



Monetary Integration under Household Heterogeneity and Bounded Rationality

[Work in Progress]

Michał Brzoza-Brzezina **Paweł R. Galiński** Krzysztof Makarski

Narodowy Bank Polski (NBP)

19th South-Eastern European Economic Research Workshop

Tirana, Albania

6–7 November 2025

The views expressed herein belong to the authors and have not been endorsed by Narodowy Bank Polski.

Motivation

- Ongoing discussion on the pros and cons of monetary integration...
- ...intensified by recent major macroeconomic shocks (COVID-19, Russian invasion of Ukraine)
- **Recent studies do not fully account for:**
 - ▶ *Non-rational expectations*: a growing literature shows that models with non-rational expectations provide a better fit for international macroeconomic dynamics ([Brzoza-Brzezina et al., 2025](#); [Kolasa et al., 2025](#); [Candian and De Leo, 2021](#)),
 - ▶ *Household heterogeneity*: the heterogeneous effects of monetary integration across different types of households.

This Paper

We use a two-country New Keynesian model (Poland and the euro area) to study:

- **Counterfactual simulation analysis:** how Poland's economy would behave assuming the integration with the euro area since 2010?
- **Role of non-rational expectations:** how results change under behavioral expectations with cognitive discounting ([Gabaix, 2020](#)).
- **Entry exchange rate:** how would Polish economy behave in the EA under different entry rates?
- **The role of fiscal policy:** would it stabilize domestic economy within the euro area?

Analysis conducted for Poland

- Poland is a compelling case for studying the effects of joining a monetary union:
 - ▶ Largest non-EA European Union member both in terms of GDP and population,
 - ▶ Closely integrated with the euro area
 - ▶ Experienced two major macroeconomic shocks:
 - ▶ Global Financial Crisis (2008–2009)
 - ▶ More recent marked by COVID-19 pandemic and Russia's full-scale invasion of Ukraine
 - ▶ Relatively calm period in the 2010s

Literature

- Large literature on the macroeconomic effects of monetary unions, ex-ante perspective
Gradzewicz and Makarski, 2013; Lama and Rabanal, 2014
- Including analysis of optimal monetary and fiscal policy
Galí and Monacelli, 2008
- Particular focus on fiscal devaluations
Kaufmann, 2019
- And the role of fiscal unions
Farhi and Werning, 2017; Kaufmann et al., 2023



Model and its Bayesian estimation

Behavioral Expectations: A Brief Introduction to Gabaix, 2020

- Behavioral agents perceive future deviations from the steady state myopically
- The expectation rule is microfounded under noisy information assumptions:

$$E_t^{BE}(X_{t+k}) = E_t^{BE}(\bar{X} + \hat{X}_{t+k}) = E_t(\bar{X}) + m^k \cdot E_t(\hat{X}_{t+k})$$

where $m \in [0, 1]$ is the cognitive discounting parameter

- They dampen the expectations effect making individuals more reactive to current conditions.
- Nest rational expectations, $m = 1$.

Model Structure: New Keynesian Framework

- **Two-country setup:** Home (Poland) and Foreign (euro area)
- **Ricardian households:** Work, consume, and save in real assets, domestic and foreign bonds
- **Hand-to-mouth (HtM) households:** Work and consume all disposable income; do not save
- Wages are sticky
- **Final goods:** assembled from domestic and foreign intermediate goods
- **Intermediate goods:** produced using capital and labor, with sticky prices
- **Monetary policy:** Taylor rule
- **Expectations:** Gabaix-style cognitive discounting/behavioral expectations

Bayesian Estimation: observables and *prior* assumptions

- Estimation period: 2000Q1–2024Q3
- Model estimated for Poland (Home) and the euro area (Foreign)
- Parameters estimated using Bayesian methods
- Observables:
 - ▶ 2x HICP, 2x GDP, 2x Consumption, 2x Investment
 - ▶ 2x Government Expenditure, 2x Real Wages
 - ▶ 2x Interest Rate, 1x Real Exchange Rate
- Prior for m : Beta distribution with mean 0.85

Bayesian estimation: rational and behavioral models

- We estimate two models: one with behavioral expectations and second with standard rational expectations ($m = 1$)
- **Comparison:**
 - ▶ BE are strongly favored by the data over RE (Bayes factor: $3 \cdot 10^{21}$).
 - ▶ BE models exhibit stronger internal propagation mechanisms compared to RE models.
 - ▶ As a result, **shock volatilities are estimated to be lower under BE** than under RE.

Counterfactual scenario: Poland in the euro area

- **Counterfactual simulation procedure:**

1. Estimate model parameters based on observables (Poland outside the EA) and identify structural shocks
2. Modify model equations to reflect counterfactual euro adoption in 2010:
 - ▶ common monetary policy with the euro area ($R_t = R_t^*$)
 - ▶ elimination of the nominal exchange rate ($q_t - q_{t-1} = \pi_t^* - \pi_t$)
 - ▶ removal of domestic monetary policy and risk-premium shocks
3. Solve and re-simulate the model using the identified shocks and estimated parameters
4. Recover IRFs, counterfactual paths of observables and their shock decompositions



Findings: Behavioral expectations role in monetary integration



Findings on Behavioral Expectations (BE) relative to Rational Expectations (RE)

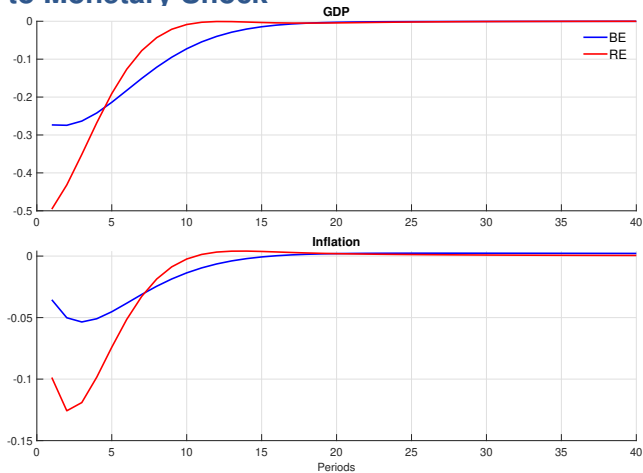
- **Lower estimated shock volatility**
-
-



Findings on Behavioral Expectations (BE) relative to Rational Expectations (RE)

- Lower estimated shock volatility
- **Weaker monetary policy transmission**
-

Impulse Response to Monetary Shock





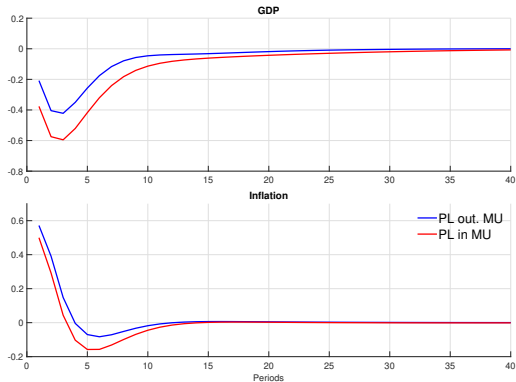
Findings on Behavioral Expectations (BE) relative to Rational Expectations (RE)

- Lower estimated shock volatility
- Weaker monetary policy transmission
- **Stronger propagation of certain shocks**

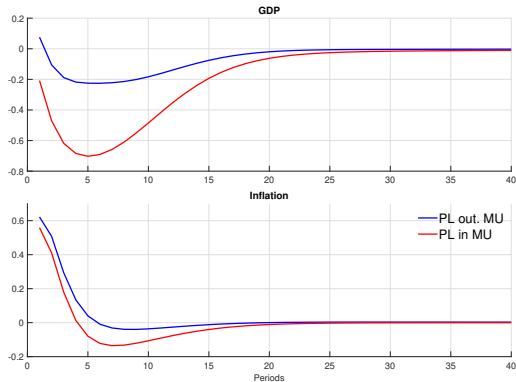
Shock Transmission: In vs. Out of MU

- Markup shock:
 - In MU: no nominal exchange rate adjustment
 - ▶ Stronger GDP response to markup shock
 - ▶ Weaker inflation response
- Under behavioral expectations:
 - ▶ MU amplifies GDP response to markup shock
 - ▶ Inflation response is similar across regimes

Impulse Response to Markup Shock



Rational Model



Behavioral Model

Findings on Behavioral Expectations (BE) relative to Rational Expectations (RE)

- Lower estimated shock volatility
- Weaker monetary policy transmission
- Stronger propagation of certain shocks

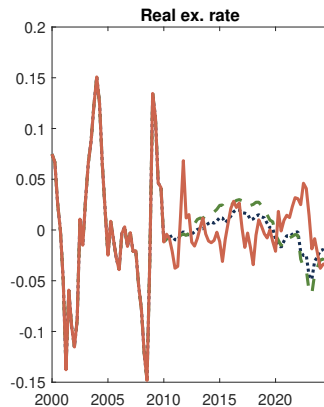
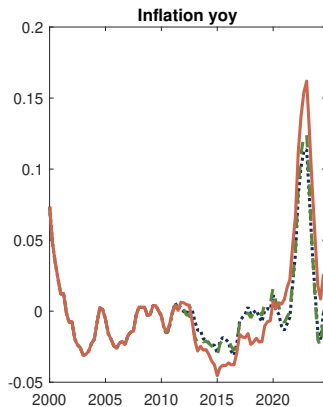
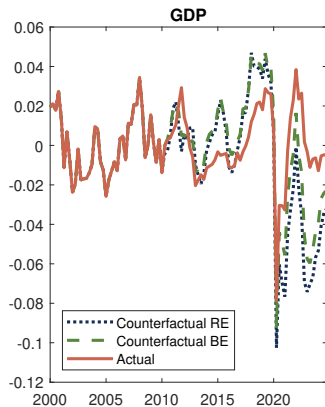
Conclusion:

Under BE, the net effect of joining a monetary union may be stronger or weaker than under RE.

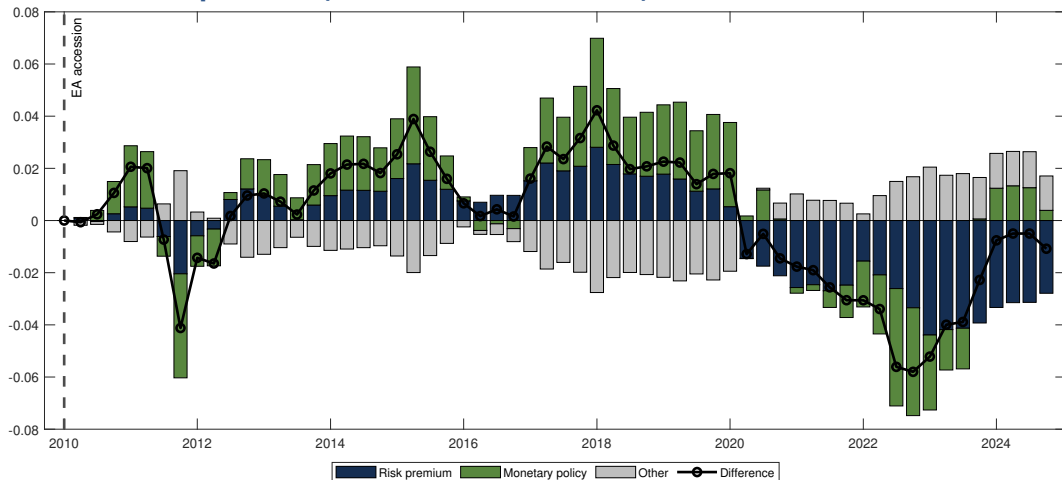


Findings: Counterfactual simulation

Euro Adoption in 2010Q1: Actual vs. Counterfactual



Difference decomposition (counterfactual - actual): GDP



Macroeconomic Volatility: Euro Adoption in 2010Q1 with and without Fiscal Rules

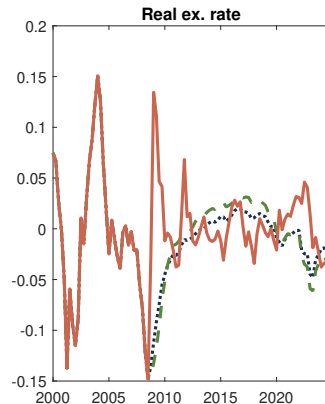
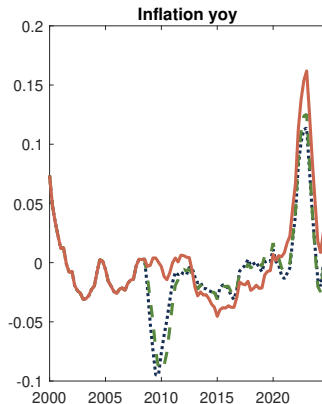
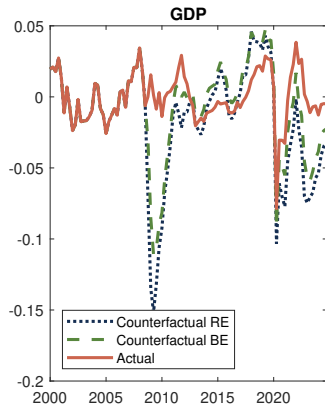
Variable	Historical	Counterfactual			
		No Fiscal Rule		With Fiscal Rule	
		BE	RE	Transfers	Gov. Spending
GDP	1.9	3.0	3.5	2.5	2.5
Inflation (YOY)	4.8	3.5	3.2	3.6	3.5

Note: The change in fiscal variables used in fiscal rules capped at 2.5% of GDP.

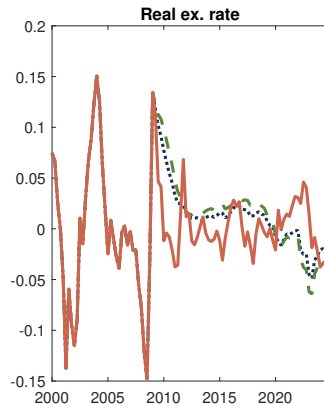
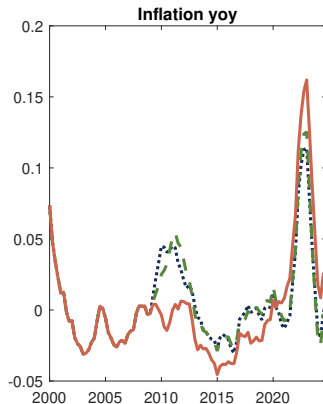
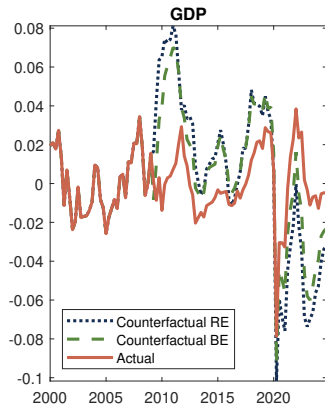


Findings: Entry exchange rate implications

Euro Adoption with strong currency at entry: Actual vs. Counterfactual



Euro Adoption with weak currency entry: Actual vs. Counterfactual






Conclusion

- MU amplifies output volatility while inflation is more stable.
- Expectations Matter: Compared to RE, macroeconomic volatility is often lower under BE.
- Realistic fiscal policy wouldn't have replicated the stability of autonomous monetary policy.
- The macroeconomic impact of MU depends on the exchange rate at entry.



Additional slides

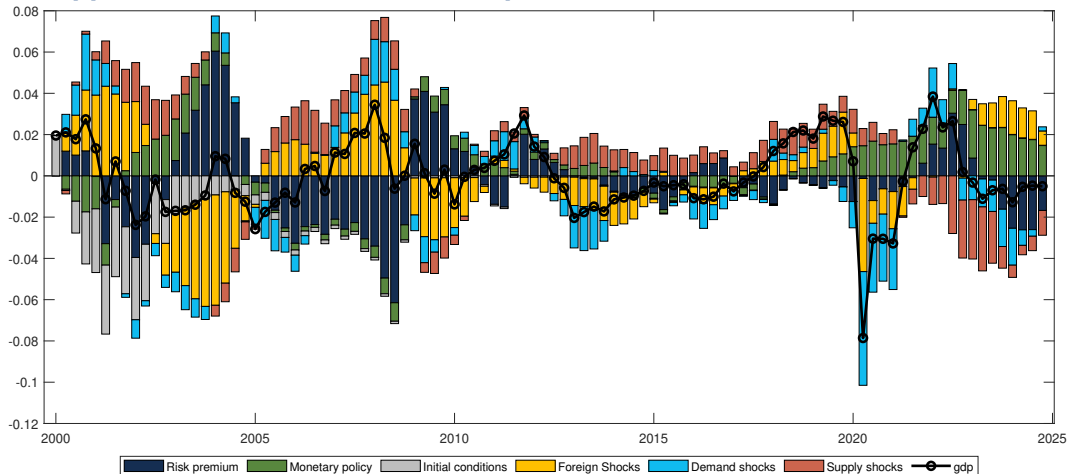
(e.g., robustness checks, extended results, or technical details)

-  Brzoza-Brzezina, Michał, Paweł R. Galiński, and Krzysztof Makarski (2025). "Monetary and fiscal policy in a two-country model with behavioral expectations". *Journal of International Money and Finance* 155.C.
-  Candian, Giacomo and Pierre De Leo (2021). "Imperfect exchange rate expectations". *The Review of Economics and Statistics*, pp. 1–46.
-  Farhi, Emmanuel and Iván Werning (2017). "Fiscal Unions". *American Economic Review* 107.12, pp. 3788–3834.
-  Gabaix, Xavier (2020). "A Behavioral New Keynesian Model". *American Economic Review* 110.8, pp. 2271–2327.
-  Galí, Jordi and Tommaso Monacelli (2008). "Optimal monetary and fiscal policy in a currency union". *Journal of International Economics* 76.1, pp. 116–132.
-  Gradzewicz, Michał and Krzysztof Makarski (2013). "The business cycle implications of the euro adoption in Poland". *Applied Economics* 45.17, pp. 2443–2455. DOI: 10.1080/00036846.2012.667550.
-  Kaufmann, Christoph (2019). "Optimal fiscal substitutes for the exchange rate in monetary unions". *Journal of Economic Dynamics and Control* 103.C, pp. 43–62. DOI: 10.1016/j.jedc.2019.04.005.
-  Kaufmann, Christoph, Maria Grazia Attinasi, and Sebastian Hauptmeier (2023). "Macroeconomic stabilisation properties of a euro area unemployment insurance scheme". *Journal of Economic Dynamics and Control* 153.C. DOI: 10.1016/j.jedc.2023.104698.
-  Kolasa, Marcin, Sahil Ravgotra, and Paweł Zabczyk (2025). "Monetary policy and exchange rate dynamics in a behavioral open economy model". *Journal of International Economics* 155, p. 104087. ISSN: 0022-1996. DOI: <https://doi.org/10.1016/j.jinteco.2025.104087>.

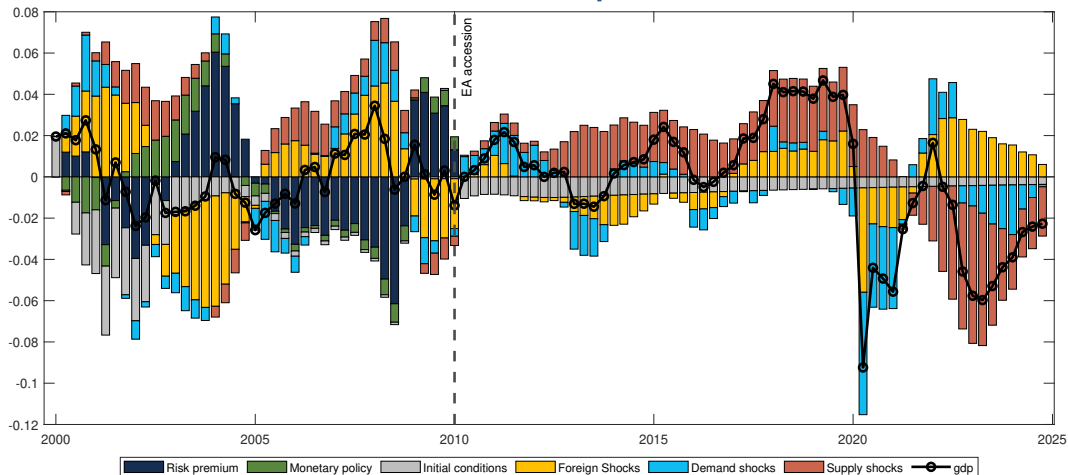


Lama, Ruy and Pau Rabanal (2014). "Deciding to enter a monetary union: The role of trade and financial linkages". *European Economic Review* 72.C, pp. 138–165. DOI: [10.1016/j.euroecorev.2014.08.005](https://doi.org/10.1016/j.euroecorev.2014.08.005).

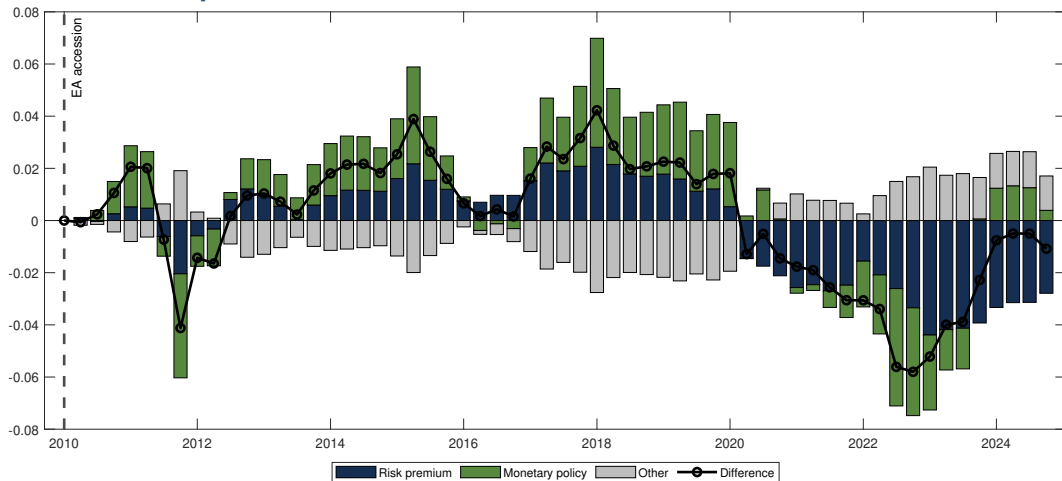
What Happened: Historical GDP Decomposition



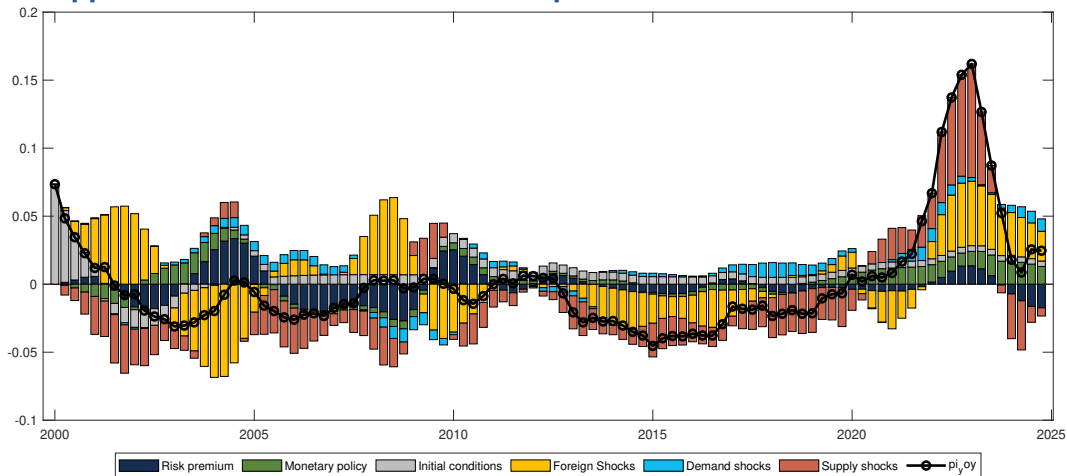
What Could Have: Counterfactual GDP Decomposition



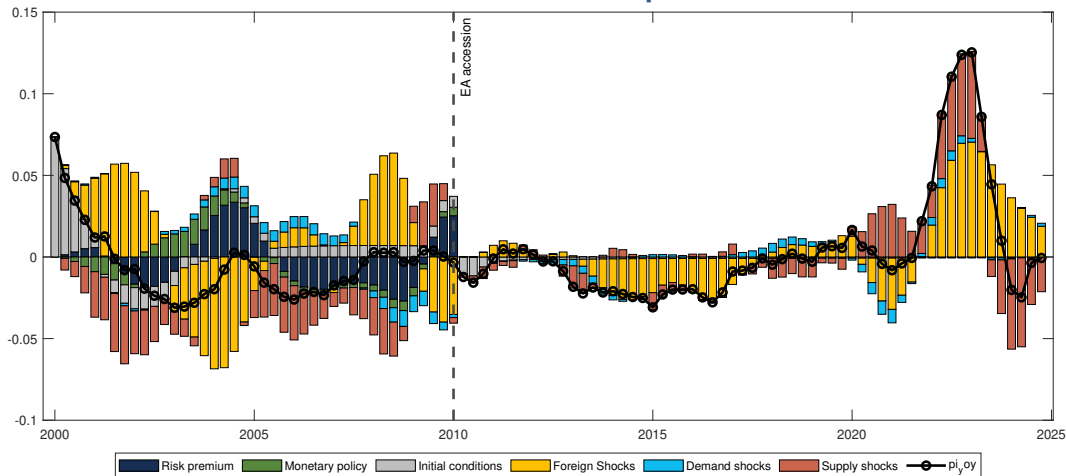
Difference decomposition: GDP



What Happened: Historical Inflation Decomposition



What Could Have: Counterfactual Inflation Decomposition



Difference decomposition: Inflation

