MIDAS includes the descriptions of models in use by the Commission in support to the policy cycle. MIDAS is developed and managed by the **Competence Centre on Modelling** of the European Commission.

Find out more at https://ec.europa.eu/knowledge4policy/modelling_en
Contact: EU-MIDAS@ec.europa.eu

Factsheet

SWD/2020/245 final

IMPACT ASSESSMENT Accompanying the document Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union

Supporting model(s)

EUROMOD, QUEST, TaxBEN

Impact assessment
SWD/2020/245 final

Fact sheet on model contributions

Source: Commission modelling inventory and knowledge management system (MIDAS)

Date of Report Generation: 30/03/2021

Overview

Title
IMPACT ASSESSMENT Accompanying the document Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union

Document ID
SWD/2020/245 final

Year of publication
2020

Led by
EMPL

Model(s) used
EUROMOD, QUEST, TaxBEN

Additional information on model use for this Impact assessment

-

EUROMOD

Full title

EUROMOD Microsimulation

Run for this impact assessment by

European Commission, JRC

Contributed to

Baseline and assessment of policy options

Helped to assess the following impacts

Impact area	*Impact category*	*Impact subcategory*
Economic impacts	Public authorities	Budgetary consequences for public authorities
Economic impacts	Macroeconomic environment	Economic growth and employment
Social	Employment	Impact on jobs
Social	Employment	Impact on jobs in specific sectors, professions, regions or countries
Social	Working Conditions	Wages, labour costs or wage setting mechanisms
Social	Effects on income, distribution and social inclusion	Households income and at risk of poverty rates
Social	Effects on income, distribution and social inclusion	Inequalities and the distribution of incomes and wealth

QUEST

Full title

Macroeconomic model QUEST

Run for this impact assessment by

European Commission, DG ECFIN

Contributed to

Baseline and assessment of policy options

Helped to assess the following impacts

Impact area	*Impact category*	*Impact subcategory*
Economic impacts	Macroeconomic environment	Economic growth and employment
Social	Employment	Impact on jobs
Social	Working Conditions	Wages, labour costs or wage setting mechanisms
Social	Effects on income, distribution and social inclusion	Inequalities and the distribution of incomes and wealth

TaxBEN

Full title

The OECD tax-benefit model

Run for this impact assessment by

OECD

Contributed to

Baseline and assessment of policy options

Helped to assess the following impacts

Impact area	*Impact category*	*Impact subcategory*
Social	Employment	Opportunities and incentives of workers/specific groups to work

TaxBEN

Full title

The OECD tax-benefit model

Run for this impact assessment by

European Commission, DG EMPL

Contributed to

Baseline only

Helped to assess the following impacts

Impact area	*Impact category*	*Impact subcategory*
Social	Employment	Opportunities and incentives of workers/specific groups to work
Social	Working Conditions	Wages, labour costs or wage setting mechanisms
Social	Effects on income, distribution and social inclusion	Households income and at risk of poverty rates

EUROMOD Microsimulation

Fact sheet

Source: Commission modelling inventory and knowledge management system (MIDAS)

Date of Report Generation: 30/03/2021

Overview

Acronym EUROMOD
Full title EUROMOD Microsimulation

Main purpose:
A static tax benefit microsimulation model, covering the EU Member States, used to assess the budgetary and distributional consequences of consolidated and prospective policy reforms.

Summary
EUROMOD is a static tax-benefit microsimulation model, developed at the University of Essex with the financial support of the Commission (DG-EMPL), the model enables the simulation of individual and household tax liabilities and benefit entitlements according to the policy rules in place in each EU member state. Over the last years, the model developing and maintenance has been progressively transferred to the JRC through a process ending in 2020. The transfer of EUROMOD has been a joint effort by DG EMPL together with DG ECFIN, DG TAXUD, DG REFORM, DG ESTAT and the JRC.

The model covers all European countries in a consistent manner, allowing for flexibility of the analyses and comparability of the results. EUROMOD combines information on policy rules with detailed and representative micro-data on individual and household circumstances drawn from the EU Statistics on Income and Living Conditions (EU-SILC). The simulations cover a large part of the tax and benefit components of household disposable income, in particular direct taxes and non-contributory cash benefits. The components of disposable income which are not simulated are taken directly from the data. Additionally, a specific EUROMOD module allows performing simulations based on hypothetical household data, a synthetic set of microdata where family and labour market characteristics are defined by the user.

EUROMOD can be used for policy formulation or evaluation, to analyse the effects of actual and prospective changes in tax-benefit policies over time, studying for example their budgetary implications, the effects on policy and inequality and the impact on work incentives.

A EUROMOD extension (Indirect Tax Tool) allowing the simulation of indirect taxes in 18 EU countries is currently under development. The JRC intends to further extend the number of countries included by end 2021.

Keywords
tax-benefit , microsimulation

Model category (thematic)
Economy

Model home page
https://euromod-web.jrc.ec.europa.eu/

Ownership & license

Ownership

Multiple copyright [Original code owned by 3rd party]

Ownership details

EUROMOD was developed by the University of Essex, Institute for Social & Economic Research. Over the last years, the model developing and maintenance have been progressively transferred to the JRC through a process ending in 2020. The transfer of EUROMOD has been a joint effort by DG EMPL together with DG ECFIN, DG TAXUD, DG REFORM, DG ESTAT and DG JRC.

Licence type

Non-Free Software licence. The license has one or more of the following restrictions: it prohibits creation of derivative works; it prohibits commercial use; it obliges to share the licensed or derivative works on the same conditions.

Details

EUROMOD structure and approach

For a complete overview of EUROMOD readers are invited to consult Sutherland and Figari (2013), "EUROMOD: The European Union Tax-Benefit Microsimulation Model", International journal of microsimulation, 6(1) 4-26". The paper is the main source of information for the following sections (Detail on EUROMOD structure and approach; Input and parameters).

EUROMOD is a static tax-benefit calculator that allows the simulation of tax liabilities and benefit entitlements for a representative sample of households and individuals in each EU Member State. The model is static, in the sense that it does not take into account behavioural responses of individuals. The scope of EUROMOD simulations includes Personal Income Tax, Social Insurance Contributions paid by employees, self-employed and employers and most non-contributory benefits. Contributory benefits are usually not simulated because of lack of relevant information (e.g. contribution history) in the underlying data. Nevertheless, some contributory benefits such as unemployment benefits are simulated making use of assumptions where needed.

Tax benefit instruments that are not simulated are used as collected in the underlying data and included in the concept of disposable income. This is the case for most contributory benefits, for example pensions.

Depending on when a country module was first introduced in EUROMOD, the first policy system included in the model varies from 2005 to 2007 (2011 for Croatia). All the following policy systems are included up to the current year (2020).

EUROMOD baseline simulations are validated and tested both at a micro level (i.e. case-by-case validation) and at macro level (comparing aggregate amounts and recipients/payers with official statistics). A similar process is applied to income distribution and poverty statistics. The results of the validation exercises are reported in the Country Reports (available on the EUROMOD web pages).

Although EUROMOD simulations usually assume full benefit take up and full tax-compliance, adjustments for benefit non take-up and/or tax evasion are simulated in a number of country modules. Such adjustments are modelled in a transparent way that can be activated or deactivated by users.

EUROMOD code is written in C# and compiled. Users use the model through a standalone user interface, programmed using Microsoft .net Framework.

See Sutherland and Figari (2013) for a complete overview of EUROMOD.

Input and parametrization

EUROMOD input datasets are usually derived from the European Union Statistics on Income and Living Conditions (EU-SILC). In some cases the EU-SILC is enriched using variables contained in the national SILC surveys which are at the basis of the SILC. In some other cases the national SILC surveys are used directly. The EUROMOD input datasets include the following key inputs:

- Demographics at household and individual level
- labour market characteristics
- gross incomes from market and other income sources (i.e. pensions, public transfers and private incomes

A network of teams of national experts also collects information on the policy rules in place in each country each year.

The original survey data undergo a process of transformation and imputation before being used as EUROMOD input dataset. In particular, a process of imputation aimed at "splitting" the aggregated benefit variables provided in EU-SILC is applied. The process is described in the EUROMOD country reports. In addition, variables are renamed to follow the EUROMOD naming convention (aimed at improving cross-country comparability).

The income variables contained in a EUROMOD input dataset are uprated using specific uprating factors when the year to which the income variables refers to differs from the tax-benefit systems to be simulated.

See Sutherland and Figari (2013) for a complete overview of EUROMOD.

Main output
The output microdata contains information on the:

- demographic characteristics of individual and households, as well as their financial circumstances
- simulated and non-simulated tax-benefit instruments
- disposable income.

The information contained in the output microdata can be analysed using statistical software such as STATA.

Spatial - temporal extent
The output has the following spatial-temporal resolution and extent:

Parameter	Description
Spatial Extent / Country Coverage	EU Member States
(Spatial) resolution	Individual and household level
Temporal extent	2005 – current year (9 countries); 2006 – current year (18 countries); 2007-current year (27 countries); 2011-current year (28 countries)
Temporal resolution	Yearly

Quality & transparency

Quality

Question	Answer	Details
Models are by definition affected by uncertainties (in input data, input parameters, scenario definitions, etc.). Have the model uncertainties been quantified? Are uncertainties accounted for in your simulations?	no	Deterministic model. Users can design uncertainty through simulating various scenarios.
Sensitivity analysis helps identifying the uncertain inputs mostly responsible for the uncertainty in the model responses. Has the model undergone sensitivity analysis?	not_applicable	Due to the nature of the model this does not apply.
Has the model undergone external peer review by a panel of experts, or have results been published in peer-reviewed journals?	yes	Model review is assured by its academic and policy uses and annual validation. EUROMOD coding language allow users to check what is modelled and how. Papers using EUROMOD are published in peer-reviewed journals.
Has model validation been done? Have model predictions been confronted with observed data (ex-post)?	yes	Simulation results are validated against official statistics. The validation process is documented in a series of country reports.

References related to external peer-review and publication in scientific journals:

- No references provided in MIDAS

Transparency

Question	Answer	Details
Is the model underlying database (i.e. the database the model runs are based on) publicly available?	no	Underlying input data are made available by the University of Essex and the European Commission to researchers who have been granted access to the model. See EUROMOD website for more information.
Can model outputs be made publicly available?	yes	Output microdata can be only made available to approved researchers. Aggregate measures derived from output microdata are made available in the EUROMOD website.
Is the model transparently documented (including underlying data, assumptions and equations, architecture, results) and are these documents available to the general public?	yes	The model structure is documented in a user manual included in the model. Model simulations and content are described in country reports publicly available on the EUROMOD website. The process of data manipulation for the creation of the EUROMOD input dataset is described in the Data Requirement Documents (DRDs), provided together with the EUROMO input datasets. Other reReferences related to documentation are the EUROMOD country reports (https://www.euromod.ac.uk/using-euromod/country-reports).
Is the model source code publicly accessible or open for inspection?	no	The University of Essex and the JRC are working toward releasing the source code, the user interface and the

country parameter files as open source.

References related to documentation:

- No references provided in MIDAS

The model's policy relevance and intended role in the policy cycle

The model is designed to contribute to the following policy areas

- Economy, finance and the euro

The model is designed to contribute to the following phases of the policy cycle

- Formulation
- Evaluation

The model's potential

EUROMOD is unique in being a research tool that is relevant not only at national level and as an integrated tool for European comparative social science research, but also as a model of the EU as a whole. EUROMOD brings a distinctive economic research on the redistributive effects of tax-benefit policies across Europe. See the publication section of the EUROMOD website (https://www.euromod.ac.uk/publications/type/Journal%20Article) for a list of publications.

The JRC has developed an interaction of EUROMOD with the DG ECFIN model QUEST and in close collaboration with DG ECFIN and ZEW-Mannheim, see Barrios et al. (2016). Published JRC research includes analyses of in-work tax expenditures for low income workers, see Barrios et al. (2015) and contributions to the Commission Tax reforms in the EU Member States report (see European Commission 2014, 2015). EUROMOD is also used in combination with the GEM-E3 model to analyse the distributional impact of green taxes. EUROMOD provides also the micro-parameters needed to run the EDGE-M3 model.

The model has increasingly been used by the Commission services over the past few years. DG EMPL use results from the model for its Quarterly and Annual reports on Employment and Social Developments in Europe (European Commission 2018) and different research notes delivered in the context of the Social Situation Monitor are based on EUROMOD. EUROMOD based simulations are also used by DG ECFIN in the Report on Public Finances in EMU (European Commission 2017). EUROMOD is also used by ESTAT for the production of the flash estimates on income and povertyhttps://ec.europa.eu/eurostat/web/experimental-statistics/income-inequality-and-poverty-indicators. Improved timeliness in the data production and the flash estimates using EUROMOD are part of a two-pillar strategy in order to ensure more recent data for income indicators for policy making. The use of the EUROMOD model for the provision of near-real time information on income indicators is therefore critical in the context of the European Semester. The JRC uses the model in cooperation with

policy DGs, in particular DG ECFIN, DG TAXUD, DG EMPL and the SRSS. Since 2015 the JRC contributes to the preparation of the Country reports for the European Semester and produces regular notes also circulated in other policy DGs (the so-called “In-depth analyses of tax reforms using the EUROMOD model”). These notes were extensively used in the Country reports of the European Semester. EUROMOD has also been used for the Social Impact Assessment of the third Greek Stabilisation programme in cooperation with DG EMPL and with the SRSS for the assessment of the reform of the personal income system in Greece in 2015 and 2016. EUROMOD has also been used to provide technical assistance to the Greek Ministry of Finance in 2018-2020. It is planned to extend this assistance to Romania, Lithuania and Slovakia as from 2020.

Ongoing work with DG TAXUD extends the model to improve the coverage of wealth taxation and for future analyses of tax shifting between corporate income taxes and personal income taxes. The model has been extended to account for labour supply adjustment combining EUROMOD and an econometrically estimated labour supply model. This extension covers all the EU Member States. The JRC is also currently extending the model to cover consumption taxation (VAT and excises). The model provided also input to a study on the fiscal impact of migration (forthcoming 2020) in cooperation with IIASA.

The JRC has developed a "simplified" version of EUROMOD, based on a web interface, which can be accessed by registered users within the Commission.

Previous use of the model in ex-ante impact assessments of the European Commission

In the Year	EUROMOD contributed to the Impact assessment called	Led by	By providing input to the	The model was run by	Details of the contribution
2020	IMPACT ASSESSMENT Accompanying the document Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union SWD/2020/245 final	EMPL	Baseline and assessment of policy options	*European Commission, JRC*	The model helped to assess the following impacts: - Budgetary consequences for public authorities - Economic growth and employment - Impact on jobs - Impact on jobs in specific sectors, professions, regions or countries - Wages, labour costs or wage setting mechanisms - Households income and at risk of poverty rates - Inequalities and the distribution of incomes and wealth
2018	Impact assessment accompanying the document Proposal for a Council recommendation: on access to social protection for workers and the self-employed SWD/2018/070 final	EMPL	Baseline and assessment of policy options	*Fondazione Giacomo Brodolini*	The model helped to assess the following impacts: - Employment protection - Households income and at risk of poverty rates - Inequalities and the distribution of incomes and wealth - Financing and organisation of social protection systems Documented in: - DOI 10.2767/65810
2018	Impact assessment accompanying the document Proposal for a Council recommendation: on access to social protection for workers and the self-employed SWD/2018/070 final	EMPL	Baseline and assessment of policy options	*European Commission*	The model helped to assess the following impacts: - Employment protection - Households income and at risk of poverty rates - Inequalities and the distribution of incomes and wealth - Financing and organisation of social protection systems

Bibliographic references

- *Employment and social developments in Europe 2018. - 10.2767/875456*
- *Report on public finances in EMU 2017. - 10.2765/256263*
- *Barrios S; Dolls M; Maftei A; Peichl A; Riscado S; Varga J; Christian W. Dynamic scoring of tax reforms in the European Union JRC Working Papers on Taxation and Structural Reforms No 3/2016. European Commission; 2016. JRC104193*
- *The fiscal effects of work-related tax expenditures in Europe. - 10.2765/6099*
- *Tax reforms in EU Member States 2015 : tax policy challenges for economic growth and fiscal sustainability. - 10.2765/274179*
- *Tax reforms in EU Member States : tax policy challenges for economic growth and fiscal sustainability : 2014 report. - 10.2778/68699*

Macroeconomic model QUEST

Fact sheet

Source: Commission modelling inventory and knowledge management system (MIDAS)

Date of Report Generation: 30/03/2021

Overview

Acronym QUEST
Full title Macroeconomic model QUEST

Main purpose:
A macro-economic model used to analyse and understand the state of the EU economy.

Summary
QUEST is a macro-economic model (Dynamic Stochastic General Equilibrium) used to analyse and understand the state of the EU economy. It is developed by DG ECFIN, and estimated model variants have been developed jointly with support from the JRC. The first version of QUEST was applied in 2007, and many extensions have been developed since.

QUEST belongs to the class of New-Keynesian Dynamic Stochastic General Equilibrium (DSGE) models that are now widely used by international institutions and central banks. These models have rigorous microeconomic foundations derived from utility and profit optimisation and include frictions in goods, labour and financial markets. With empirically plausible estimation and calibration they are able to fit the main features of the macroeconomic time series. The QUEST model has been estimated on euro area and US data using Bayesian estimation methods. Calibrated model versions are used in wider applications.

QUEST supports questions related to policy formulation, implementation and evaluation. Many of the main applications deal with fiscal and monetary policy interactions. In order to deal with the wide range of policy issues in DG ECFIN, different model versions of the QUEST model have been constructed, each with a specific focus and regional and sectoral disaggregation.

Keywords
macroeconomic model , DSGE model

Model category (thematic)
Economy

Model home page
https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/economic-research/macroeconomic-models_en

Ownership & license

Ownership

Sole copyright [European Union]

Ownership details

The model is owned by DG ECFIN.DDG2.B.3

Licence type

Non-Free Software licence. The license has one or more of the following restrictions: it prohibits creation of derivative works; it prohibits commercial use; it obliges to share the licensed or derivative works on the same conditions.

Details

QUEST structure and approach

QUEST III belongs to the class of New-Keynesian Dynamic Stochastic General Equilibrium (DSGE) models that are now widely used by international institutions and central banks. These models have rigorous microeconomic foundations derived from utility and profit optimisation and include frictions in goods, labour and financial markets. With empirically plausible estimation and calibration they are able to fit the main features of the macroeconomic time series. Calibrated model versions are used for most policy applications, but the QUEST III model has also been estimated on Euro Area, US and specific Euro Area countries (ES, DE) data using Bayesian estimation methods.

In order to deal with the wide range of policy issues in DG ECFIN, different model versions of the QUEST III model have been constructed, each with a specific focus and regional and sectoral disaggregation. Many of the main applications deal with fiscal and monetary policy interactions and either use a one-sector model or models that explicitly distinguish tradable and nontradable sectors, and include trade in intermediates. Other model variants also include housing and collateral constraints.

QUEST III has also been used for the analysis of structural reforms and another version has been employed for the analysis of energy and climate change policies. All these models are employed using different country disaggregations, focusing on the euro area or EU as a whole, and other global regions, or on individual member states.

The models are developed by the modelling unit in DG ECFIN. The Joint Research Centre of the European Commission supports QUEST development providing econometric, computational and methodological expertise in estimation and calibration, maintaining dedicated IT resources.

An update of some new developments of the QUEST III models was described in ECFIN Research Letter Vol.3.Issue 1/2009 (pp 10-13). For further references on the QUEST model, see the model homepage.

Input and parametrization

Key inputs for the estimated model versions are coming from national accounts and other macroeconomic data source. The main ones are:

- National account data (GDP and its components, current and constant prices)
- Labour market data (wages, employment)
- Financial variables (interest rates)
- Trade data
- Monetary data (interest rates)

Main output

Key outputs produced by the model:

- Model parameter estimates to be used for simulation (time evolution of all macro-variables of interest in response to a shock in the economy or changes in policy) and model-based policy analysis;
- Among the macroeconomic variables of interest, the model allows to study dynamics and economic drivers of:
    - GDP and its components
    - Price deflators
    - Fiscal variables
    - Employment, wages
    - Interest rates
    - Trade

Spatial - temporal extent

The output has the following spatial-temporal resolution and extent:

Parameter	Description
Spatial Extent / Country Coverage	Global, incl. individual EU countries, various EU aggregates (EU, Euro area, OMS, NMS, etc).
(Spatial) resolution	Up to country aggregation
Temporal extent	Estimation data range: 1985-2013 for Euro area aggregate; 1995-2013 for individual countries. Simulation horizon: the model is simulated for several periods ahead to allow convergence.
Temporal resolution	Quarterly

Quality & transparency

Quality

Question	Answer	Details
Models are by definition affected by uncertainties (in input data, input parameters, scenario definitions, etc.). Have the model uncertainties been quantified? Are uncertainties accounted for in your simulations?	yes	Possible
Sensitivity analysis helps identifying the uncertain inputs mostly responsible for the uncertainty in the model responses. Has the model undergone sensitivity analysis?	yes	Very often model versions are subject to sensitivity analysis.
Has the model undergone external peer review by a panel of experts, or have results been published in peer-reviewed journals?	yes	The model has many publications in peer-reviewed journals.
Has model validation been done? Have model predictions been confronted with observed data (ex-post)?	yes	k-periods ahead behavior of the model variables is compared with historical observations.

References related to external peer-review and publication in scientific journals:

- Ratto M, Roeger W, Int Veld J. QUEST III: An Estimated Open-Economy DSGE Model of the Euro Area with Fiscal and Monetary Policy. ECONOMIC MODELLING 26; 2009. p. 222-233. JRC46465

Transparency

Question	Answer	Details
Is the model underlying database (i.e. the database the model runs are based on) publicly available?	yes	Taken from public sources.
Can model outputs be made publicly available?	yes	In publications.
Is the model transparently documented (including underlying data, assumptions and equations, architecture, results) and are these documents available to the general public?	yes	Model structure is typically documented in scientific publications (e.g. Ratto et.al 2009). Technical algorithms and codes are available upon request.
Is the model source code publicly accessible or open for inspection?	no	Technical algorithms and codes of estimated model versions published in academic journals are made available upon request.

References related to documentation:

- Fiscal stimulus and exit strategies in the EU : a model-based analysis. – DOI: 10.2765/44208

The model's policy relevance and intended role in the policy cycle

The model is designed to contribute to the following policy areas

- Economy, finance and the euro
- Taxation
- Employment and social affairs
- Trade

The model is designed to contribute to the following phases of the policy cycle

- Anticipation
- Formulation
- Implementation
- Evaluation

The model's potential

QUEST III is a tool suitable for policy preparation and implementation. It is designed to analyze economic issues like the occurrence boom-bust cycles, the study of structural reforms (Lisbon process), fiscal policy, country debt stabilization and sustainability. Main policy areas requiring QUEST based analysis concern MIP (Macroeconomic Imbalance Procedure) assessments, EDP (Excess Deficit) procedures and debt sustainability analysis.

DG ECFIN uses QUEST III for macroeconomic policy analysis and research. Results of the studies feed into ECFIN policy repots. JRC supports DG ECFIN for the development of QUEST III, focusing on the estimation. JRC provides estimated versions of QUEST models for individual member states, used to support policy studies for macro-economic surveillance by DG ECFIN

Previous use of the model in ex-ante impact assessments of the European Commission

Use of the model in ex-ante impact assessments since July 2017.

In the Year	QUEST contributed to the Impact assessment called	Led by	By providing input to the	The model was run by	Details of the contribution
2020	IMPACT ASSESSMENT Accompanying the document Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union SWD/2020/245 final	EMPL	Baseline and assessment of policy options	*European Commission, DG ECFIN*	The model helped to assess the following impacts: - Economic growth and employment - Impact on jobs - Wages, labour costs or wage setting mechanisms - Inequalities and the distribution of incomes and wealth
2018	Impact assessment accompanying the document Proposals for a Regulation of the European Parliament and of the Council on: the European Regional Development Fund and on the Cohesion Fund and; Proposal for a Regulation of the European Parliament and the Council on: a mechanism to resolve legal and administrative obstacles in a cross-border context and; Proposal for a Regulation of the European Parliament and the Council on: specific provisions for the European territorial cooperation goal (Interreg) supported by the European Regional Development Fund and external financing instruments SWD/2018/282 final	REGIO	Baseline and assessment of policy options	*European Commission*	The model helped to assess the following impacts: - Economic growth and employment - Investment cycle - Affects on individual Member States - Stimulation of research and development - Innovation for productivity/resource efficiency
2018	Impact assessment accompanying the document Proposal for a Regulation of the European Parliament and of the Council on: the establishment of a European Investment Stabilisation Function SWD/2018/297 final	ECFIN	Baseline and assessment of policy options	*European Commission*	The model helped to assess the following impacts: - Budgetary consequences for public authorities - Economic growth and employment - Macro-economic stabilisation
2018	Impact assessment accompanying the document Proposal for a Regulation of the European Parliament and the Council on: establishing Horizon Europe - the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination and; Proposal for a Decision of the European Parliament and the Council on:	RTD	Baseline and assessment of policy options	*European Commission*	The model helped to assess the following impacts: - Investment cycle - Affects on individual Member States - Stimulation of research and development - Innovation for productivity/resource efficiency - Economic growth and employment

establishing the specific programme implementing Horizon Europe - the Framework Programme for Research and Innovation and; Proposal for a Regulation of the European Parliament and the Council on: establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing Horizon Europe - the Framework Programme for Research and Innovation

SWD/2018/307 final

Bibliographic references

- *Kollmann R, Ratto M, Roeger W, Int Veld J, Vogel L. What drives the German current account And how does it affect other EU member states. ECONOMIC POLICY 30 (81); 2015. p. 47-93. JRC88946*
- *Int Veld J, Kollmann R, Pataracchia B, Ratto M, Roeger W. International Capital Flows and the Boom-Bust Cycle in Spain. JOURNAL OF INTERNATIONAL MONEY AND FINANCE 48 (Part B); 2014. p. 314-335. JRC89811*
- *Varga, J., Roeger, W. & in't Veld, J. Growth effects of structural reforms in Southern Europe: the case of Greece, Italy, Spain and Portugal; Empirica (2014) 41: 323. doi: 10.1007/s10663-014-9253-3*
- *Kollmann R, Ratto M, Roeger W, In `T Veld J. Fiscal Policy, Banks and the Financial Crisis. JOURNAL OF ECONOMIC DYNAMICS and CONTROL 37 (2); 2013. p. 387-403. JRC75073*
- *in't Veld, J., Larch, M. & Vandeweyer, M. Automatic Fiscal Stabilisers: What They Are and What They Do; Open Econ Rev (2013) 24: 147. doi: 10.1007/s11079-012-9260-6*
- *Coenen, G., Erceg, C. J., Freedman, C., Furceri, D., Kumhof, M., Lalonde, R., … in't Veld, J. (2012). Effects of Fiscal Stimulus in Structural Models. American Economic Journal: Macroeconomics, 4(1), 22–68. doi:10.1257/mac.4.1.22*
- *Int Veld J, Raciborski R, Ratto M, Roeger W. The Recent Boom-Bust Cycle: The Relative Contribution of Capital Flows, Credit Supply and Asset Bubbles. EUROPEAN ECONOMIC REVIEW 55; 2011. p. 386-406. JRC62821*
- *Fiscal stimulus and exit strategies in the EU : a model-based analysis. – DOI: 10.2765/44208*
- *Varga, J., in 't Veld, J. A model-based analysis of the impact of Cohesion Policy expenditure 2000–06: Simulations with the QUEST III endogenous R&D model; Economic Modelling (2010) doi: 10.1016/j.econmod.2010.06.004*
- *Roeger, W., in't Veld, J. & Vogel, L. Fiscal consolidation in Germany; Intereconomics (2010) 45: 364. doi: 10.1007/s10272-010-0357-0*
- *Ratto M, Roeger W, Int Veld J. QUEST III: An Estimated Open-Economy DSGE Model of the Euro Area with Fiscal and Monetary Policy. ECONOMIC MODELLING 26; 2009. p. 222-233. JRC46465*
- *Roeger, W., Varga, J. & Veld, J. Modelling the Lisbon Strategy: Analysing Policies to Promote Knowledge Investment with an Endogenous Growth Model; Comp Econ Stud (2009) 51: 520. doi: 10.1057/ces.2009.13*
- *Breuss, F., Roeger, W. & in't Veld, J. Global impact of a shift in foreign reserves to euros; Empirica (2009) 36: 101. doi: 10.1007/s10663-008-9094-z*

TaxBEN

OECD tax-benefit model

Fact sheet

Source: Commission modelling inventory and knowledge management system (MIDAS)

Date of Report Generation: 30/03/2021

Dissemination: Public

Overview

Acronym TaxBEN
Full title OECD tax-benefit model

Main purpose:
TaxBEN produces policy indicators on household incomes, labour costs and work incentives in different family situations and policy settings. It covers a broad set of income-support and tax policies for all EU countries going back to early 2000s (for most countries).

Summary
The tax-benefit model (TaxBEN) is the cross-country tax and benefit simulation model developed and maintained by the OECD. It is a unique tool for exploring the detailed mechanics of tax-benefit policies and reforms on working age individuals and their families across countries. The scope of TaxBEN includes taxes and social benefits that, together, account for a large share of government budgets. The model is mantained thanks to the grant agreement between the OECD and the European Commission. DG EMPL is the main contributor to the model, which also receives financial support by DG ECFIN. In the past also DG TAXUD contributed to the maintenance of the model.

TaxBEN produces policy indicators on household incomes, labour costs and work incentives in different family situations and policy settings. It covers a broad set of income-support and tax policies going back to early 2000s for all EU countries. The model draws on a comprehensive library of tax and benefit policy rules that are relevant for working-age individuals and their families.

Model updates have been undertaken annually with full results for the current year typically available internally before the end of the calendar year and disseminated to the users soon after. Updates benefit from the direct involvement of the European Commission from ministries and other government institutions, who provide up-to-date policy information and ensuring the accuracy of results. To maintain a consistent time series for policy monitoring and analysis, any changes or corrections to the tax and benefit calculations are systematically back-dated to earlier policy years as relevant.

Keywords
tax-benefit, hypothetical households simulation model

Model category (thematic)
Economy

Model home page
http://www.oecd.org/social/benefits-and-wages/

Ownership & license

Ownership

Sole ownership [3rd party].

Ownership details

Sole ownership [OECD]. The European Commission contributed to the development of the TaxBEN model since 2002. The Commission can access the TaxBEN model through an online platform on which it is also possible to change policy parameters. However the Commission is not owner of the model.
The TaxBEN model can be accessed through as an online platform, after the review of the application process by the OECD. At the European Commission everyone who wants to access the online platform should get in touch with EMPL.A4 who assigns access subject to the capacity constraints of the infrastructure. The online platform works in Stata language, though the software installation is not needed.

Licence type

Non-Free Software licence. The license has one or more of the following restrictions: it prohibits creation of derivative works; it prohibits commercial use; it obliges to share the licensed or derivative works on the same conditions.

Details

TaxBEN structure and approach

For a complete overview of TaxBEN readers are invited to consult "TaxBEN: The OECD tax-benefit simulation model Methodology, user guide and policy applications", December 2020 (https://www.oecd.org/social/benefits-and-wages/OECD-TaxBEN-methodology-and-manual.pdf).

TaxBEN follows a “hypothetical family” approach, that is to say, it calculates tax liabilities and benefit entitlements for a broad set of stylised families (sometimes referred to as “vignettes”) whose characteristics are relevant from a policy perspective. The hypothetical family approach does not require the use of survey or administrative microdata, which are typically available only with significant time lags or are difficult to access. The focus on stylised but policy-relevant households enables broad country coverage, timely results and model use by a broad range of users without a need to apply for access to household micro-data, but at the same time results based on the TaxBEN model are not representative for the whole population.

The model covers insurance benefits, assistance and universal benefits, including unemployment, minimum-income, housing and in-work benefits, as well as cash family support. On the tax side, TaxBEN incorporates personal income taxes as well as mandatory social contributions, non-tax compulsory payments and payroll taxes. Childcare fees and benefits for parents using centre-based childcare and disability benefits are included for selected countries and policy years. The most important policy areas that currently remain outside the scope of the model are direct taxes on wealth (e.g. taxes on immovable and movable property, including council tax at a local level), indirect taxes (e.g. VAT), early-retirement and retirement benefits, and in-kind transfers (e.g. subsidised housing, transport and health care). Sickness benefits and short-time working benefits (partial unemployment benefits and similar job-retention measures) were included in the policy library in 2020 and may be added to the model in the future.

Input and parametrization

The modelling relies on a consistent set of assumptions across countries and uses official information on policy parameters that is provided and validated through country delegates of relevant OECD Working Parties.

For each country every year the OECD develops country documents describing in detail the policy rules and parameters they apply in a selected policy year to calculate tax and benefit amounts for the families and labour market circumstances that are within the scope of the tax-benefit model. The reports are validated through country delegates of relevant OECD Working Parties. They use a standardised format to facilitate cross-country comparisons and monitoring of policy reforms over time. They also provide clear links between policy descriptions and model’s parameters, as well standardized output from the Tax-benefit model. For particularly complicated policy mechanisms, the reports may include also boxes or charts with detailed step-by-step calculations of specific benefit or tax amounts.

Another input to the model are earnings decile points for full time employees in absolute terms and in % of the average wage, by gender. Earnings distribution data, as well as earnings of full-time minimum-wage workers, enable the calculation of indicator values at different points in the country-specific earnings distribution. These data are derived from the OECD Earnings Database and adapted to the TaxBEN model.

Main output

The main core outputs of the TaxBEN model include:

- Net household income and individual income components for selected family types and labour market circumstances.
- Headline policy indicators of tax burdens, benefit generosity, work incentives.
- Comparable information on the distribution of earnings by gender and on the annual statutory minimum wages of full-time workers. This information is directly incorporated in the TaxBEN model.

Spatial - temporal extent

The output has the following spatial-temporal resolution and extent:

Parameter	Description
Spatial Extent / Country Coverage	EU Member States + United Kingdom, Iceland, Norway, Switzerland, Turkey, Japan, United States
(Spatial) resolution	Individual and household level
Temporal extent	2001 – 2004 (18 EU MS and 6 non-EU countries); 2005 – 2007 (24 EU MS and 7 non-EU countries); 2008 – 2012 (25 EU MS and 7 non-EU countries); 2013 (26 EU MS and 7 non-EU countries); 2014 (27 EU MS and 7 non-EU countries); 2015 – 2016 (26 EU MS and 7 non-EU countries); 2017 – 2020 (27 EU MS and 7 non-EU countries)
Temporal resolution	Yearly

Quality & transparency

Quality

Question	Answer	Details
Models are by definition affected by uncertainties (in input data, input parameters, scenario definitions, etc.). Have the model uncertainties been quantified? Are uncertainties accounted for in your simulations?	no	Deterministic model. Users can design uncertainty through simulating various scenarios.
Sensitivity analysis helps identifying the uncertain inputs mostly responsible for the uncertainty in the model responses. Has the model undergone sensitivity analysis?	not applicable	Due to the nature of the model this does not apply.
Has the model undergone external peer review by a panel of experts, or have results been published in peer-reviewed journals?	yes	Model review is assured by its academic and policy uses and annual validation by ministries. TaxBEN coding language allow users to check what is modelled and how. Research using TaxBEN is published in OECD and European Commission reports. In addition, papers using TaxBEN are published in reputable research journals or books.
Has model validation been done? Have model predictions been confronted with observed data (ex-post)?	yes	The model is validated by ministries. In addition users contribute to its improvements. The second question is not applicable because the model does not do predictions for the future. When TaxBEN is used to simulate policy changes the scenario used is selected by the user.

References related to external peer-review and publication in scientific journals:

- No references provided in MIDAS

Transparency

Question	Answer	Details
Is the model underlying database (i.e. the database the model runs are based on) publicly available?	no	TaxBEN relies on nine decile points for the full-time earnings distribution which are computed based on the OECD Earnings Distribution Database (which compiles data from the European Union Structure of Earnings Survey, Labour Force Survey, country-specific household surveys or enterprise surveys). Decile points are then expressed as ratios of the mean in the same survey. Finally, these ratios are applied to the AW measure. In this way, the shape of the earnings distribution is maintained, but the distribution is anchored on the AW measure, making all TaxBEN wages internally consistent. When earnings distribution microdata is not available for a

		particular year, inter- or extrapolation is used to fill gaps in decile-point data.
Can model outputs be made publicly available?	yes	Output indicators are available in the EC tax and benefit database. https://europa.eu/economy_finance/db_indicators/tab/ In addition Users can access the TaxBEN model through: 1) A tax-benefit web calculator available from the OECD webpage; 2) An online platform, after the review of the application process by the OECD. At the European Commission everyone who wants to access the online platform should get in touch with EMPL.A4. https://www.oecd.org/els/soc/benefits-and-wages/tax-benefit-web-calculator/#d.en.500997
Is the model transparently documented (including underlying data, assumptions and equations, architecture, results) and are these documents available to the general public?	yes	The model structure, all its assumptions and underlying data used are well documented in the following online document: "TaxBEN: The OECD tax-benefit simulation model Methodology, user guide and policy applications", December 2020 https://www.oecd.org/social/benefits-and-wages/OECD-TaxBEN-methodology-and-manual.pdf
Is the model source code publicly accessible or open for inspection?	no	The model source code is kept internal by the OECD. However, the European Commission has access to all policy parameters files through the online platform described above.

The model's policy relevance and intended role in the policy cycle

The model is designed to contribute to the following policy areas

- Economy, finance and the euro
- Taxation
- Employment and social affairs

The model is designed to contribute to the following phases of the policy cycle

- Formulation
- Evaluation

The model's potential

The European Commission has supported TaxBEN since 2002. Results provide inputs into EC flagship publications (such as the different editions of the Employment and Social Development in Europe report by DG EMPL [1] and the in the Taxation Trends in the European Union report [2] by DG TAXUD), the European Semester country reports and recommendations, as well as a number of Commission publications and databases that provide monitoring capabilities in the context of key convergence objectives, such as the European Pillar of Social Rights. TaxBEN also features regularly in analytical reports and studies undertaken, commissioned or supported by the European Commission.

More precisely, the European Commission uses the tax and benefit indicators produced by TaxBEN in the context of the European Semester and for benchmarking of tax wedge (DG ECFIN), minimum income (DG EMPL), unemployment benefit (DG EMPL) and minimum wage (DG EMPL). In addition, the Social Scoreboard contains one indicator (net earnings of a full-time single worker without children earning an average wage) based on it. Finally TaxBEN has also been used for the impact assessment on the Directive on "Adequate minimum wages for workers across Member States", which Commission proposal was published on 28 October 2020.

Tax and benefits indicators based on the TaxBEN model are available in the European Commission database (https://europa.eu/economy_finance/db_indicators/tab/) and in a restricted set in the Eurostat database (https://ec.europa.eu/eurostat/data/database)

[1]
https://ec.europa.eu/social/main.jsp?advSearchKey=esdereport&mode=advancedSubmit&catId=22&policyArea=0&policyAreaSub=0&country=0&year=0

[2]
https://ec.europa.eu/taxation_customs/business/economic-analysis-taxation/taxation-trends-eu-union_en

Previous use of the model in ex-ante impact assessments of the European Commission

In the Year	EUROMOD contributed to the Impact assessment called	Led by	By providing input to the	The model was run by	Details of the contribution
2020	IMPACT ASSESSMENT Accompanying the document Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union SWD/2020/245 final	EMPL	Baseline and assessment of policy options	DG EMPL and OECD	TaxBEN provided inputs to the adequacy indicators and assessment of policy options TaxBEN was used to compute net incomes of minimum wage earners (but also other types of workers as well as minimum income beneficiaries) and their tax wedge. It was also used to simulate the impact of minimum wage increases on work incentives. The model helped to assess the following impacts: - Opportunities and incentives of workers/specific groups to work - Wages, labour costs or wage setting mechanisms - Households income and at risk of poverty rates

Bibliographic references

- *Anic, A. and G. Krstic (2017), "Are the unemployed and inactive financially trapped? Evidence from Serbia", Ekonomski anali, Economic Annals, Vol. 62/214, pp. 87-105, http://dx.doi.org/10.2298/eka1714087a.*
- *Benczúr, P., G. Kátay and Á. Kiss (2018), "Assessing the economic and social impact of tax and benefit reforms: A general-equilibrium microsimulation approach applied to Hungary", Economic Modelling, Vol. 75, pp. 441-457, http://dx.doi.org/10.1016/j.econmod.2018.06.016.*
- *Immervoll, H. and S. Scarpetta (2012), "Activation and employment support policies in OECD countries. An overview of current approaches", IZA Journal of Labor Policy, Vol. 1/1, p. 9, http://dx.doi.org/10.1186/2193-9004-1-9.*
- *Kvist, J., S. Straubinger and A. Freundt (2013), "Measurement Validity in Comparative Welfare State Research: The Case of Measuring Welfare State Generosity", European Journal of Social Security, Vol. 15/4, pp. 321-340, http://dx.doi.org/10.1177/138826271301500402.*
- *Marchal, S. and W. Van Lancker (2018), "The Measurement of Targeting Design in Complex Welfare States: A Proposal and Empirical Applications", Social Indicators Research, Vol. 143/2, pp. 693-726, http://dx.doi.org/10.1007/s11205-018-1995-z.*
- *Martin, J. (2015), "Activation and active labour market policies in OECD countries: stylised facts and evidence on their effectiveness", IZA Journal of Labor Policy, Vol. 4/1, http://dx.doi.org/10.1186/s40173-015-0032-y.*
- *Nelson, K. (2011), "Social Assistance and EU Poverty Thresholds 1990-2008. Are European Welfare Systems Providing Just and Fair Protection Against Low Income?", European Sociological Review, Vol. 29/2, pp. 386-401, http://dx.doi.org/10.1093/esr/jcr080.*
- *Allègre, G. and K. Jaehrling (2011), "Making Work Pay for Whom? Tax and Benefits Impacts on In-Work Poverty", in Working Poverty in Europe, Palgrave Macmillan UK, London, http://dx.doi.org/10.1057/9780230307599_13.*
- *Ferrarini, T., K. Nelson and H. Höög (2013), "From Universalism to Selectivity: Old Wine in New Bottles for Child Benefits in Europe and Other Countries", in Minimum Income Protection in Flux, Palgrave Macmillan UK, London, http://dx.doi.org/10.1057/9781137291844_6.*
- *Immervoll, H. (2012), "Minimum-Income Benefits in OECD Countries", in Counting the Poor, Oxford University Press, http://dx.doi.org/10.1093/acprof:oso/9780199860586.003.0009.*
- *European Commission (2019), "Investing in people and social sustainability: short-term costs vs long-term benefits" Chapter 4 in Employment and Social Developments in Europe 2019, Publications Office of the European Union, http://dx.doi.org/10.2767/305832.*

- *European Commission (2020), "Fairness in the EU: perceptions, evidence and drivers" Chapter 2 in Employment and Social Developments in Europe 2020, Publications Office of the European Union, http://dx.doi.org/10.2767/478772.*
- *OECD (2019), OECD Employment Outlook 2019: The Future of Work, OECD Publishing, Paris, https://dx.doi.org/10.1787/9ee00155-en.*
- *OECD (2019), Under Pressure: The Squeezed Middle Class, OECD Publishing, Paris, https://dx.doi.org/10.1787/689afed1-en.*
- *OECD (2018), A Broken Social Elevator? How to Promote Social Mobility, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264301085-en.*