



BANCA D'ITALIA
EUROSISTEMA

Macroeconomic modelling strategies in the Eurosystem

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Macroeconomic models for monetary policy:
State of play and way forward

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*The views expressed here are those of the author and should not be attributed to the Bank of Italy

Foreword

- Presentation based on **ECB Occasional Paper No.267, 2021** *“Review of macroeconomic modelling in the Eurosystem: current practices and scope for improvement”*
- **Eurosystem work stream on Eurosystem Modelling** within ECB strategy review activities (2020-21): 33 contributors, 3 co-leads and 2 coordinators from ECB and NCBs
- **Chapter 3:** Macroeconomic modelling strategies across the Eurosystem



Occasional Paper Series

Work stream on Eurosystem modelling

Review of macroeconomic modelling in the Eurosystem: current practices and scope for improvement



Disclaimer: This paper constitutes staff input into the Governing Council's deliberation in the context of the ECB's monetary policy strategy review. This paper should not be reported as representing the views of the Eurosystem. The views expressed are those of the authors and do not necessarily reflect those of the Eurosystem.

Road map

- Which models? Results of 2020 survey among national central banks (CBs)
- Which use?
- Benchmarking: what do other institutions do?

Eurosystem macroeconomic models: type, scope, use

- Macroeconomic models **regularly** used for **forecasting** and **policy analysis**:
baseline projections production and support to monetary policy decisions
- **Suite-of-models** approach. Extensive use of models in the policy process

	Projections	Monetary policy simulations	Other policy use
Geographic coverage	Country-specific Euro area (ECB)	Country-specific Euro area Global	Country-specific Euro area Global
Structural (DSGE)	Macroeconomic models regularly used to build the (B)MPE baseline	Macroeconomic models regularly used to assess the ECB monetary stance and effects	Macroeconomic models regularly used for other policy purposes (e.g. Fiscal or Global scenarios)
Semi-structural			
Time-series			

Macroeconomic modelling strategies: overview

- **Projections:** typically large **semi-structural** models. Flexible, data-driven. Complexity vs. tractability. **Country-specific** perspective reflects Eurosystem projections setup (country-by-country, bottom-up). Interest rates as conditioning exogenous variables (ELB and non-linearities typically not modelled)
- **Scenario/policy analysis: structural (DSGE)** models. Complement projection with narrative. Analysis of policy announcements and counterfactual scenarios. Emphasis on **open-economy** dimension. Interaction of monetary and fiscal policy. Possible role for ELB and non-standard measures
- **Satellite** models: short-term forecasting. Since the beginning of the pandemic, development of new econometric methods and use of new and higher- frequency data

Eurosystem macroeconomic models: overview

	Projections		Monetary policy simulations		Other policy use		
	Country-specific	Country-specific	Euro area	Global	Country-specific	Euro area	Global
Structural (DSGE)	5	15	20	13	15	19	14
Semi-structural	18	13	1	8	13	1	7
Time-series	1	1	-	-	1	2	-

[Details](#)

Macro models in action: use for monetary policy

- Eurosystem macroeconomic **projections** (BMPE-MPE)
- Largely **model-based**: baseline production and interpretation; sensitivity to underlying projections assumptions; alternative scenarios around baseline
- Forecasting **models** provide consistent framework to account for wide range of indicators. Model-based input complemented by **expert judgement** (account for factors not sufficiently captured by models)
- Other policy processes: **monetary analysis** and regular monetary **stance** assessment. Example: impact of monetary policy decisions using suite of models developed at the ECB and across the Eurosystem

Eurosystem-wide macroeconomic modelling

- Example of **joint** macro modelling effort between the ECB and NCBs: the **EAGLE** model (Gomes et al., 2012)
- DSGE model, regularly used across NCBs for **scenario** analysis and **policy** simulations. **Coherent** framework and common platform for evaluating euro area-wide and country-specific policy measures. Emphasis on **open-economy** dimension, international **spillovers**
- Policy use: **interaction** between single **monetary** policy and **fiscal** measures in individual member states, interaction between euro-area policies and those implemented in other economies, **non-standard** monetary policy measures in monetary union (forward guidance)

Benchmarking against other institutions

Types of model outside the Eurosystem, their scope and use: details

Country	Projections	Other policy use	References
CZ	G3+ [D]	G3+ [D] NIGEM [S]	Brazdik et al. (2020), NIESR
SE	MAJA [D]	MAJA [D]	Corbo and Strid (2020) Villani (2009)
US	FRB/US [S] EDO [D]	FRB/US [S] EDO [D] SIGMA [D]	Brayton et al. (2014) Chung et al. (2010) Erceg et al. (2005)
UK	COMPASS [D]	COMPASS [D]	Burgess et al. (2013)
CA	ToTEM [D] LENS [S]	ToTEM [D] LENS [S]	Murchinson and Rennison (2006) Dorich et al. (2013) Gervais and Gosselin (2014)
IMF	GPM [S]	GEM [D] GIMF [D] FSGM [S] IPF [D]	Carabenciov et al. (2013) Laxton and Pesenti (2003), Pesenti (2008) Kumhof et al. (2010) Andrieu et al. (2015) Adrian et al. (2020)
EC	QUEST III [D] GM [D]	QUEST III [D] GM [D]	Ratto et al. (2009) Albonico et al. (2017)

Note: S=Semi-structural; D=Structural.

Macroeconomic modelling: an assessment

- Current **suite-of-models** approach provides good **balance** between model diversity and specialization. In line with common practice outside Eurosystem
- Significant **improvement** in modelling toolkit since 2003 ECB strategy review
- **Projection** models: proved **resilient** over last decade. Modified, or replaced with new ones, to account for role of **financial** factors
- **Structural** models: **enriched** in many dimensions, in response to changing macroeconomic environment, following academic literature
- Looking forward: more systematic treatment of elements characterizing current policy environment (low interest rates, non-standard measures)

Thanks

Eurosystem macroeconomic models

	Projections	Monetary policy simulations			Other policy use		
		Country-specific	Euro area	Global	Country-specific	Euro area	Global
ECB	ECB-BASE [S], ECB-MC [S], NAWM II [D]	ECB-MC [S]	NAWM II [D]	ECB-Global [S], DSGEs [D]	ECB-MC [S]	NAWM II [D], BVAR [R]	ECB-Global [S], DSGEs [D]
AT	AQM [S]	AQM [S]	AQM [S]		AQM [S]	AQM [S]	
BE	NONAME [S], BE3C [D]	NONAME [S]	BE3C [D], (B)EAGLE [D]	BE3C [D], (B)EAGLE [D]	NONAME [S], 3D version [D]	BE3C [D], (B)EAGLE [D]	BE3C [D], (B)EAGLE [D]
CY	Semi-structural model [S]	Semi-structural model [S], CY-EAGLE [D]	CY-EAGLE [D]	CY-EAGLE [D]	Semi-structural model [S], EAGLE version [D]	CY-EAGLE [D]	CY-EAGLE [D]
DE	Macro-econometric model [S]	Macro-econometric model [S], 3-region model [D]	TANK [D], Kuehl model [D]	NIgEM [S]	Macro-econometric model [S], 3-region model [D]	TANK [D], Kuehl model [D]	NIgEM [S]
EE	-	-	-	-	-	-	-
ES	MTBE [S], JoSE [D]	MTBE [S], JoSE [D]	JoSE [D], ELMo [D]	NIgEM [S]	MTBE [S], JoSE [D]	JoSE [D], DSGE [D]	NIgEM [S]
FI	Aino 2.0 [D], SVAR [R]	Aino 2.0 [D], SVAR [R]	DSGE [S], SVAR [R]	IMF-GIMF [D]	Aino 2.0 [D], SVAR [R]	DSGE [S], SVAR [R]	IMF-GIMF [D]
FR	FR-BDF [S]	FR-BDF [S]	FREAM [D]	IMF-GIMF [D] IMF-FSGM [S] NIgEM [S]	FR-BDF [S]	FREAM [D]	IMF-GIMF [D] IMF-FSGM/NIgEM [S] Devulder-Lisack
GR	Macro-econometric model [S]	BoGGEM [D], EAGLE version [D]	3D [D], EAGLE version [D]	EAGLE version [D]	BoGGEM [D]	3D [D]	EAGLE version [D]
IE	Econometric model [S]	Econometric model [S], DSGE [D]	EAGLE version [D]	NIgEM [S]	Econometric model [S], EAGLE version [D]	DSGE [D]	NIgEM [S]
IT	BIQM [S]	BIQM [S]	DSGE [D]	DSGE [D]	BIQM [S]	DSGE [D]	DSGE [D]
LT	Semi-structural model [S]	Semi-structural model [S], EAGLE version [D]	EAGLE version [D]	EAGLE version [D]	Semi-structural model [S], EAGLE version [D]	EAGLE version [D]	EAGLE version [D]
LU	Semi-structural model [S]	LU-EAGLE [D], LED [D]	LU-EAGLE [D], LED [D]	LU-EAGLE [D], LED [D]	LU-EAGLE [D], LED [D]	LU-EAGLE [D], LED [D]	LU-EAGLE [D], LED [D]
LV	Main DSGE for forecasting [D]	Main DSGE with fiscal sector [D]			Main DSGE with fiscal sector [D]		
MT	STREAM [S]	MEDSEA [D]	MEDSEA [D]		MEDSEA [D]	MEDSEA [D]	
NL	DELFI [S]	DELFI [S]	EAGLE [D]	NIgEM [S]	DELFI [S]	EAGLE [D]	NIgEM [S]
PT	"M" [S]	"M" [S], PESSOA [D]	PESSOA [D]	EAGLE version [D]	"M" [S], PESSOA [D]	PESSOA [D]	EAGLE version [D]
SK	NBS main macro model [S]	NBS main macro model [S], PREMISE [D]		ECB-Global [S], EAGLE [D]	NBS main macro model [S], PREMISE [D]		ECB-Global [S], EAGLE [D]
SL	Semi-structural model [S]	EAGLE version [D]			EAGLE version [D]		

S=semi-structural; D=structural; R=reduced form

Eurosystem models typology