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Remarks on "*The FRB/US Model*" and "*The Quarterly Japanese Economic Model*"

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The views expressed here are my own and do not necessarily reflect those of the Bank of Italy

General remarks on semi-structural models

- ✓ The Bank of Italy has a long tradition of a large scale semi-structural model → still the main tool for forecasting and macro analysis on Italy: 750 endogenous variables (95 stochastic equations), expectations backwards looking + inflation surveys and "ad hoc" equations (WP, July 2017).
- ✓ Good compromise b/w economic theory and data fit
- ✓ Story behind the figures ("…*it is essential that a logical, consistent causal chain can be traced from the assumptions to the results and that well-known economic mechanisms are evoked at each step*" ← Siviero and Terlizzese, 2008)
- ✓ Flexibility
  - Estimated equations have a direct interpretation (e.g. consumption/investment choices) and can be easily fixed/augmented to account for relevant off-model information
  - Examples: changes in policies (e.g. temporary incentives to firms…) and forecast breakdowns (e.g. impact of credit crunch on investment)
- ✓ Allow a joint monitoring of single equations and system properties (accounting identities, wage/price adjustments, expectations, policy rules, …)

The treatment of expectations

- ✓ Addressing the drawbacks of full information RE models
  - Too strong economic assumptions
  - Too strong statistical assumptions (law of iterated expectations vs instabilities and breaks in macroeconomic data)
  - Empirical evidence on RE and FW looking behavior is controversial (e.g. Mavroeidis et al., 2014; Coibion et al., 2018-2019; Hendry, 2018)
- ✓ VAR-type expectations seem a good compromise
  - Reduced form specification assuming limited information
  - Important to control/calibrate the degree of forward lookingness
- ✓ Drawbacks of backward looking expectations (as for the Bank of Italy model), but:
  - Allow a complete separation of single equation vs system properties → can easily monitor dynamic 'interim' multipliers against a priori information (e.g. accelerator, overshooting, etc.)
  - Allow to study the impact of policy changes (e.g. temporary tax cuts etc.) by simulating the isolated effect on investment/labor demand conditional on everything else equal (and then construct appropriate 'add-factors' to obtain the full macroeconomic impact)

Monetary policy shock: US vs Japan vs Italy

- ✓ Temporary shock of 100 basis points (dies out within about 2 years)
  - Maximum effect on GDP: -0.5 per cent US (lower under MCE), -0.2 Japan [-0.3 Italy]
  - Maximum effect on inflation: -0.04 US (lower under MCE), -0.07 Japan , [-0.14 Italy]

- ✓ Regarding GDP response: cost of capital and intertemporal substitution typically are related to the long term interest rates. How much do they react following a temporary monetary policy shock?

- ✓ Regarding inflation, the role of exchange rate must be important to address the differences as the domestic currency appreciates (up to 2% for Japan, 1% for Italy). Of course, exchange rate movements also depends on foreign monetary policy.

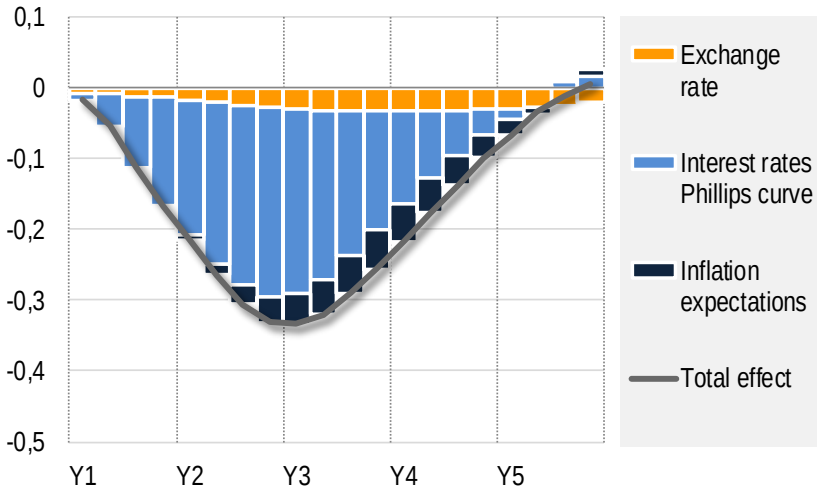
- ✓ In general, the range of estimates of the impact of a monetary policy shock on inflation may be quite large across models and countries. Main contributors:
  - Exchange rate (degree of openness + UIP assumption)
  - Phillips curve (is it alive?)
  - Inflation expectations

- ✓ Important to disentangle the different channels on GDP and inflation (cost of capital, intertemporal substitution, wealth, exchange rate, expectations): e.g. the work done nearly 20 years ago within the Eurosystem →Van Els, Locarno, Morgan, Villetelle (ECB working paper n. 94, December 2001).

Monetary policy shock: channels

- ✓ The figures contain the contributions on GDP and inflation of the three main channels of transmission of a (temporary) monetary policy shock of 100 basis points in the case of the Bank of Italy model: (i) exchange rate, (ii) inflation expectations, (iii) cost of capital / intertemporal substitution / wealth (and slope of the Phillips curve).

GROSS DOMESTIC PRODUCT



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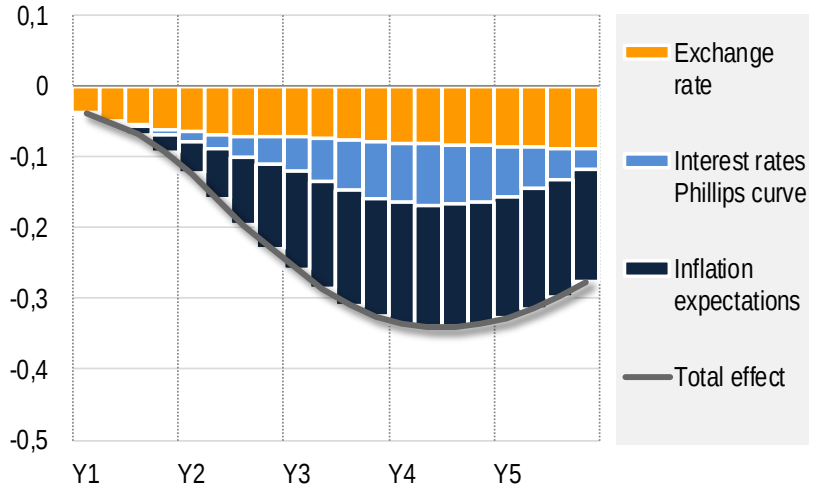

Other results that have been presented

- ✓ Term premium shock (100 basis points):
  - GDP response is similar in US (-0.6) and Japan (-0.5) but there is a strong appreciation of the yen (up to 9%)
  - Consistently, the response of inflation is 3 times stronger in Japan
- ✓ Shock to foreign output (Q-JEM): exports react a lot and quickly benefitting also of the exchange rate depreciation (in the Bank of Italy model changes in the latter have a more gradual impact on exports).
- ✓ A common question: How the output of the satellite models are reconciled with the simulations of the main model? (A) FRB/US: output gap seems determined outside the model. (B) Q-JEM: nonlinear model for survey expectations.
- ✓ Q-JEM: A single Philips curve for consumer prices embodies wages, markup and demand prices? No gain from disaggregation?
- ✓ Stochastic simulations under different regimes in the FRB/US: very interesting way to account for (a sequence of) recessionary shocks: are the bootstrap residuals chosen separately equation by equation or they are selected jointly?

Concluding remarks

- ✓ The properties of FRB/US and Q-JEM seem overall broadly similar to those of the semi-structural model in use at the Bank of Italy
- ✓ Expectations are key to determine the system properties. The treatment of expectations of Q-JEM more closely resembles ours
- ✓ At the end of the day, in data-driven models the degree of forward lookingness and the interplay between expectation formation and the macroeconomy is an empirical matter that can be tackled with different tools, but likely to yield similar results
- ✓ I enjoyed reading and learning from your work
- ✓ Thank you!

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