

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

- 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

3 Roadmap for MCE activities

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 infrastuctures

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

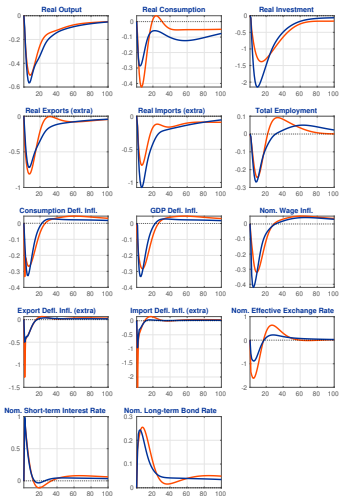
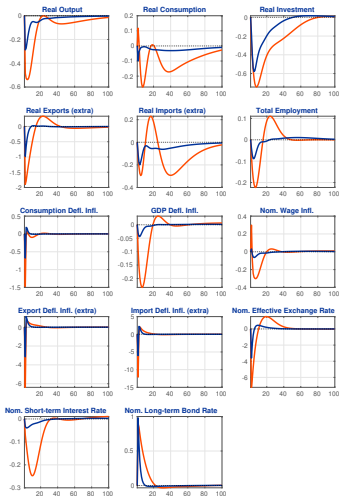
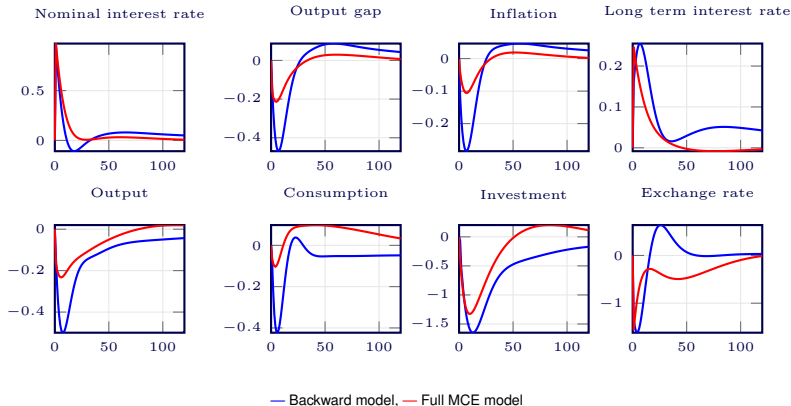


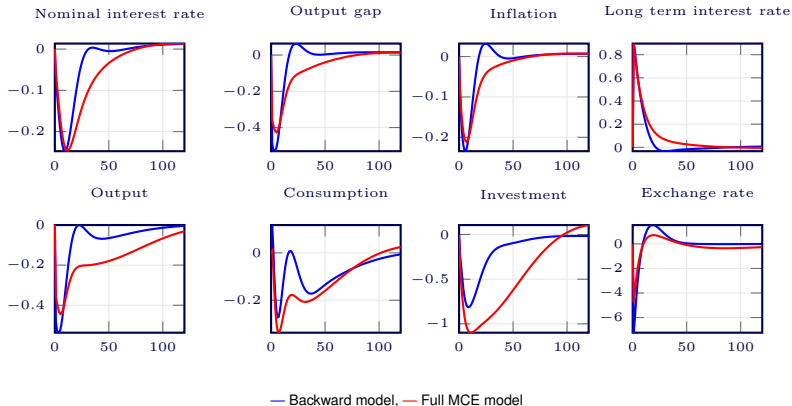
Figure 3: Term premium shock (100bp)



Responses to a one point shock on the nominal interest rate



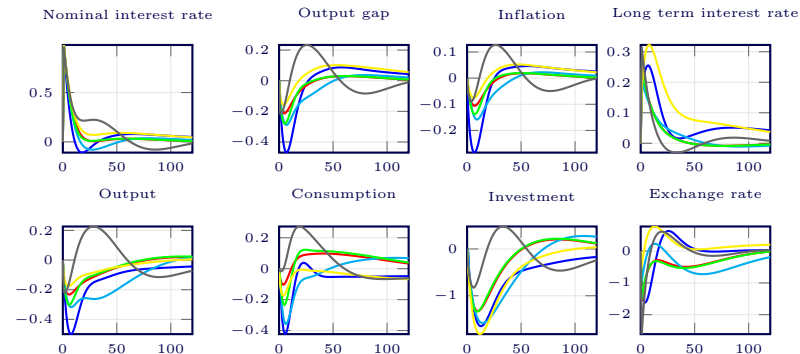
Responses to a one point shock on the term premium



Simulations

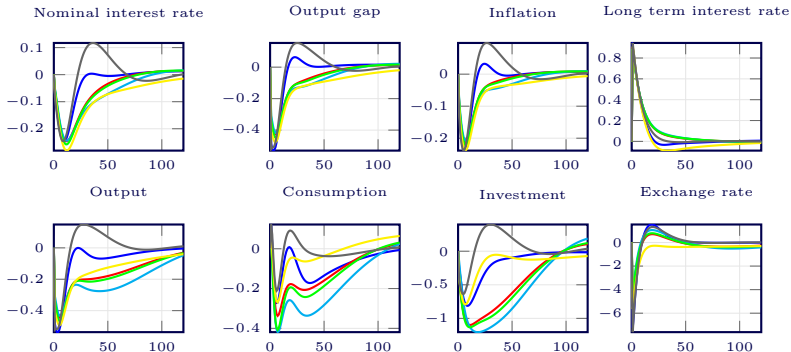
- Backward model,
- Full MCE,
- Same as — without MCE in PAC equations,
- Same as — without MCE in consumption block,
- Same as — without MCE in financial block,
- Same as — without MCE in exchange rate / UIP block.

Responses to a one point shock on the nominal interest rate



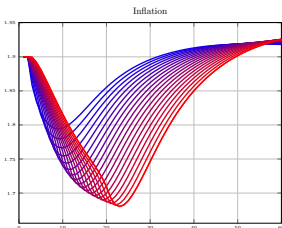
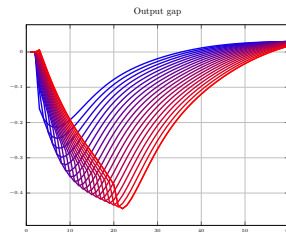
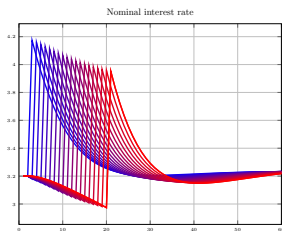
— Backward model, — Full MCE model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,
 — Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

Responses to a one point shock on the term premium



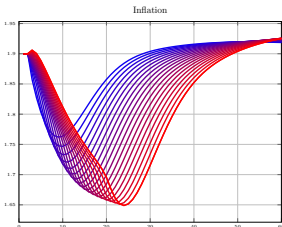
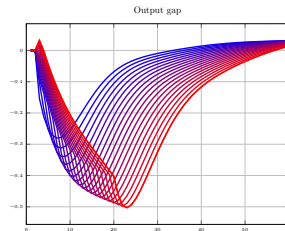
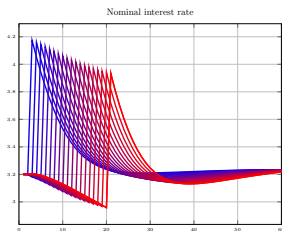
— Backward model, — Full MCE model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,
 — Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

Forward guidance (full MCE)

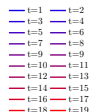
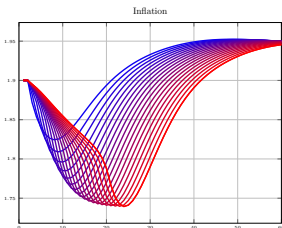
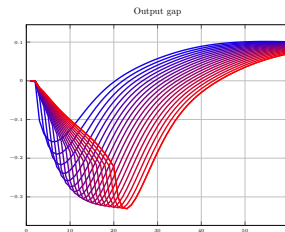
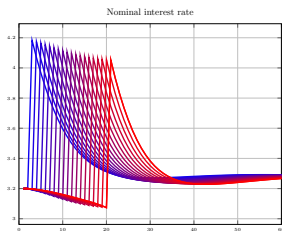


t=1 t=2
t=3 t=4
t=5 t=6
t=7 t=8
t=9 t=9
t=10 t=11
t=12 t=13
t=14 t=15
t=16 t=17
t=18 t=19

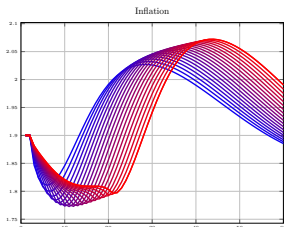
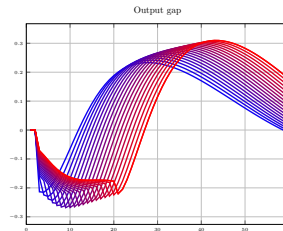
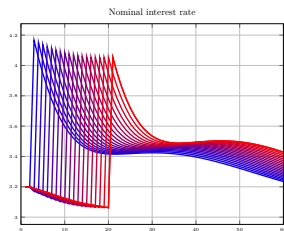
Forward guidance (without mce in consumption)



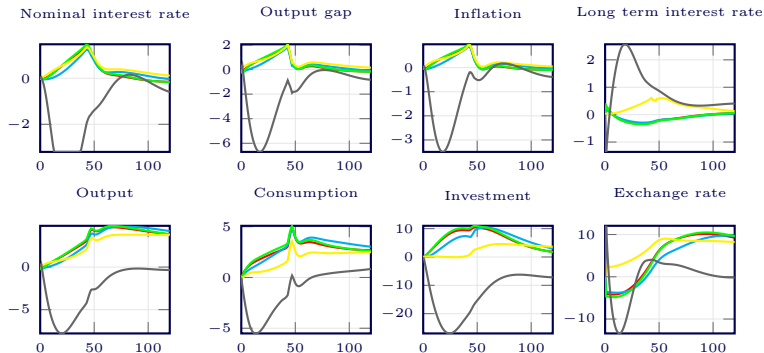
Forward guidance (without mce in financial)



Forward guidance (without mce in exchange rate)



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



— 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