

Model-consistent-expectations in the ECB-BASE: First results and Roadmap

Stéphane Adjemian Nikola Bokan Matthieu Darracq Pariès

July, 2020

Context

MCE activities within the ECB-MC project

- Starts from the ECB-BASE (backward) model with few changes
 - re-estimation of the model on more recent euro area data
 - appropriate convergence towards the balance growth path
 - other minor fixes
- Further work is still needed to fine tune the re-estimation of the ECB-BASE (backward) model
- MCE activities will proceed in parallel to this process

100

1

- Price and wage setting blocks
- Financial block
- Exchange rate determination
- Consumption block

- Benchmark backward model
- Backward versus full MCE
- Standard shocks across MCE specifications
- Forward guidance shocks
- Anticipated productivity shocks

MCE specification: wapro and wage blocks

MCE in the wage and price setting equations

- Replacing the VAR-based expectation by MCE expectation for the next period inflation term in the GDP-deflator equation
- Replacing the VAR-based expectation by MCE expectation for the next period wage gap term in the wage gap equation
- Long-term inflation expectations remain imperfectly anchored as in the backward model

MCE specification: financial block

MCE in the term structure of interest rate

- Long-term interest rates
 - Expectation theory for the risk-free 10-year OIS rate: we introduce a consol bond serving geometrically decaying coupons, discounted by the short-term policy rate and a duration corresponding the one of a 10-year zero coupon.
 - The 10-year OIS rate accounting for a term premium: we introduce a similar consol with a discounting of coupons augmented by a term premium.
 - Similar treatment for corporate bond

MCE specification: financial block

MCE in financial spreads

- Replacing the VAR-based expectation by MCE expectation for 10-year average of expected output gap
- this variable then loads into the financial spreads (term premium, corporate spread, lending rate spreads and cost-of-equity)
- Consistent reformulation of the revaluation effects on households net financial wealth

Follow-up: stock prices may be formally specified

MCE specification: Exchange rate determination

MCE for the Uncovered Interest rate Parity equation (UIP)

- Replacing the "level" equation for the nominal exchange rate in the backward model by a UIP condition
- The expected depreciation rate depends on the short-term interest rate differential...
- ... augmented with a term premium effect to obtain a plausible "APP-like" transmission of term premium shocks
- Given the consumption specification, adding a term on NFA in the UIP is not necessary to ensure stationary NFA dynamics

Empirical and theoretical challenges remain on the UIP specification

MCE specification: Consumption block

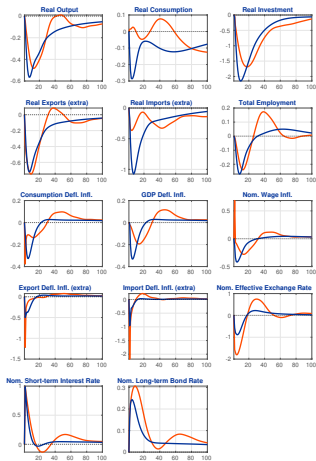
- Permanent incomes.
 - Infinite sums of discounted expected incomes can be rewritten recursively as forward AR(1) models
- PAC equation.
 - Depends on the expected path of the consumption target. . .
 - Expressed as an infinite sum of expected growth rates
 - Can be rewritten recursively as a forward AR(p) model

Outline

- 1 MCE specification
 - Price and wage setting blocks
 - Financial block
 - Exchange rate determination
 - Consumption block
- 2 Simulations
 - Benchmark backward model
 - Backward versus full MCE
 - Standard shocks across MCE specifications
 - Forward guidance shocks
 - Anticipated productivity shocks
- 3 Roadmap for MCE activities

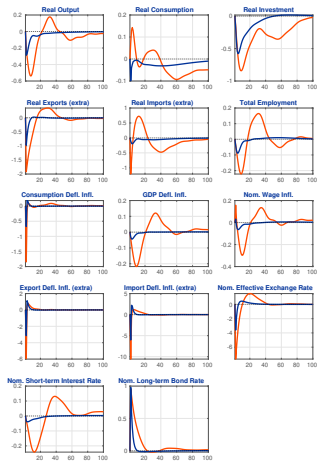
Old vs New infrastructures

Figure 2: Short-term interest rate shock (100bp)



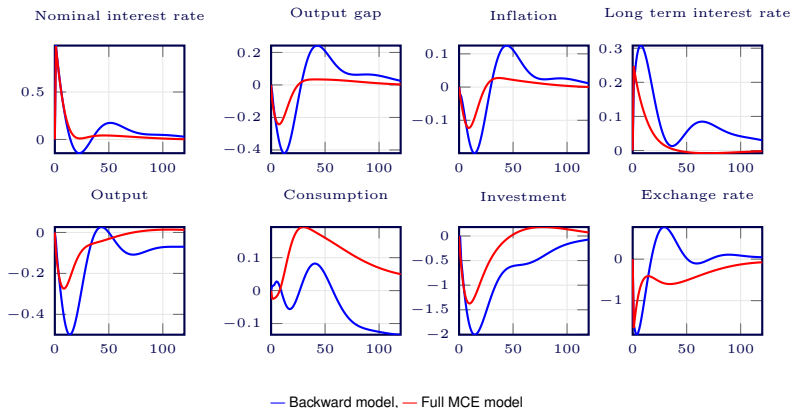
— ECB-BASE NEW VAR EXPECTATIONS — ECB-BASE WP VAR

Figure 3: Term premium shock (100bp)

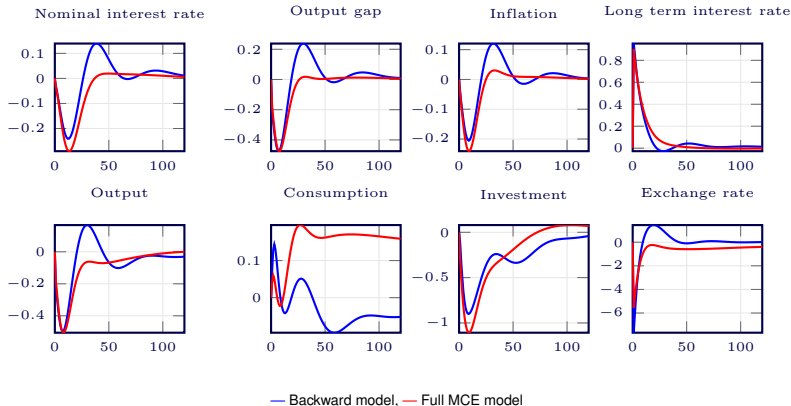


— ECB-BASE NEW VAR EXPECTATIONS — ECB-BASE WP VAR

Responses to a one point shock on the nominal interest rate



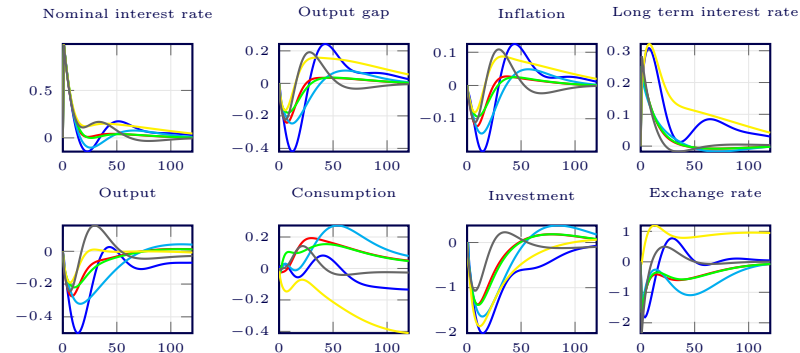
Responses to a one point shock on the term premium



Simulations

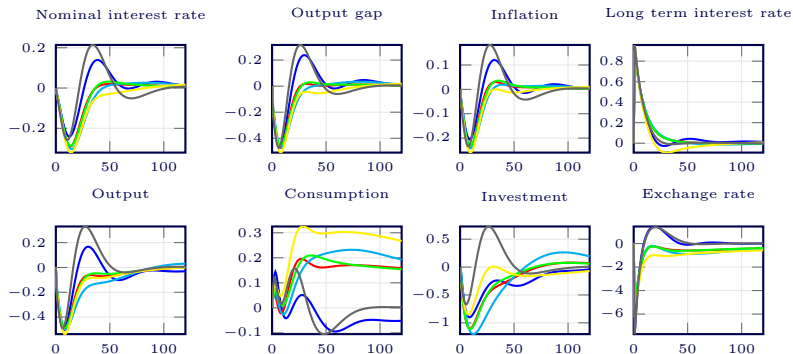
- Backward model,
- Full MCE,
- Same as — without MCE in PAC equations,
- Same as — without MCE in consumption block,
- Same as — without MCE in financial block,
- Same as — without MCE in exchange rate / UIP block.

Responses to a one point shock on the nominal interest rate



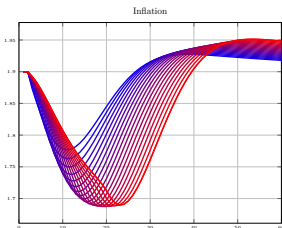
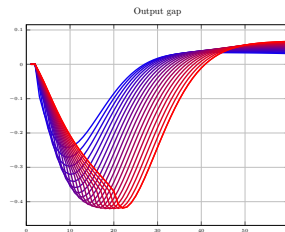
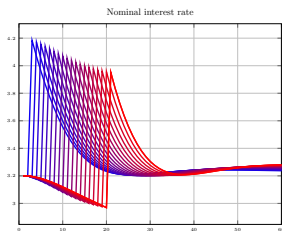
— Backward model, — Full MCE model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,
 — Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

Responses to a one point shock on the term premium

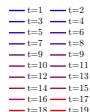
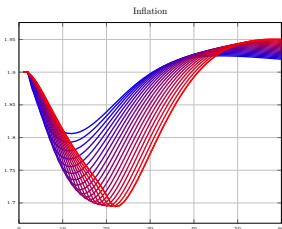
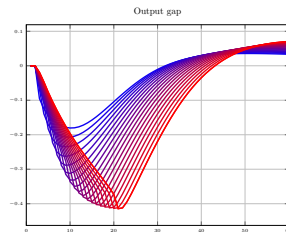
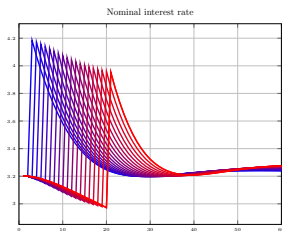


— Backward model, — Full MCE model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,
 — Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

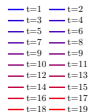
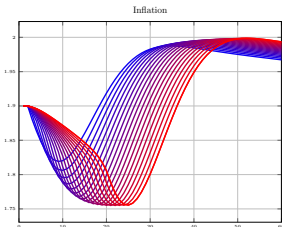
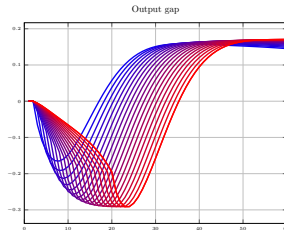
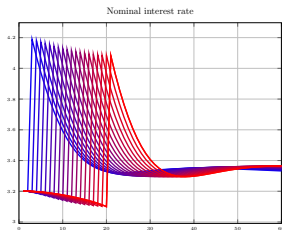
Forward guidance (full MCE)



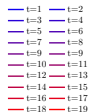
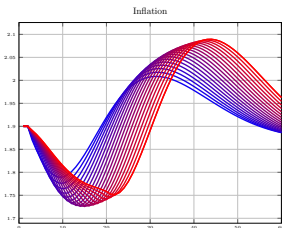
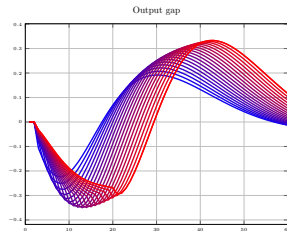
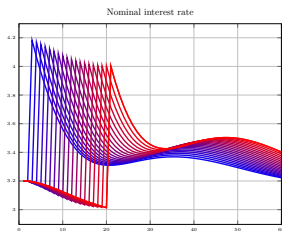
Forward guidance (without mce in consumption)



Forward guidance (without mce in financial)

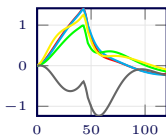


Forward guidance (without mce in exchange rate)

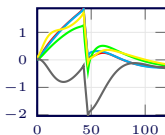


Expected TFP growth shock in 10 years for one year ($4 \times 1\%$)

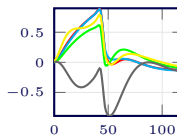
Nominal interest rate



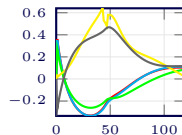
Output gap



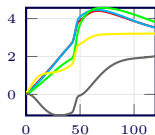
Inflation



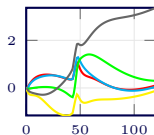
Long term interest rate



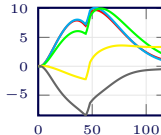
Output



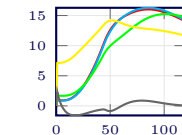
Consumption



Investment



Exchange rate



— Full hybrid model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,
— Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

Outline

- 1 MCE specification
 - Price and wage setting blocks
 - Financial block
 - Exchange rate determination
 - Consumption block
- 2 Simulations
 - Benchmark backward model
 - Backward versus full MCE
 - Standard shocks across MCE specifications
 - Forward guidance shocks
 - Anticipated productivity shocks
- 3 Roadmap for MCE activities

Next steps

Main deliverables for the end-August milestone

- Freeze the benchmark backward model
- Systematic comparison of shock transmission between the backward model, the hybrid expectations model and the full MCE model
- Further examples of anticipated shocks
- Policy application

Follow-up activities

Possible workstreams

- Stationary version of the model and linear approximation
 - Tractability of stochastic simulations
 - Filtering
- Empirical validation of the MCE model
 - Indirect inference on the Wapro/wage blocks
 - System-wide inference using the linear model
- Policy analysis with the MCE model
 - Nesting a term-structure model into the ECB-BASE-MCE
 - Optimal policy projections