Evolving approaches to monetary policy communication in the face of uncertainty: fan charts, scenarios and guidance - online annex

We use a small macroeconomic model estimated on aggregate data from the Group of Seven (G7) to illustrate potential challenges in monetary policy communication.

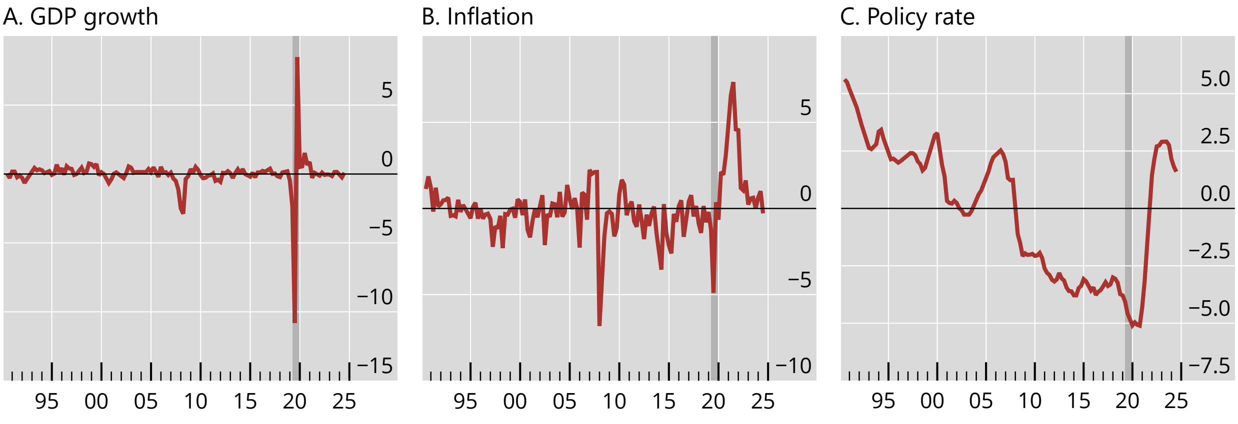
The model is a dynamic stochastic general equilibrium (DSGE) model that belongs to the tradition of New Keynesian models. Its key agents include households, firms and the central bank. It features a New Keynesian Phillips curve, which arises from price adjustment as in Rotemberg (1982). The central bank sets the policy rate according to a Taylor rule that responds to inflation and the output gap. The model includes three types of structural shocks: demand shocks, stationary total factor productivity shocks and monetary policy shocks.

We estimate the model using Bayesian methods, with weighted data for the G7. Specifically, we aggregate data for the United States, euro area, Japan, United Kingdom and Canada, weighted by each economy's share of purchasing power parity-adjusted G7 GDP. Our observables include real GDP growth (quarter-on-quarter), consumer price index inflation (quarter-on-quarter, annualised) and the policy interest rate (Graph A.1).[1] To account for the zero lower bound, we use shadow rates (see Wu and Xia (2016)), when an individual country was at the effective lower bound.[2] The estimation spans from the second quarter of 1991 to the second quarter of 2025, covering periods at the effective lower bound and the Covid-19 pandemic.

Aggregated macroeconomic data for the G7 countries used to estimate a New Keynesian model[1]

In per cent

Graph A.1



The shaded area indicates the period of Covid-19 adjustment in the estimation.

[1] Data are weighted by each economy's share of purchasing power parity-adjusted G7 GDP.

Sources: National data; authors' calculations.

[1] The data are demeaned before the estimation.

[2] See eg Bianchi et al (2021) and Darracq Pariès et al (2023) for model-based analyses quantifying the impact of the effective lower bound and negative interest rate policies on output and inflation.

The Covid-19 pandemic coincided with extreme fluctuations, particularly in GDP growth. To account for these movements, we include additional one-time components in our structural shocks, allowing for larger standard deviations (Faria-e-Castro (2025), Ferroni et al (2025)). This limits the influence of these observations on the estimation of the model's parameter values, including the variances of the structural shocks.

We estimate a total of 10 parameters using standard prior distributions from the literature, while fixing some parameters at conventional values. The parameters are well identified in the estimation, and their inferred values align closely with the results found in other studies (see Table A.1).

Estimation of the New Keynesian model for the G7

Prior and posterior distribution of estimated parameters — Table A.1

Parameters		Prior			Posterior		
		Type[1]	Mean	Std dev	Median	5%	95%
Risk aversion	σ	N	2	0.25	2.89	2.57	3.21
Inflation response Taylor rule	θ_{Π}	N	2	0.25	2.78	2.47	3.10
Output gap response Taylor rule	θ_{Y}	N	0.5	0.05	0.49	0.41	0.57
Inflation indexation	ι	B	0.5	0.1	0.16	0.10	0.23
Rotemberg pricing	φ	N	100	5	93.5	84.8	101.7
Persistence TFP[2]	ρ_A	B	0.5	0.2	0.96	0.94	0.98
Persistence demand	ρ_ζ	B	0.5	0.2	0.92	0.89	0.94
Standard deviation TFP[2]	$100\sigma_A$	IG	1	2.5	1.26	1.13	1.42
Standard deviation demand	$100\sigma_\zeta$	IG	1	2.5	5.01	4.10	6.45
Standard deviation MP[3] shock	$100\sigma_{MP}$	IG	1	2.5	0.77	0.70	0.86

[1] The prior type indicates the prior density function. B stands for a beta distribution, G for a gamma distribution and IG for an inverse gamma distribution. [2] TFP = total factor productivity. [3] MP = monetary policy.

Source: Authors' calculations.

References

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