

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

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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

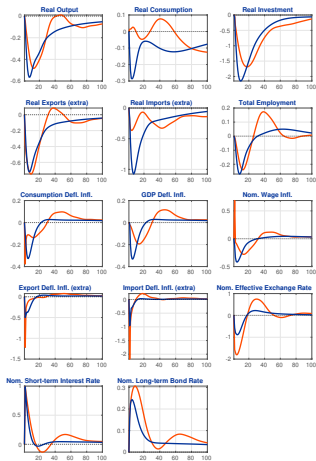


# Outline

- 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
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- 3 Roadmap for MCE activities

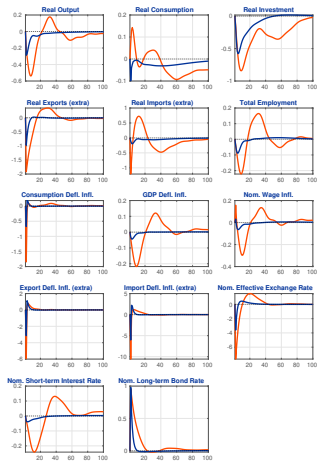
# Old vs New infrastructures

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



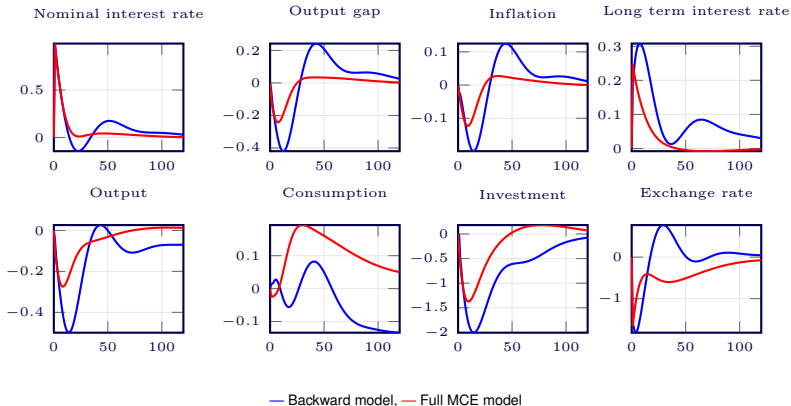
— ECB-BASE NEW VAR EXPECTATIONS — ECB-BASE WP VAR

Figure 3: Term premium shock (100bp)

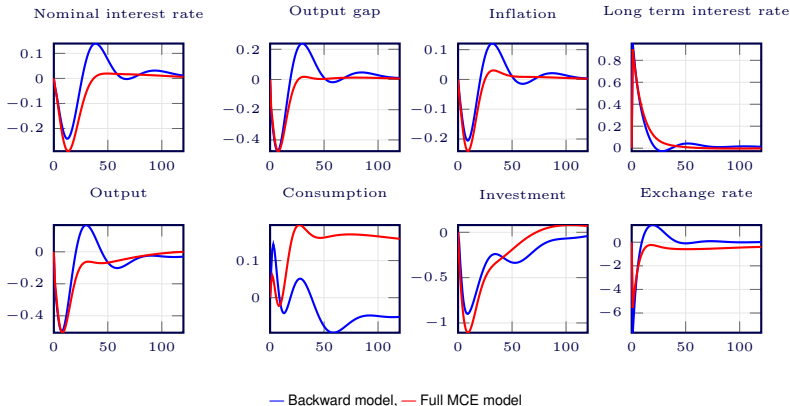


— ECB-BASE NEW VAR EXPECTATIONS — ECB-BASE WP VAR

# Responses to a one point shock on the nominal interest rate



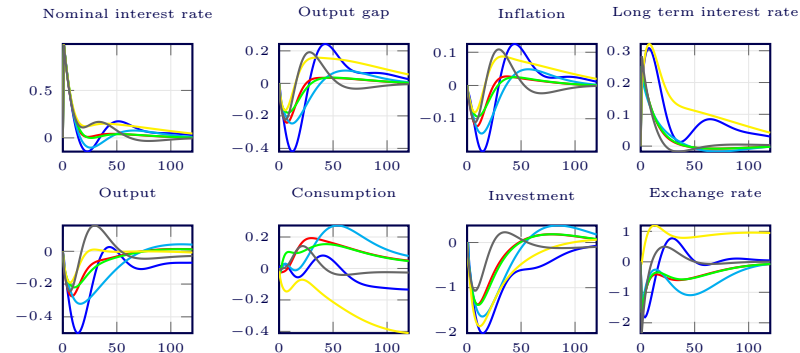
# Responses to a one point shock on the term premium



# Simulations

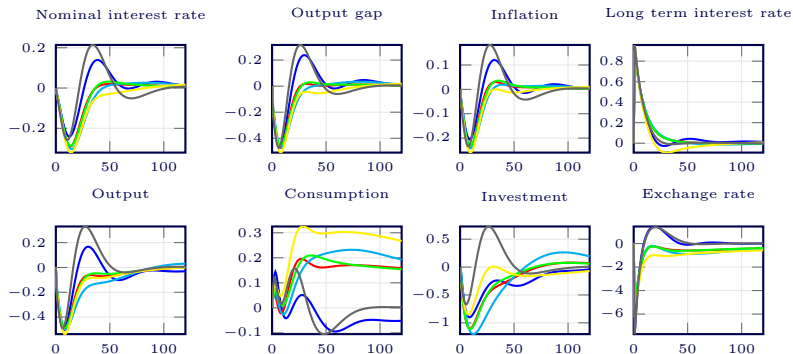
- Backward model,
- Full MCE,
- Same as — without MCE in PAC equations,
- Same as — without MCE in consumption block,
- Same as — without MCE in financial block,
- Same as — without MCE in exchange rate / UIP block.

# Responses to a one point shock on the nominal interest rate



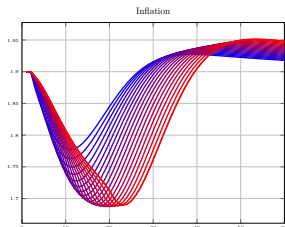
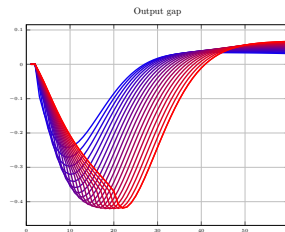
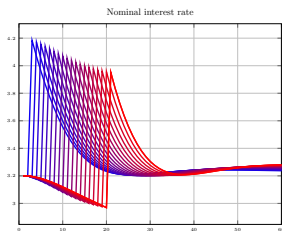
— Backward model, — Full MCE model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,  
 — Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

# Responses to a one point shock on the term premium



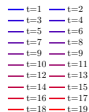
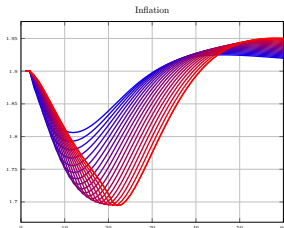
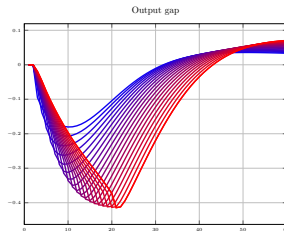
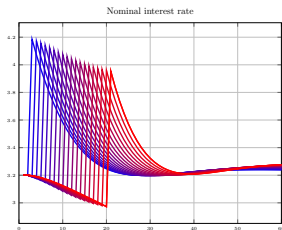
— Backward model, — Full MCE model, — Hybrid model without MCE in PAC, — Hybrid model without MCE in consumption,  
 — Hybrid model without MCE in financial, — Hybrid model without MCE/UIP

# Forward guidance (full MCE)

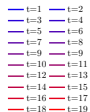
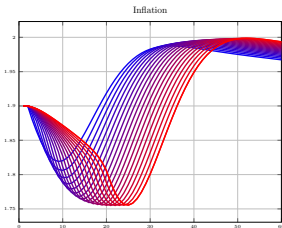
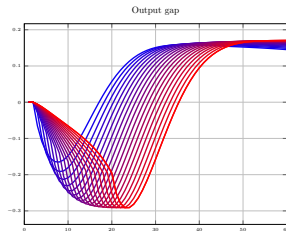
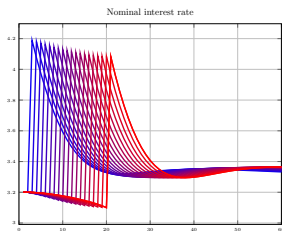




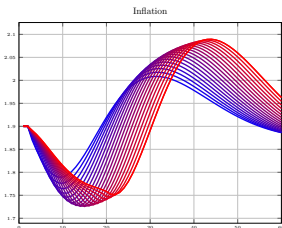
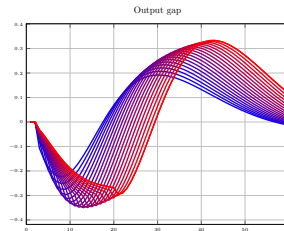
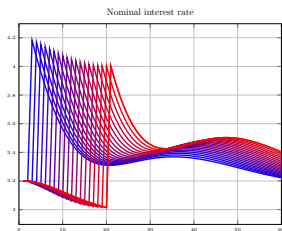
# Forward guidance (without mce in consumption)



# Forward guidance (without mce in financial)



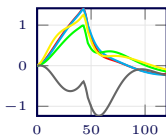
# Forward guidance (without mce in exchange rate)



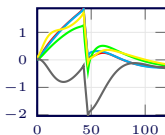
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t=3 t=4  
t=5 t=6  
t=7 t=8  
t=9 t=9  
t=10 t=11  
t=12 t=13  
t=14 t=15  
t=16 t=17  
t=18 t=19

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

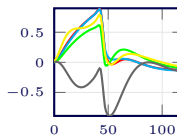
Nominal interest rate



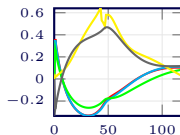
Output gap



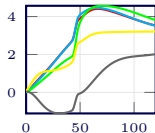
Inflation



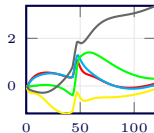
Long term interest rate



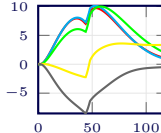
Output



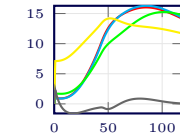
Consumption



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

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# 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