE_XXR)) = DE_H_Q_YER/100+DE_TREND_XXR_AUX+de_xxr_ecm*(log(DE_XXR(-1))-log(DE_OXXR(-1)))
+de_xxr_de_wdrex*(diff(log(DE_WDREX))-DE_H_Q_YER/100)
+de_xxr_de_eenx*diff(log(DE_EENX))
+res_DE_XXR

log(DE_OMTR) = log(DE_WER)
+de_omtr_constant+de_omtr_de_mtd*(log(DE_MEED)-log(DE_YED))
+DE_TTREND*de_omtr_trend+res_DE_OMTR_tmp

log(DE_OMEED) = de_omeed_constant+de_omeed_de_yed_cmd*log(DE_CMD)
+log(DE_YED)*(1-de_omeed_de_yed_cmd)
+DE_TTREND*de_omeed_trend+res_DE_OMEED_tmp

log(DE_OXTD) = log(DE_CXD)
+de_oxtd_constant+de_oxtd_de_yed_cxd*(log(DE_YED)-log(DE_CXD))
+de_oxtd_de_med_cxd*(log(DE_MED)-log(U2_EXR)-log(DE_CXD))
+DE_TTREND*de_oxtd_trend+res_DE_OXTD_tmp

log(DE_OXTR) = log(DE_WDR)
+de_oxtr_constant+de_oxtr_de_xtd_cxd*(log(DE_XTD)-log(DE_CXD))
+DE_TTREND*de_oxtr_trend+res_DE_OXTR_tmp

log(DE_OXXR) = log(DE_WDREX)
+de_oxxr_constant+de_oxxr_de_xxd_cxdex*(log(DE_XXD)-log(DE_CXDEX))
+DE_TTREND*de_oxxr_trend+res_DE_OXXR_tmp

log(DE_OXXD) = log(DE_CXDEX)
+de_oxxd_constant+de_oxxd_de_yed_cxdex*(log(DE_YED)-log(DE_CXDEX))
+DE_TTREND*de_oxxd_trend+res_DE_OXXD_tmp

log(DE_OMXR) = log(DE_WER)
+de_omxr_constant+de_omxr_de_mxd*DE_MXD/DE_YED+DE_TTREND*de_omxr_trend+de_omxr_dummy_crisis*DUMMY_CRISIS+res_DE_OMXR_tmp

log(DE_OMXD) = log(DE_CMDEX)
+de_omxd_constant+de_omxd_de_med*(log(DE_MED)-log(U2_EXR)-log(DE_CMDEX))
+de_omxd_de_yed_cmdex*(log(DE_YED)-log(DE_CMDEX))
+DE_TTREND*de_omxxd_trend+res_DE_OMXD_tmp

DE_WER = de_s_c_wer*DE_HH_COR+de_s_g_wer*DE_GO_COR+de_s_i_wer*DE_ITR+de_s_x_wer*DE_XTR

DE_WEREX = de_s_c_wer*DE_HH_COR+de_s_g_wer*DE_GO_COR+de_s_i_wer*DE_ITR+de_s_x_wer*DE_XXR

log(DE_CXDEX) = log(DE_CXEDEX)
+log(DE_EENX)

log(DE_CMDEX) = log(DE_CXEDEX)
+log(DE_EENX)
+res_DE_CMDEX

log(DE_MED) = 0.8*log(DE_POU)
+0.2*log(U2_PCU)

DE_MTN = DE_MTD*DE_MTR

DE_XTN = DE_XTR*DE_XTD

DE_XXN = DE_XXR*DE_XXD

DE_MXN = DE_MXD*DE_MXR

DE_XNN = DE_XTN-DE_XXN

DE_MNN = DE_MTN-DE_MXN

DE_XNR = DE_XTR-DE_XXR

DE_XND = DE_XNN/DE_XNR

DE_MNR = DE_MTR-DE_MXR

DE_MND = DE_MNN/DE_MNR

DE_WDR = (1-de_wdrin)*DE_WDREX+de_wdrin*DE_WDRIN+res_DE_WDR

DE_CXD = DE_CXDEX*(1-de_cxdin)
+de_cxdin*DE_CXDIN+res_DE_CXD

DE_CMD = DE_CMDEX*(1-de_cmdin)
+de_cmdin*DE_CMDIN+res_DE_CMD

WAGE

DE_G_C_CER_VE = var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_A_YED_0*U2_A_YED+var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_G_YER_0*U2_G_YER+var_expectation_model_DE_E_
1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_G_YER_1*U2_G_YER(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_EHIC_1*U2_EHIC(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_G_EYER_1*U2_G_EYER(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_U2_STN_1*U2_STN(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_DE_A_YED_1*DE_A_YED(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_DE_E_G_C_CER_1*DE_E_G_C_CER(-1)
+var_expectation_model_DE_E_G_C_CER_OP_FCAST_DE_T_G_C_CER_1*DE_T_G_C_CER(-1)

DE_G_C_CER = (0.411193176387121*DE_G_C_CER_VE+0.3*DE_G_C_CER(-1)
+0.1609153722582302*(DE_EHIC-u2_annual_inflation_rate)-0.5522530244831182*DE_G_A_YED+0.391337652224888*DE_G_A_YED(-1))/1.123357952916136-
0.092082630991800*DE_G_R_LUN(-1)
+res_DE_G_C_CER

log(DE_C_CER_TAR) = de_c_cer_tar_de_trend*DE_TTREND+de_c_cer_tar_de_const+coeff_one*log(DE_T_YER)-coeff_one*log(DE_T_LNN)
+coeff_one*log(DE_YED)-coeff_one*log(DE_HH_COD)
+res_DE_C_CER_TAR_tmp

log(DE_C_CER) = DE_G_C_CER/100+log(DE_C_CER_TAR)

log(DE_WAN) = log(DE_C_WAN)
+log(DE_LEN)

DE_A_C_WAN = 100*((DE_C_WAR*DE_HH_COD/(DE_HH_COD(-1)*DE_C_WAR(-1)))^4-1)

log(DE_C_CEN) = log(DE_C_CER)
+log(DE_HH_COD)

DE_A_C_CEN = 100*((DE_C_CER*DE_HH_COD/(DE_C_CER(-1)*DE_HH_COD(-1)))^4-1)

DE_A_C_CER = 100*((DE_C_CER/DE_C_CER(-1))^4-1)

DE_C_WAR = DE_C_CER-DE_C_GO_BU_SCN/DE_HH_COD

log(DE_C_WAN) = log(DE_HH_COD)
+log(DE_C_WAR)

DE_A_C_CER_TAR = 100*((DE_C_CER_TAR/DE_C_CER_TAR(-1))^4-1)

DE_T_A_C_CEN = 100*(exp(4*(DE_H_Q_YER/100-diff[log(DE_TAU)]))-1)
+DE_EHIC

DE_C_GO_BU_SCN = DE_GO_BU_R_SCN*DE_C_CEN

WAPRO

log(DE_YED) = log(DE_YED(-1))
+log((1+DE_A_YED/100)^0.25)

DE_A_YED_VE = var_expectation_model_DE_A_YED_OP_FCAST_DE_A_YED_0*DE_A_YED+var_expectation_model_DE_A_YED_OP_FCAST_DE_G_YER_0*DE_G_YER+var_expectation_model_DE_A_YED_OP_FC
1)
+var_expectation_model_DE_A_YED_OP_FCAST_DE_G_YER_1*DE_G_YER(-1)
+var_expectation_model_DE_A_YED_OP_FCAST_U2_ESTN_1*U2_ESTN(-1)
+var_expectation_model_DE_A_YED_OP_FCAST_DE_EHIC_1*DE_EHIC(-1)
+var_expectation_model_DE_A_YED_OP_FCAST_DE_G_EYER_1*DE_G_EYER(-1)
+var_expectation_model_DE_A_YED_OP_FCAST_U2_STN_1*U2_STN(-1)

DE_A_YED = (0.387271924091236*DE_A_YED(-1)
+0.629532709573858*DE_A_YED_VE+0.000625*(100*((DE_MED/DE_MED(-1))^4-1)
+100*((DE_MED(-1)/DE_MED(-2))^4-1)
+100*((DE_MED(-2)/DE_MED(-3))^4-1)
+100*((DE_MED(-3)/DE_MED(-4))^4-1)
+100*((DE_MED(-4)/DE_MED(-5))^4-1)
+100*((DE_MED(-5)/DE_MED(-6))^4-1)
+100*((DE_MED(-6)/DE_MED(-7))^4-1)
+100*((DE_MED(-7)/DE_MED(-8))^4-1))
+0.2268538377311621*DE_EHIC+0.121357609729608*(DE_G_C_CER+0.4285714285714286*DE_G_YER))/1.244283471396256+0.4*(diff[DE_GO_R_TIN_YED)*400-
154.908*diff[DE_GO_R_TIN_YED(-1)))
+res_DE_A_YED

DE_EHIC = 0.75*DE_EHIC(-1)
+0.25*(DE_A_YED(-1)*0.4+0.60*DE_A_YED_TAR(-1))
+res_DE_EHIC

DE_A4_YED = 100*(DE_YED/DE_YED(-4)-1)

DE_G_A_YED = DE_A_YED-DE_A_YED_TAR

DE_A_YED_TAR = 0.9596*DE_A_YED_TAR(-1)
+0.040399999999999999*u2_annual_inflation_rate

WEALTH

DE_HH_B_APN = ((1+u2_annual_inflation_rate/100)*(1+u2_annual_pop_growth_rate/100)*(1+u2_annual_tfp_growth_rate/100))^0.25*DE_HH_B_APN(-1)
+res_DE_HH_B_APN

DE_HH_GSN = DE_HH_DIN+DE_HH_B_APN-DE_HH_CON

DE_HH_B_KTN = DE_HH_B_KTN(-1)*((1+u2_annual_inflation_rate/100)*(1+u2_annual_pop_growth_rate/100)*(1+u2_annual_tfp_growth_rate/100))^0.25+res_DE_HH_B_KTN

DE_HH_IVN = DE_HH_IVN(-1)*DE_IVN/DE_IVN(-1)
+res_DE_HH_IVN

log(DE_HH_ITN) = log(DE_HH_ITN(-1))
+diff[log(DE_HH_IHN))
+res_DE_HH_ITN

DE_HH_KFN = DE_HH_ITN+DE_HH_IVN

DE_HH_NPN = ((1+u2_annual_inflation_rate/100)*(1+u2_annual_pop_growth_rate/100)*(1+u2_annual_tfp_growth_rate/100))^0.25*DE_HH_NPN(-1)
+res_DE_HH_NPN

DE_HH_KFNPN = DE_HH_KFN+DE_HH_NPN

DE_HH_CFKN = DE_HWN(-1)*DE_HH_D_IHN

DE_HH_D_IHN = (1-de_hh_d_ihn_l1)*de_hh_d_ihn_lr+de_hh_d_ihn_l1*DE_HH_D_IHN(-1)
+res_DE_HH_D_IHN

DE_HH_B9N = DE_HH_GSN+DE_HH_B_KTN-DE_HH_KFNPN

DE_HH_TWN = DE_HH_FWN+DE_HWN

DE_HH_TWR = DE_HH_TWN/DE_HH_COD

DE_HWN = DE_HWN(-1)*DE_RPPD/DE_RPPD(-1)
+DE_HH_IHN-DE_HH_CFKN+res_DE_HWN

DE_HH_FWN = DE_HH_FWN(-1)*(0.5930+0.0666*DE_YRB_10Y(-1)/DE_YRB_10Y+0.1622*DE_CB(-1)/DE_CB+0.1782*DE_COE(-1)/DE_COE)
+DE_HH_B9N+res_DE_FWN

The list of Exogenous Variables

Exogenous Variable Name Description Blockname

DE_BU_D_ITR
DE_BU_S_DTN
DE_BU_Y_MIBR
DE_CMDIN
DE_CXDIN
DE_CXEDEX
DE_D_IHR
DE_D_ITR
DE_EENX
DE_E_G_C_CER
DE_GO_B9N
DE_GO_BU_R_SCN
DE_GO_CON
DE_GO_COR
DE_GO_HH_DTN
DE_GO_ITN
DE_GO_ITR
DE_GO_MAL
DE_GO_R_TIN_HEF
DE_GO_R_TIN_HEG
DE_GO_R_TIN_YED
DE_GO_SBCN
DE_GO_SCN
DE_GO_SIN
DE_GO_TIN
DE_G_EYER
DE_OS_RPPD_T
DE_POU
DE_S_RW_NFAN
DE_S_SCNL
DE_S_SCNT
DE_S_TIH
DE_TREND_MTR_AUX
DE_TREND_MXD_AUX
DE_TREND_MXR_AUX
DE_TREND_XTD_AUX
DE_TREND_XTR_AUX
DE_TREND_XXD_AUX
DE_TREND_XXR_AUX
DE_TTREND
DE_T_G_C_CER
DE_WAP
DE_WDREX
DE_WDRIN
DUMMY_CRISIS
DYN_H_HICP
U2_A_YED
U2_EHIC
U2_ESTN
U2_EXR
U2_G_EYER
U2_G_YER
U2_PCU
U2_STN
U2_US_10Y
dummy_long_run

F List of Model Variables

In the next pages we provide the full list of variables of the German block (DE) with a brief description.

Variable	Desciption	Variable	Desciption
DE_A_C_CEN	Annual Growth of compensation per employee nominal	**DE_BU_D_ITR**	Depreciation Rate - Private Capital Stock (Index, level)
DE_A_C_CER	Annual Growth of compensation per employee real	**DE_BU_ITD**	Business investment, Deflator
DE_A_C_CER_TAR	Target for annual growth of real compensation per employee	**DE_BU_ITN**	Business investment, Nominal
DE_A_C_WAN	Target for annual growth of real compensation per employee excluding social security contributions	**DE_BU_ITR**	Business investment, Real
DE_A_EYER_10Y	GDP expectations 10 Years from now	**DE_BU_L_ITN**	Interest paid on business investments
DE_A_EYER_1Y	GDP expectations 1 Year from now	**DE_BU_L_ITR**	Financial cost of capital (lending rate Average real)
DE_A_EYER_2Y	GDP expectations 2 Years from now	**DE_BU_OITD**	Target Business Investment, Deflator
DE_A_EYER_3Y	GDP expectations 3 Years from now	**DE_BU_OITR**	Target Business Investment, Real
DE_A_EYER_4Y	GDP expectations 4 Years from now	**DE_BU_OITR_T**	Target Business Investment, Trend
DE_A_EYER_5Y	GDP expectations 5 Years from now	**DE_BU_S_DTN**	Business investment tax rate. Share of corporate taxes on corporate profits
DE_A_YED	Annual inflation, GDP deflator	**DE_BU_U_ITR**	Real User Cost of Capital
DE_A_YED_TAR	Target for annual inflation growth rate	**DE_BU_Y_ITR**	Desired capital-output ratio
DE_A_YED_VE	Annual inflation, GDP deflator, VAR Expectations	**DE_BU_Y_MIBR**	Capital income share (proxy)
DE_A4_YED	Annualised quartlerly GDP deflator	**DE_BUSINESS_AUX**	Proxy for the accelerator effect
DE_AMIR	Average market interest rate on newly issued debt	**DE_BUSINESS_PAC_PE**	PAC Expectations of Business Investment
DE_C_CEN	Nominal compensation per employee (deflated by private consumption deflator)	**DE_CMUDEX**	Quarterly, in levels (in USD), Competitors import prices - extra euro area
DE_C_CER	Real compensation per employee	**DE_CMUDIN**	Quarterly, in levels (in USD), Competitors import prices - intra euro area
DE_C_CER_TAR	Target for real compensation per employee	**DE_COE**	Cost of equity rate
DE_C_GO_BU_SCN	Share of net social contribution in wages	**DE_COE_OLD**	Cost of equity rate
DE_C_LNH	Total hours per employed	**DE_CONS_PAC_PE**	PAC Expectations of Consumption
DE_C_WAN	Nominal compensation per employee excluding social security contributions	**DE_CP_10Y**	10-year Government Benchmark bond yield - Yield
DE_C_WAR	Real compensation per employee excluding social security contributions	**DE_CXD**	Quarterly, in levels (domestic currency), Competitors export prices
DE_CAN	Current account	**DE_CXDEX**	Quarterly, in levels (domestic currency), competitors export prices - extra euro area
DE_CB	Corporate bond rate IG	**DE_CXDIN**	Quarterly, in levels (domestic currency), competitors export prices - intra euro area
DE_CB_ALL	Corporate bond rate all grades	**DE_CXEDEX**	Competitors export prices in their domestic currency
DE_CB_BBB	Corporate bond rate BBB grade	**DE_CXUDEX**	Quarterly, in levels (in USD), Competitors export prices - extra euro area
DE_CEN	Compensation of employees - Domestic (home or reference area), Total economy, Total - All activities, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Seasonally adjusted data, not calendar adjusted	**DE_CXUDIN**	Quarterly, in levels (in USD), Competitors import prices - intra euro area
DE_CMD	Quarterly, in levels (domestic currency), Competitors import prices	**DE_D_IHR**	Dwellings depreciation rate
DE_CMDEX	Quarterly, in levels (domestic currency), competitors import prices - extra euro area	**DE_D_ITR**	Total depreciation rate
DE_CMDIN	Quarterly, in levels (domestic currency), competitors import prices - intra euro area	**DE_DB2YEN_DM**	Government debt to nominal GDP demeaned
DE_DB2YEN_DM_SQ	Government debt to nominal GDP demeaned squared	**DE_ES_RPPD_IHD**	Average growth rate of relative house price to residential investment deflator
DE_DF2YEN	Def. to nominal GDP ratio	**DE_EXR**	US,Quarterly, in levels (domestic currency), Exchange rate against the euro, External
DE_DIVY_NFC	GERMANY-DS NON-FINANCIAL Equity Index, source: DataStream	**DE_G_A_YED**	Inflation gap
DE_DLYHLT	De-meaned growth rate of labour and transfer income	**DE_G_C_CER**	Gap of compensation per employee

DE_DYN_H_HICP	Dummy for homogeneity restriction in HICP equation	**DE_G_C_CER_VE**	Gap for VAR expectations of real compensation per employee
DE_E_G_C_CER	Expected gap of comp. per empl.	**DE_G_EYER**	Gap for Expected real GDP
DE_EENM	Quarterly, in levels (domestic currency), Nominal effective exchange rate - import side	**DE_G_HH_S_DIRL**	Gap of the share of labour income over total income
DE_EENX	Quarterly, in levels (domestic currency), Nominal effective exchange rate - export side	**DE_G_HH_S_DIRP**	Gap of the share of property income over total income
DE_EHIC	Inflation expectations	**DE_G_HH_S_DIRT**	Gap of the share of transfer income over total income
DE_EHIC_1Y	Inflation expectations 1 Year from now	**DE_G_HH_S_EDIRL**	Gap of the share of Expected labour permanent income
DE_EHIC_2Y	Inflation expectations 2 Years from now	**DE_G_HH_S_EDIRP**	Gap of the share of Expected property permanent income
DE_EHIC_3Y	Inflation expectations 3 Years from now	**DE_G_HH_S_EDIRT**	Gap of the share of Expected transfer permanent income
DE_EHIC_4Y	Inflation expectations 4 Years from now	**DE_G_HH_S_VDIRL**	Present value of the gap of the share of labour income over total income
DE_EHIC_5Y	Inflation expectations 5 Years from now	**DE_G_HH_S_VDIRL_VE**	Present value of the gap of the share of labour income over total income VAR Expectations
DE_EPS_L_DE_T_YER	Residual in the potential output equation	**DE_G_HH_S_VDIRP**	Present value of the gap of the share of property income over total income
DE_G_HH_S_VDIRP_VE	Present value of the gap of the share of property income over total income VAR Expectations	**DE_GCN_N**	Government consumption, Nominal
DE_G_HH_S_VDIRT	Present value of the gap of the share of tranfer income over total income	**DE_GCR_N**	Government consumption, Real
DE_G_HH_S_VDIRT_VE	Present value of the gap of the share of tranfer income over total income VAR Expectations	**DE_GID_N**	Government investment, Deflator
DE_G_HH_Y_DIR	Gap of the share of income over gdp	**DE_GIN_N**	Government investment, Nominal
DE_G_HH_Y_EDIR	Gap of the share of expected income over gdp	**DE_GIR_N**	Government investment, Real
DE_G_HH_Y_VDIR	Present value of the gap of the share of income over gdp	**DE_GO_B9N**	NET LEND.(+)/BORROW.(-)
DE_G_HH_Y_VDIR_VE	Gap of the share of expected income over gdp	**DE_GO_BU_DTN**	Direct taxes, enterprises, Fiscal
DE_G_LNN	Employment rate gap	**DE_GO_BU_R_SCN**	Rate for net social contribution
DE_G_R_LUN	Unemployment rate gap	**DE_GO_BU_SCN**	Net social security contributions payable by firms
DE_G_VYER	Present value of output gap	**DE_GO_CEN**	Compensation of employees - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data
DE_G_VYER_VE	Present value of output gap Var Expectations	**DE_GO_CON**	Final consumption expenditure - World (all entities, including reference area, including IO), General government, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data
DE_G_YER	Output gap	**DE_GO_COR**	Final consumption expenditure - World (all entities, including reference area, including IO), General government, Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data
DE_G_YER_E10Y	Expected 10Y real GDP gap	**DE_GO_DTN**	Current taxes on income, wealth, etc. - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data
DE_G_YER_E10Y_VE	VAR expectations of 10Y real GDP gap	**DE_GO_HH_DTN**	Current taxes on income and wealth payable by households

DE_GCD_N	Government consumption, Deflator	**DE_GO_HH_SCN**	Net social security contributions payable by households
DE_GO_ICN	Intermediate consumption - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data	**DE_GO_SCNI**	Employers` imputed social contributions - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Neither seasonally adjusted nor calendar adjusted
DE_GO_IPN	Interest - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government interest expenditure (seasonally adjusted)	**DE_GO_SIN**	Subsidies - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government expenditure related to subsidies (seasonally adjusted)
DE_GO_ITN	Gross fixed capital formation - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government investment expenditure (seasonally adjusted)	**DE_GO_STKN**	Social transfers in kind - purchased market production - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government social transfers in kind (purchased market production) (seasonally adjusted)
DE_GO_ITR	Quarterly, in levels (domestic currency), government investment	**DE_GO_TEN**	Total government expenditure - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Partially consolidated or aggregate containing both consolidated and non-consolidated items, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government total expenditure (seasonally adjusted)
DE_GO_LEN	Government employment, Fiscal	**DE_GO_TIN**	Taxes on production and imports - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data

DE_GO_LNN	Employment (number of persons)	**DE_GO_TRN**	Total government revenue - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Partially consolidated or aggregate containing both consolidated and non-consolidated items, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government total revenue (seasonally adjusted)
DE_GO_MAL	Closing balance sheet/Positions/Stocks - Maastricht debt - Liabilities (Net Incurrence of) - maturity: All original maturities - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Consolidated, Current prices, Face value - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data	**DE_GOSMIN**	Operating surplus and mixed income, gross - Domestic (home or reference area), Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Seasonally adjusted data, not calendar adjusted
DE_GO_R_TIN	Indirect tax rate	**DE_H_HH_S_DIRL**	Trend of labour income over total income
DE_GO_R_TIN_HEF	Fiscal measure for HICP excluding unprocessed food and energy	**DE_H_HH_S_DIRP**	Trend of property income over total income
DE_GO_R_TIN_HEG	Fiscal measure for HICP energy	**DE_H_HH_S_DIRT**	Trend of transfer income over total income
DE_GO_R_TIN_YED	Fiscal measure for GDP deflator	**DE_H_HH_Y_DIR**	Trend of total income over GDP
DE_GO_SBCN	Social benefits other than social transfers in kind - Debit (Uses) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government social benefits other than social transfers (seasonally adjusted)	**DE_H_Q_YER**	Quarterly HP growth rate of potential GDP
DE_GO_SCN	Net social contributions - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Calendar and seasonally adjusted data Government revenue from net social contributions (seasonally adjusted)	**DE_H_Q_YER400**	Annualized H_Q_YER
DE_GO_SCNF	Employers` actual social contributions - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Neither seasonally adjusted nor calendar adjusted	**DE_HEF**	HICP - All-items excluding energy and food, Monthly Index, National Central Bank, Working day and seasonally adjusted

DE_GO_SCNH	Households` actual social contributions - Credit (Resources) - counterpart area: World (all entities, including reference area, including IO), counterpart sector: Total economy - Non-consolidated, Current prices, Standard valuation based on SNA/ESA - Domestic currency (incl. conversion to current currency made using a fixed parity), Neither seasonally adjusted nor calendar adjusted	**DE_HEF_NSA_SDW**	HICP - All-items excluding energy and food, Monthly Index, Eurostat, Neither seasonally nor working day adjusted
DE_HEG	HICP - energy	**DE_HH_C_ODDR**	Long-run target of dividend income of households real
DE_HEX	HICP - All-items excluding energy, Monthly Index, National Central Bank, Working day and seasonally adjusted	**DE_HH_CFKN**	Consumption of fixed capital by HH (depreciation)
DE_HEX_NSA_SDW	HICP - All-items excluding energy, Monthly Index, Eurostat, Neither seasonally nor working day adjusted	**DE_HH_COD**	Individual Consumption Expenditure Deflator
DE_HGPDR	Change in relative price (smoothened)	**DE_HH_CON**	Individual consumption expenditure - World (all entities, including reference area, including IO), Households and non profit institutions serving households (NPISH), Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data
DE_HH_B_APN	Net Adjustment for the change in pension entitlements by households	**DE_HH_COR**	Individual consumption expenditure - World (all entities, including reference area, including IO), Households and non profit institutions serving households (NPISH), Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data
DE_HH_B_IRN	Net interest income of households nominal	**DE_HH_D_APN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Adjustment for the change in pension entitlements - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_HH_B_KTN	Net Capital transfers by households	**DE_HH_D_IHN**	Random walk depreciation
DE_HH_B_OPPN	Net other property income nominal	**DE_HH_D_KTN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Capital transfers - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total

DE_HH_B_SBN	Net Social benefits	**DE_HH_D_SCN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Net social contributions - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_HH_B_SCN	Net social security contributions	**DE_HH_DIN**	Nominal disposable income
DE_HH_B9N	Net lending to household	**DE_HH_DINL**	Nominal disposable income from labour
DE_HH_C_APN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Adjustment for the change in pension entitlements - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_HH_DINP**	Nominal disposable income from property
DE_HH_C_DDN	Dividend income of households nominal	**DE_HH_DINT**	Nominal disposable income from transfers
DE_HH_C_DDR	Dividend income of households real	**DE_HH_DIR**	Real disposable income
DE_HH_C_KTN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Capital transfers - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_HH_DIRL**	Real disposable income from labour
DE_HH_DIRP	Real disposable income from property	**DE_HH_IHR**	Gross fixed capital formation - World (all entities, including reference area, including IO), Total economy, Dwellings (gross), Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data
DE_HH_DIRT	Real disposable income from transfers	**DE_HH_ITN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Gross fixed capital formation - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total Gross fixed capital formation of households
DE_HH_DTN	Direct Taxes on Income, Wealth, etc.	**DE_HH_IVN**	Household nominal inventories

DE_HH_EDIR	Expected total permanent income	**DE_HH_KFN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Gross capital formation - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_HH_EDIRL	Expected labour permanent income	**DE_HH_KFNPN**	Household nominal inventories
DE_HH_EDIRP	Expected property permanent income	**DE_HH_L_CON**	Quarterly, in levels (domestic currency), composite lending rate for consumer credit, Capital markets
DE_HH_EDIRT	Expected transfer permanent income	**DE_HH_L_CON_SDW**	Annualised agreed rate (AAR) / Narrowly defined effective rate (NDER), Credit and other institutions (MFI except MMFs and central banks)Reportingsector - Loans for consumption excluding revolving loans and overdrafts, convenience and extended credit card debt, Total initial rate fixation, New business coverage, Households and non-profit institutions serving households (S.14 and S.15) sector, denominated in Euro
DE_HH_FAN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Closing balance sheet/Positions/Stocks - Total financial assets/liabilities - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Assets (Net Acquisition of) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_HH_L_DEP**	Annualised agreed rate (AAR) / Narrowly defined effective rate (NDER), Credit and other institutions (MFI except MMFs and central banks)Reportingsector - Deposits with agreed maturity, Total original maturity, New business coverage, Households and non-profit institutions serving households (S.14 and S.15) sector, denominated in Euro
DE_HH_FLN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Closing balance sheet/Positions/Stocks - Total financial assets/liabilities - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Liabilities (Net Incurrence of) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_HH_L_IHN**	Annualised agreed rate (AAR) / Narrowly defined effective rate (NDER), Credit and other institutions (MFI except MMFs and central banks)Reportingsector - Lending for house purchase excluding revolving loans and overdrafts, convenience and extended credit card debt, Total calculated by weighting the volumes with a moving Average (defined for cost of borrowing purposes), New business coverage, Households and non-profit institutions serving households (S.14 and S.15) sector, denominated in Euro
DE_HH_FWN	Households financial wealth nominal	**DE_HH_L_IHN_OLD**	Annualised agreed rate (AAR) / Narrowly defined effective rate (NDER), Credit and other institutions (MFI except MMFs and central banks)Reportingsector - Lending for house purchase excluding revolving loans and overdrafts, convenience and extended credit card debt, Total initial rate fixation, New business coverage, Households and non-profit institutions serving households (S.14 and S.15) sector, denominated in Euro

DE_HH_GOS	Gross Operating Surplus (household)	**DE_HH_NPN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Acquisitions less disposals of non-produced assets - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total Acquisitions less disposals of non-produced assets of households
DE_HH_GOSMIN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Operating surplus and mixed income, gross - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total Gross operating surplus and mixed income of households	**DE_HH_OCOD**	Target Business Investment Deflator
DE_HH_GSN	Gross savings by households (Disposable income + adjustment for pensions - consumption)	**DE_HH_OCOR**	Target for real consumption
DE_HH_IHD	Residential investment deflator	**DE_HH_OIHD**	Target Residential investment deflator
DE_HH_IHN	Gross fixed capital formation - World (all entities, including reference area, including IO), Total economy, Dwellings (gross), Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data	**DE_HH_OIHR**	Target Residential Investment
DE_HH_PYN	Disposable income, Nominal	**DE_HICP_W_HIF**	HICP - Food incl. alcohol and tobacco, Sub-index weight, Eurostat, Neither seasonally nor working day adjusted
DE_HH_PYN_N	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Disposable income, gross - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_HICP_W_HXE**	HICP - All-items excluding energy, Sub-index weight, Eurostat, Neither seasonally nor working day adjusted
DE_HH_S_IHD	Nominal residential investment	**DE_HIF**	Food component of HICP
DE_HH_SL_CON	Spread on consumption credit	**DE_HOUSEPRICE_PAC_PE**	PAC Expectations of House prices
DE_HH_SL_DEP	Spread on households deposits	**DE_HWN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Closing balance sheet/Positions/Stocks - Housing wealth (net) - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Not applicable- Current prices - Euro- Calendar and seasonally adjusted data - Total
DE_HH_SL_IHN	Spread on housing investment	**DE_IR_TAN**	Interest rate on total assets nominal
DE_HH_TWN	Total wealth nominal	**DE_IR_TAN_RV**	Revaluation term of Interest rate on total assets nominal
DE_HH_TWR	Total wealth real	**DE_IR_TLN**	Interest rate on total liabilities nominal

DE_HH_U_IHR	Real User Cost (house prices)	**DE_IR_TLN_RV**	Revaluation term of Interest rate on total liabilities nominal
DE_HH_U_IHR2	User cost of capital (residential investment)	**DE_ITD**	Investment deflator
DE_HIC	HICP - Overall index, Monthly Index, National Central Bank, Working day and seasonally adjusted	**DE_ITN**	Gross fixed capital formation - World (all entities, including reference area, including IO), Total economy, Fixed assets by type of asset (gross), Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data
DE_HIC_NSA_SDW	HICP - Overall index, Monthly Index, Eurostat, Neither seasonally nor working day adjusted	**DE_ITR**	Gross fixed capital formation - World (all entities, including reference area, including IO), Total economy, Fixed assets by type of asset (gross), Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data
DE_HICP	Harmonised Index of Consumer Prices	**DE_IVN**	Changes in inventories and acquisition less disposals of valuables - World (all entities, including reference area, including IO), Total economy, Inventories by type of inventory and valuables (gross), Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data
DE_HICP_W_HEF	HICP - All-items excluding energy and food, Sub-index weight, Eurostat, Neither seasonally nor working day adjusted	**DE_IVR**	Changes in inventories and acquisition less disposals of valuables, real
DE_HICP_W_HEG	HICP - Energy, Sub-index weight, Eurostat, Neither seasonally nor working day adjusted	**DE_LABOUR_PAC_PE**	PAC Expectations of labour
DE_LEH	Employees - Domestic (home or reference area), Total economy, Total - All activities, Hours worked, Not applicable, Non transformed data, Calendar and seasonally adjusted data	**DE_MNR**	Quarterly, in levels (domestic currency), Imports of Goods and Services (intra euro area), National accounts definition, Real
DE_LEN	Employees - Domestic (home or reference area), Total economy, Total - All activities, Persons, Not applicable, Non transformed data, Calendar and seasonally adjusted data	**DE_MTD**	Total imports deflator
DE_LFN	labour force	**DE_MTN**	Imports of goods and services - Rest of the World, Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data
DE_LNH	Total employment - Domestic (home or reference area), Total economy, Total - All activities, Hours worked, Not applicable, Non transformed data, Calendar and seasonally adjusted data	**DE_MTR**	Imports of goods and services - Rest of the World, Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data
DE_LNN	Total employment - Domestic (home or reference area), Total economy, Total - All activities, Persons, Not applicable, Non transformed data, Calendar and seasonally adjusted data	**DE_MUD_N**	Mark-up indicator (GDP deflator at basic prices growth - ULA growth)
DE_LRN	Annualised agreed rate (AAR) / Narrowly defined effective rate (NDER), Credit and other institutions (MFI except MMFs and central banks)Reportingsector - Loans (defined for cost of borrowing purposes, sum of A2A and A2Z (both related to non-financial corporations)), Total calculated by weighting the volumes with a moving Average (defined for cost of borrowing purposes), New business coverage, Non-Financial corporations (S.11) sector, denominated in Euro	**DE_MV**	GERMANY-DS Market Equity Index, source: DataStream

DE_LRN_OLD	Annualised agreed rate (AAR) / Narrowly defined effective rate (NDER), Credit and other institutions (MFI except MMFs and central banks)Reportingsector - Loans other than revolving loans and overdrafts, convenience and extended credit card debt, Total initial rate fixation, Total amount, New business coverage, Non-Financial corporations (S.11) sector, denominated in Euro	**DE_MV_FIN**	GERMANY-DS Financials Equity Index, source: DataStream
DE_LSH	Self employed - Domestic (home or reference area), Total economy, Total - All activities, Hours worked, Not applicable, Non transformed data, Calendar and seasonally adjusted data	**DE_MV_NFC**	GERMANY-DS NON-FINANCIAL Equity Index, source: DataStream
DE_LSN	Self employed - Domestic (home or reference area), Total economy, Total - All activities, Persons, Not applicable, Non transformed data, Calendar and seasonally adjusted data	**DE_MXD**	Extra imports deflator
DE_LUN	European Labour Force Survey; Unemployment; Total; Age 15 to 74; Total; Seasonally adjusted, not working day adjusted	**DE_MXN**	Quarterly, in levels (domestic currency), Imports of Goods and Services (extra euro area), National accounts definition, Nominal
DE_MED	Import deflator, energy	**DE_MXR**	Quarterly, in levels (domestic currency), Imports of Goods and Services (extra euro area), National accounts definition, Real
DE_MEED	Import deflator, excluding energy	**DE_N_C_DDN**	Reportinginstitutional sector Total economy - Distributed income of corporations - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_MIN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Mixed income, gross - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_N_C_IRN**	Reportinginstitutional sector Total economy - Interest - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Partially consolidated or aggregate containing both consolidated and non-consolidated items- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_MND	Intra imports deflator	**DE_N_C_OIN**	Reportinginstitutional sector Total economy - Other investment income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_MNN	Quarterly, in levels (domestic currency), Imports of Goods and Services (intra euro area), National accounts definition, Nominal	**DE_N_C_PPN**	Reportinginstitutional sector Total economy - Property income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Partially consolidated or aggregate containing both consolidated and non-consolidated items- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total

DE_N_C_RIN	Reportinginstitutional sector Total economy - Reinvested earnings on FDI (excluding IF) - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_GEI_FC**	Reportinginstitutional sector Financial corporations - Entrepreneurial income (gross) - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_C_RTN	Reportinginstitutional sector Total economy - Rent - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_GEI_NFC**	Reportinginstitutional sector Non financial corporations - Entrepreneurial income (gross) - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_CAN	Reportinginstitutional sector Total economy - Current external balance - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HEG**	HICP - Energy, Monthly Index, National Central Bank, Working day and seasonally adjusted
DE_N_CAN_BOP	-Quarterly- Neither seasonally adjusted nor calendar adjusted data- Germany vis-a-vis Rest of the World- sector: Total economy vis-a-vis Total economy- Transactions- Balance (Credits minus Debits)- Current account- Euro- All currencies- Compilation methodology based on international standards	**DE_N_HH_C_CTN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Other current transfers - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_N_CFKN	Reportinginstitutional sector Total economy - Consumption of fixed capital - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HH_C_DDN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Distributed income of corporations - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_CFKN_FC	Reportinginstitutional sector Financial corporations - Consumption of fixed capital - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HH_C_IRN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Interest - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total

DE_N_CFKN_NFC	Reportinginstitutional sector Non financial corporations - Consumption of fixed capital - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HH_C_OIN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Other investment income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_D_DDN	Reportinginstitutional sector Total economy - Distributed income of corporations - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HH_C_PPN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Property income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_N_D_IRN	Reportinginstitutional sector Total economy - Interest - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Partially consolidated or aggregate containing both consolidated and non-consolidated items- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HH_C_RIN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Reinvested earnings on FDI (excluding IF) - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_D_OIN	Reportinginstitutional sector Total economy - Other investment income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_HH_C_RTN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Rent - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total

Variable	Desciption	Variable	Desciption
DE_N_D_PPN	Reportinginstitutional sector Total economy - Property income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Partially consolidated or aggregate containing both consolidated and non-consolidated items- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	DE_N_HH_C_SBN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Social benefits other than social transfers in kind - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_N_D_RIN	Reportinginstitutional sector Total economy - Reinvested earnings on FDI (excluding IF) - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	DE_N_HH_C_SCN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Net social contributions - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_N_D_RTN	Reportinginstitutional sector Total economy - Rent - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	DE_N_HH_CFKN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Consumption of fixed capital - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_N_DTN_FC	Reportinginstitutional sector Financial corporations - Current taxes on income, wealth, etc. - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	DE_N_HH_D_CTN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Other current transfers - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_N_DTN_NFC	Reportinginstitutional sector Non financial corporations - Current taxes on income, wealth, etc. - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	DE_N_HH_D_IRN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Interest - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_HH_D_PPN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Property income - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	DE_N_RW_D_PPN	Reportinginstitutional sector Total economy - Property income - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_HH_D_RTN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Rent - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	DE_N_RW_NFAN	Reportinginstitutional sector Total economy - Financial net worth - Total financial assets/liabilities - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Net (Assets minus Liabilities) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total

DE_N_HH_D_SBN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Social benefits other than social transfers in kind - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_N_RW_TAN**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Total financial assets/liabilities - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Liabilities (Net Incurrence of) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_HH_DTN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Current taxes on income, wealth, etc. - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total	**DE_N_RW_TLN**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Total financial assets/liabilities - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Assets (Net Acquisition of) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_HH_IVN	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Changes in inventories and acquisition less disposals of valuables - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_S12_GOSMIN**	Reportinginstitutional sector Financial corporations - Operating surplus and mixed income, gross - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_HIF	HICP - Food incl. alcohol and tobacco, Monthly Index, Eurostat, Neither seasonally nor working day adjusted	**DE_N_SKFN**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Fixed assets by type of asset (net) - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Not applicable- Current prices - Euro- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_MTN_BOP	-Quarterly- Neither seasonally adjusted nor calendar adjusted data- Germany vis-a-vis Rest of the World- sector: Total economy vis-a-vis Total economy- Transactions- Debit (Uses)- Goods and services- Euro- All currencies- Compilation methodology based on international standards	**DE_N_SKFR**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Fixed assets by type of asset (net) - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Not applicable- Chain linked volume (rebased) - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_NFAN	Reportinginstitutional sector Total economy - Financial net worth - Total financial assets/liabilities - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Net (Assets minus Liabilities) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_SKHN**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Dwellings (gross) - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Not applicable- Current prices - Euro- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_RPPD	Whole country; Transaction value - Index; Residential property, All dwelling types, new and existing; Compiled by European Central Bank (ECB)	**DE_N_SKHR**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Dwellings (gross) - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Debit (Uses) - Not applicable- Chain linked volume (rebased) - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total

DE_N_RW_C_IPN	Reportinginstitutional sector Total economy - Interest - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_TAN**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Total financial assets/liabilities - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Assets (Net Acquisition of) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_RW_C_OPPN	Reportinginstitutional sector Total economy - Property income other than interest - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_TBN_BOP**	-Quarterly- Neither seasonally adjusted nor calendar adjusted data- Germany vis-a-vis Rest of the World- sector: Total economy vis-a-vis Total economy- Transactions- Balance (Credits minus Debits)- Goods and services- Euro- All currencies- Compilation methodology based on international standards
DE_N_RW_C_PPN	Reportinginstitutional sector Total economy - Property income - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_TLN**	Reportinginstitutional sector Total economy - Closing balance sheet/Positions/Stocks - Total financial assets/liabilities - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Liabilities (Net Incurrence of) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total
DE_N_RW_D_IPN	Reportinginstitutional sector Total economy - Interest - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_US_HIC**	United States - HICP - Overall index, Monthly Index, Eurostat, Neither seasonally nor working day adjusted
DE_N_RW_D_OPPN	Reportinginstitutional sector Total economy - Property income other than interest - Not applicable - Not applicable - Counterpart area Rest of the World, counterpart institutional sector Total economy - Debit (Uses) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Neither seasonally adjusted nor calendar adjusted - Total	**DE_N_XTN_BOP**	-Quarterly- Neither seasonally adjusted nor calendar adjusted data- Germany vis-a-vis Rest of the World- sector: Total economy vis-a-vis Total economy- Transactions- Credit (Resources)- Goods and services- Euro- All currencies- Compilation methodology based on international standards
DE_NFAN	Nominal net foreign assets	**DE_OMTR**	Target of Imports goods and services real
DE_NFANRV	Revaluation on nominal net foreign assets	**DE_OMXD**	Target of Imports goods and services deflator, Extra euro area
DE_NFANRV_S	Share of revaluation on nominal net foreign assets	**DE_OMXR**	Target of Imports goods and services real, Extra euro area
DE_NHEF	NIPE HICP excluding unprocessed food and energy	**DE_OS_RPPD**	Target relative house prices to private consumption deflator
DE_NHEG	NIPE HICP energy	**DE_OS_RPPD_T**	Target relative house prices to private consumption deflator, trend
DE_NHEX	NIPE HICP excluding energy	**DE_OXTD**	Target of Exports goods and services deflator
DE_NHIC	NIPE HICP	**DE_OXTR**	Target of Exports goods and services real
DE_NHIF	NIPE HICP food	**DE_OXXD**	Target of Exports goods and services deflator Extra
DE_OHEF	Long-run target of energy component of HICP excluding unprocessed food and energy	**DE_OXXR**	Target of Exports goods and services real, Extra
DE_OHEG	Long-run target of energy component of HICP	**DE_PCU**	World,Quarterly, in levels, Non-energy commodity prices (in USD), External
DE_OHIF	Long-run target of energy component of HICP food	**DE_PD_NFC_EA**	Expected default frequency within one year - Non-financial corporations - Average weighted by total assets provided by ECB, model changed from EDF8 to EDF9 as of 1 June 2015
DE_OIS_10Y	Long term interest rates	**DE_POP**	Total population - World (all entities, including reference area, including IO), Total economy, Persons, Not applicable, Non transformed data, Calendar and seasonally adjusted data
DE_OLNN	Target of employment	**DE_POU**	World,Quarterly, in levels, Oil price assumption (in USD), External
DE_OLSN	Target of self-employed	**DE_PROPERTY_PAC_PE**	PAC Expectations of property income
DE_OMEED	Target of Imports goods and services deflator, excluding energy	**DE_Q_MV**	MSCI source: DataStream
DE_Q_MV_FIN	MSCI Germany Financials, source: DataStream	**DE_S_RW_NFAN**	Share of net foreign assets to nominal GDP

DE_Q_S_RPPD_IHD	Quarterly growth rate of relative house price to residential investment deflator	**DE_S_SCNL**	Share of social security contribution attributed to labour income
DE_Q_T_PRO	Trend productivity (quarterly)	**DE_S_SCNT**	Share of social security contribution attributed to transfer income
DE_Q_TAU	Population growth (quarterly)	**DE_S_TIH**	Indirect taxes related to housing. Share of housing taxes on housing wealth(HWN)
DE_Q16_S_RPPD	Average growth rate of relative house prices	**DE_S11_GOSMIN**	Reportinginstitutional sector Non financial corporations - Operating surplus and mixed income, gross - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Balance (Credits minus Debits) - Not applicable- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total
DE_R_LFP	labour force participation rate	**DE_SAX**	Savings ratio
DE_R_LUN	Unemployment rate	**DE_SAX_N**	Household saving ratio
DE_R_LUN_LFS	Quarterly, Unemployment rate (% of labour force), Labour Market	**DE_SCB**	Corporate bond spread
DE_R_LUN_LFSI	European Labour Force Survey; Unemployment rate; Total; Age 15 to 74; Total; Seasonally adjusted, not working day adjusted	**DE_SCOE**	Spread on the cost of equity
DE_RESIDENTIAL_PAC_PE	PAC Expectations of residential	**DE_SIVR**	Stock of inventories real
DE_RPPD	Residential Property Price deflator	**DE_SKFR**	Real total capital stock
DE_S_DTNL	Share of direct taxes attributed to labour income	**DE_SKHR**	Residential Capital Stock (real)
DE_S_DTNT	Share of direct taxes attributed to transfer income	**DE_SLRN**	Spread on business lending rate
DE_S_RPPD	Relative House Prices to Consumption deflator	**DE_STN**	Euro area (changing composition) - Money Market - Euribor 3-month - Historical close, Average of observations through period - Euro, provided by Refinitiv Euribor 3-month - Historical close, Average of observations through period
DE_S_RPPD_IHD	Relative house price to residential investment deflator	**DE_T_A_C_CEN**	Trend of A_C_CEN
DE_T_BU_Y_Q_ITR	Desired capital ratio output growth trend	**DE_TIN**	Taxes on production and imports less subsidies - Domestic (home or reference area), Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Seasonally adjusted data, not calendar adjusted
DE_T_BU_Y_Q_ITR_100	Desired capital ratio output growth trend	**DE_TREND_MTR_AUX**	Imports goods and services, real, trend
DE_T_C_LNH	Trend total hours per employed	**DE_TREND_MXD_AUX**	Imports goods and services deflator, extra, trend
DE_T_G_C_CER	Trend of G_C_CER	**DE_TREND_MXR_AUX**	Imports goods and services real, extra, trend
DE_T_LNN	Trend employment	**DE_TREND_XTD_AUX**	Exports goods and services deflator, trend
DE_T_PRO	Productivity (labour augmented)	**DE_TREND_XTR_AUX**	Exports goods and services real, trend
DE_T_Q_YER	Quarterly growth rate of potential GDP	**DE_TREND_XXD_AUX**	Exports goods and services deflator, extra trend
DE_T_Q_YER_100	QoQ growth rate of potential real GDP /100	**DE_TREND_XXR_AUX**	Exports goods and services real, extra trend
DE_T_R_LFP	trend labour force participation rate	**DE_TTREND**	Time trend
DE_T_R_LUN	Quarterly, NAIRU (iterative for multiple NCB estimates)	**DE_URT_N**	NAIRU
DE_T_Y_SIVR	Share of stock of inventories over GDP trend	**DE_URX**	Unemployment rate (% of labour force)
DE_T_YER	Quarterly, in levels (domestic currency), Potential output (iterative for multiple NCB estimates)	**DE_URX_N**	Unemployment rate (% of labour force)
DE_TAU	Population growth (level)	**DE_W0_CEN**	Reportinginstitutional sector Households and non profit institutions serving households (NPISH) - Compensation of employees - Not applicable - Not applicable - Counterpart area World (all entities, including reference area, including IO), counterpart institutional sector Total economy - Credit (Resources) - Non-consolidated- Current prices - Domestic currency (incl. conversion to current currency made using a fixed parity)- Calendar and seasonally adjusted data - Total

DE_TBN	Nominal trade balance	**DE_WAN**	Compensation excluding social security contributions
DE_TBR	Real trade balance	**DE_WAP**	European Labour Force Survey; Population; Total; Age 15 to 64; Total; Neither seasonally nor working day adjusted
DE_WDR	Quarterly, in levels (domestic currency), World demand	**DE_Y_DNFAN**	Delta net foreign asset position share in nominal GDP
DE_WDREX	Quarterly, in levels (domestic currency), World demand - extra euro area	**DE_Y_ITD**	Relative Price of investment to GDP deflator
DE_WDRIN	Quarterly, in levels (domestic currency), World demand - intra euro area	**DE_Y_SIVR**	Share of stock of inventories real over GDP real
DE_WER	Domestic absorption (Import demand indicator)	**DE_YED**	GDP Deflator
DE_WEREX	Extra domestic absorption (Import demand indicator)	**DE_YEG_N**	Output gap (% of potential output)
DE_WSTN	United Kingdom - Money Market - US Dollar 3-month British Bankers` Association (BBA) Libor - Historical close, Average of observations through period - US dollar, provided by Refinitiv US Dollar 3-month British Bankers` Association (BBA) Libor - Historical close, Average of observations through period	**DE_YEN**	Gross domestic product at market prices - Domestic (home or reference area), Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data
DE_XND	Intra exports deflator	**DE_YER**	Gross domestic product at market prices - Domestic (home or reference area), Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data
DE_XNN	Quarterly, in levels (domestic currency), Exports of Goods and Services (intra euro area), National accounts definition, Nominal	**DE_YER_VAR**	Real GDP VAR
DE_XNR	Quarterly, in levels (domestic currency), Exports of Goods and Services (intra euro area), National accounts definition, Real	**DE_YER_VAR_DB**	Variance of GDP times debt to GDP demeaned
DE_XTD	Total exports deflator	**DE_YET_N**	Potential output
DE_XTN	Exports of goods and services - Rest of the World, Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Current prices, Non transformed data, Calendar and seasonally adjusted data	**DE_YRB_10Y**	10-year Government Benchmark bond yield - Yield
DE_XTR	Exports of goods and services - Rest of the World, Total economy, Domestic currency (incl. conversion to current currency made using a fix parity), Chain linked volume (rebased), Non transformed data, Calendar and seasonally adjusted data	**DE_YRBY10**	Benchmark bond - Germany 10 Years Government Benchmark Bond - Yield - Euro, source: Refinitiv
DE_XXD	Extra exports deflator	**DE_ZHICP**	Modeled residual of HICP
DE_XXN	Quarterly, in levels (domestic currency), Exports of Goods and Services (extra euro area), National accounts definition, Nominal	**DUMMY_CRISIS**	Dummy for crisis
DE_XXR	Quarterly, in levels (domestic currency), Exports of Goods and Services (extra euro area), National accounts definition, Real	**dummy_long_run**	dummy_long_run for nfa (1 in long-run, 0 otherwise)
DYN_H_HICP	Dummy for homogeneity restriction in HICP equation	**res_DE_G_C_CER**	Residual gap compensation per employee
res_DE_A_YED	Residual for Annualised quartlerly GDP deflator	**res_DE_G_YER**	Resdiual for Output gap
res_DE_BU_ITD_tmp	Resdiual for Business investment, Deflator	**res_DE_GOSMIN**	Resdiual for Gross operating suprlus
res_DE_BU_ITR	Resdiual for Business investment, Real	**res_DE_H_HH_S_DIRL**	Resdiual for Trend of labour income over total income
res_DE_BU_Q_ITD	Resdiual for Business investment, Deflator quartlery	**res_DE_H_HH_S_DIRP**	Resdiual for Trend of property income over total income
res_DE_C_CER_TAR_tmp	Resdiual for Target for real compensation per employee	**res_DE_H_HH_S_DIRT**	Resdiual for Trend of transfer income over total income
res_DE_C_LNH	Resdiual for Total hours per employed	**res_DE_H_HH_Y_DIR**	Resdiual for Trend of total income over GDP
res_DE_CB	Resdiual for Corporate bond rate	**res_DE_H_Q_YER**	Resdiual forQuarterly HP growth rate of potential GDP
res_DE_CMD	Resdiual for Competitors import prices	**res_DE_HEF**	Resdiual for HICP excluding unprocessed food and energy
res_DE_CMDEX	Resdiual for Competitors import prices - extra euro area	**res_DE_HEG**	Resdiual for HICP energy
res_DE_COE	Resdiual for cost of equity	**res_DE_HEX**	Resdiual for HICP excluding energy
res_DE_CP_10Y	Resdiual for 10-year Government Benchmark bond yield - Yield	**res_DE_HGPDR**	Resdiual for Change in relative price (smoothened)
res_DE_CXD	Resdiual for Competitors export prices	**res_DE_HH_B_APN**	Resdiual for Net Adjustment for the change in pension entitlements by households

res_DE_EHIC	Residual perceived expected inflation	**res_DE_HH_B_IRN**	Resdiual for Net interest income of households nominal
res_DE_FWN	Resdiual for financial wealth	**res_DE_HH_B_KTN**	Resdiual for Net Capital transfers by households
res_DE_HH_B_OPPN	Resdiual for Net other property income nominal	**res_DE_HH_OIHR**	Resdiual for Business investment, Target Residential Investment
res_DE_HH_B_SBN	Resdiual for Net Social benefits	**res_DE_HH_PYN**	Resdiual for Disposable income, Nominal
res_DE_HH_B_SCN	Resdiual for Net social security contributions	**res_DE_HH_Q_COD**	Resdiual for consumption deflator
res_DE_HH_C_DDR	Resdiual for Dividend income of households real	**res_DE_HH_Q_IHD**	Resdiual for investment deflator
res_DE_HH_COR	Resdiual for Individual Consumption Expenditure Real, temporary	**res_DE_HH_SL_CON**	Resdiual for Spread on consumption credit
res_DE_HH_D_IHN	Resdiual for Nominal disposable income from transfers	**res_DE_HH_SL_DEP**	Residual for Spread on households deposits
res_DE_HH_DTN	Resdiual for Business investment, Real	**res_DE_HH_SL_IHN**	Resdiual for Spread on housing investment
res_DE_HH_GOS	Resdiual for Gross Operating Surplus (household)	**res_DE_HICP**	Resdiual for HICP
res_DE_HH_IHR	Resdiual for Residential investment deflator	**res_DE_HIF**	Resdiual for HICP food
res_DE_HH_ITN	Resdiual for Household nominal investment, Nominal	**res_DE_HWN**	Resdiual for Household wealth non-financial
res_DE_HH_IVN	Resdiual for Household nominal inventories	**res_DE_IR_TAN_RV**	Resdiual for Revaluation term of Interest rate on total assets nominal
res_DE_HH_L_CON	Resdiual for Consumer lending rate	**res_DE_IR_TLN_RV**	Resdiual for Revaluation term of Interest rate on total liabilities nominal
res_DE_HH_L_DEP	Resdiual for Deposit rate	**res_DE_IVN**	Resdiual for Changes in inventories and acquisition less disposals of valuables
res_DE_HH_L_IHN	Resdiual for Residential investment lending rate	**res_DE_LNN**	Resdiual for total employment
res_DE_HH_NPN	Resdiual for Acquisitions less disposal of non-produced non-financial assets by households	**res_DE_LRN**	Resdiual for Business lending rate
res_DE_LSN	Residual for Self-employed	**res_DE_OXXD_tmp**	Resdiual for Target of Exports goods and services deflator Extra
res_DE_MEED	Resdiual for Import deflator, excluding energy	**res_DE_OXXR_tmp**	Resdiual forTarget of Exports goods and services real, Extra
res_DE_MIN	Resdiual for Mixed income	**res_DE_Q_T_PRO**	Resdiual for Trend productivity (quarterly)
res_DE_MTD	Resdiual for Total imports deflator	**res_DE_R_LFP**	Resdiual for trend labour force participation rate
res_DE_MTR	Resdiual for Total imports real	**res_DE_S_DTNL**	Resdiual for Share of direct taxes attributed to labour income
res_DE_MXD	Resdiual for Total imports deflator, extra-euro area	**res_DE_S_DTNT**	Resdiual for Share of direct taxes attributed to transfer income
res_DE_MXR	Resdiual for Total imports real, extra-euro area	**res_DE_S_RPPD**	Resdiual for Relative House Prices to Consumption deflator
res_DE_NFAN	Resdiual for Revaluation on nominal net foreign assets	**res_DE_SCB**	Resdiual for Spread on the cost of equity
res_DE_NFANRV_S	Resdiual for Share of revaluation on nominal net foreign assets	**res_DE_SCOE**	Corporate bond spread
res_DE_OMEED_tmp	Resdiual for Target of Imports goods and services deflator, excluding energy	**res_DE_SIVR**	Residual for Stock of inventories real
res_DE_OMTR_tmp	Resdiual for Target of Imports goods and services real	**res_DE_SLRN**	Resdiual for Spread on business lending rate
res_DE_OMXD_tmp	Resdiual for Target of Imports goods and services deflator, Extra euro area	**res_DE_T_BU_Y_Q_ITR**	Resdiual for Desired capital ratio output growth trend
res_DE_OMXR_tmp	Resdiual for Target of Imports goods and services real, Extra euro area	**res_DE_T_BU_Y_Q_ITR_100**	Resdiual for Desired capital ratio output growth trend
res_DE_OXTD_tmp	Resdiual for Target of Exports goods and services deflator	**res_DE_T_C_LNH**	Resdiual for Trend total hours per employed
res_DE_OXTR_tmp	Resdiual for Target of Exports goods and services real	**res_DE_T_Q_YER_100**	Resdiual for QoQ growth rate of potential real GDP /100
res_DE_T_R_LFP	Resdiual for trend labour force participation rate	**U2_A_YED**	Euro area annual inflation
res_DE_T_R_LUN	Resdiual for Trend unemployment rate	**U2_dUSTP_10Y**	De-meaned 10 year US term premium
res_DE_T_Y_SIVR	Residual for Share of stock of inventories over GDP trend	**U2_EHIC**	Euro area inflation expectations
res_DE_TAU	Resdiual for Population growth (level)	**U2_ESTN**	Euro area interest rate expectations
res_DE_TIN	Resdiual for Taxes on production	**U2_EXR**	Nominal exchange rate against US dollar
res_DE_W0_CEN	Residual for Compensation of employees receivable by households	**U2_G_EYER**	Expected real GDP gap
res_DE_WDR	Resdiual for World demand	**U2_G_YER**	Euro area output gap
res_DE_XTD	Resdiual for Exports goods and serices, deflator	**U2_G_YER_E10Y**	Expected 10Y real GDP gap
res_DE_XTR	Resdiual for Exports goods and services, real	**U2_G_YER_E10Y_VE**	VAR expectations of 10Y real GDP gap
res_DE_XXD	Resdiual for Exports goods and serices, deflator, extra euro area	**U2_OIS_10Y**	Euro Overnight Index Swap 10-year (EONIA)
res_DE_XXR	Resdiual for Exports goods and services, real, extra euro area	**U2_PCU**	Commodity price (in US dollar)
res_DE_YER	Resdiual for Real GDP	**U2_POU**	Oil price (in US dollar)
res_DE_ZHICP	Resdiual for Business investment, Real	**U2_STN**	Policy rate (EURIBOR)

res_U2_TP_10Y	Resdiual for Business investment, Real	**U2_STN_E10Y**	Expected 10Y short term interest rate
res_U2_USTP_10Y	Resdiual for Business investment, Real	**U2_STN_E10Y_VE**	VAR expectations of 10Y short term interest rate
U2_TP_10Y	10 years term premium	**DE_.T_Q_YER**	Quarterly growth rate of potential GDP
U2_US_10Y	Long-term U.S. interest rate	**DE_.T_Q_YER_100**	Quarterly growth rate of potential GDP
U2_USTP_10Y	10 year US term premium	**DE_.T_R_LFP**	Trend labour force participation rate
DE_.T_BU_Y_Q_ITR_100	Desired capital ratio output growth trend	**DE_.T_R_LUN**	Trend unemployment rate
DE_.T_C_LNH	Trend total hours per employed	**DE_.T_Y_SIVR**	Compensation of Employees
DE_.T_G_C_CER	Trend Gap compensation per employee per head	**DE_.T_YER**	Potential GDP
DE_.T_LNN	Trend employment	**DE_.WAN**	Compensation excluding social security contributions
DE_.T_PRO	Productivity (labour augmented)	**DE_.WAP**	Working age participation assumed to be equal to total population

References

Adjemian, S., Bokan, N., Darracq Pariès, M., Müller, G. & Zimic, S. (2024), ECB-(RE)BASE: Heterogeneity in expectation formation and macroeconomic dynamics, Working Paper Series 2965, European Central Bank.

Adjemian, S., Juillard, M., Karamé, F., Mutschler, W., Pfeifer, J., Ratto, M., Rion, N. & Villemot, S. (2024), Dynare: Reference Manual, Version 6, Dynare Working Papers 80, CEPREMAP.
URL: *https://ideas.repec.org/p/cpm/dynare/080.html*

Angelini, E., Bokan, N., Christoffel, K. P., Ciccarelli, M. & Zimic, S. (2019), 'Introducing ECB-Base: The Blueprint of the New ECB Semi-Structural Model for the Euro Area', *Working Paper* (2315).

Brayton, F., Davis, M. & Tulip, P. (2000), Polynomial Adjustment Costs in the FRB-US, mimeo, Federal Reserve Bank.

Brayton, F. & Tinsley, P. (1996), A guide to FRB/US: A macroeconomic model of the United States., Finance and economics discussion series 1996-42, Board of Governors of the Federal Reserve System.

Ciccarelli, M., Darracq Paries, M., Landau, B. & Sousa, J. (2023), 'Why we need models to make projections'. European Central Bank Blog.
URL: *https://www.ecb.europa.eu/press/blog/date/2023/html/ecb.blog230705 d16c61381c.en.html*

Ciccarelli, M., Darracq Pariès, M. & Priftis, R. (2024), ECB macroeconometric models for forecasting and policy analysis: Development, current practices and prospective challenges, Occasional Paper 344, European Central Bank.
URL: *https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op344 53b9e2aa4d.en.pdf*

Cogley, T. & Sbordone, A. M. (2008), 'Trend inflation, indexation, and inflation persistence in the new keynesian phillips curve', *American Economic Review* **98**(5), 2101–26.
URL: *http://www.aeaweb.org/articles?id=10.1257/aer.98.5.2101*

Darracq Pariès, M., Kilponen, J. & Notarpietro, A. (2021), Review of macroeconomic modelling in the eurosystem: Current practices and scope for improvement, Occasional Paper Series 267, European Central Bank, Frankfurt am Main. Edited by.

Dieppe, A., González Pandiella, A. & Willman, A. (2011), The ecb's new multi-country model for the euro area: Nmcm – simulated with rational expectations, ECB Working Paper 1315, European Central Bank. Available at European Central Bank Working Paper Series, No. 1315.
URL: *https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1315.pdf*

European Central Bank (2016), *A Guide to the Eurosystem/ECB Staff Macroeconomic Projection Exercises*, European Central Bank.
URL: *https://op.europa.eu/en/publication-detail/-/publication/3e9f7e58-7650-11e6-b076-01aa75ed71a1*

Galì, J. (2011), 'The Return of the Wage Phillips curve', *Journal of the European Economic Association* **9**.

Galì, J., Smets, F. & Wouters, R. (2012), 'Unemployment in an Estimated New Keynesian Model', *NBER Macroeconomics Annual* **26**(1), 329–360.
URL: *https://ideas.repec.org/a/ucp/macann/doi10.1086-663994.html*

Goldstein, M. & Khan, M. S. (1985), Income and price effects in foreign trade, *in* R. W. Jones & P. B. Kenen, eds, 'Handbook of International Economics', Vol. 2 of *Handbook of International Economics*, Elsevier, chapter 20, pp. 1041–1105.
URL: *https://ideas.repec.org/h/eee/intchp/2-20.html*

Hubrich, K. & Karlsson, T. (2010), Trade consistency in the context of the Eurosystem projection exercises - an overview, Occasional Paper Series 108, European Central Bank.
URL: *https://ideas.repec.org/p/ecb/ecbops/2010108.html*

Kozicki, S. & Tinsley, P. A. (2002), 'Dynamic specifications in optimizing trend-deviation macro models', *Journal of Economic Dynamics and Control* **26**(9-10), 1585–1611.
URL: *https://www.sciencedirect.com/science/article/pii/S0165188901000860*

Tinsley, P. (2002), 'Rational error correction', *Computational Economics* **19**.

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