Do long-term interest rates drive GDP and inflation in Small Open Economies? Evidence from Poland [1]

Grzegorz Wesołowski*

*Narodowy Bank Polski and Warsaw School of Economic

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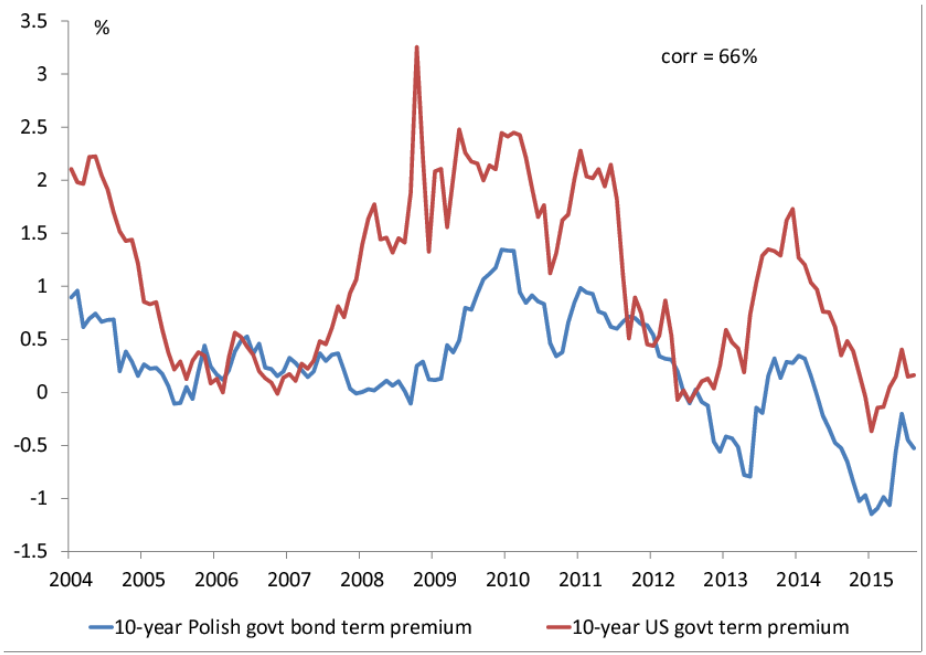
[1] The views expressed herein are those of the author and not necessarily those of Narodowy Bank Polski or the Warsaw School of Economics.

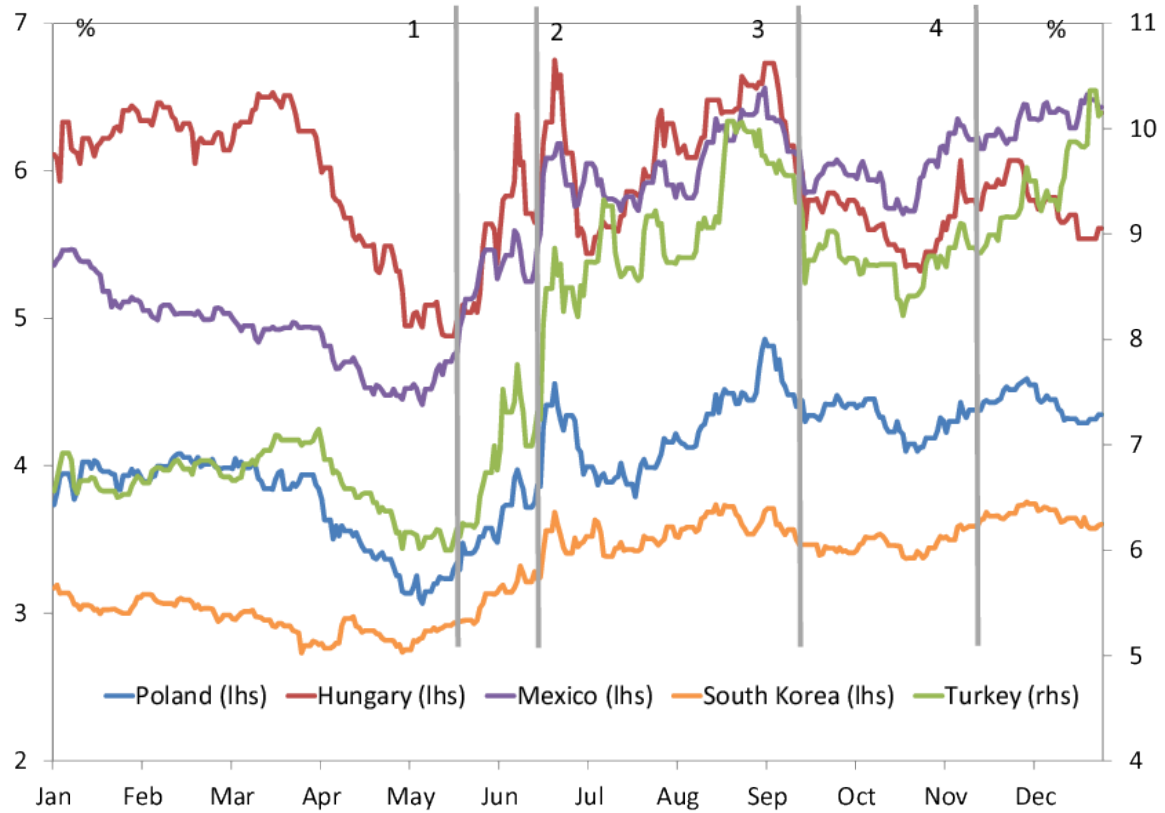
The time-varying term premium may represent an interesting link between an SOE and the ROW



Source: New York Fed (the term premium in the US), my estimation based on Adrian et al (2013; the term premium in Poland)

▸ Evidence against the EH

E.g. QE programs had a simultanuos impact on many SOEs



A deeper motive: understanding the macro impact of the term premium on an SOE, taking PL as an example

- Does the term premium affect economic dynamics/ shock propagation?
- Does it impact the volatility of other macro variables?
- Some attempts have been made w.r.t. large closed economies (see e.g. Kiley 2012, Andres, Lopez-Salido & Nelson, 2004, Chen et al 2012, Falgiarda, 2012)
- Recently also other economists have started investigating the QE effects on the ROW (Alpanda & Kabaca, 2015)
- but...

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SOEs differ from large closed economies

- Long term interest rates may impact the exchange rate
- They may be driven by other variables: e.g. external debt

Correlations between term premia and international investment positions to GDP

	correlation	p-value (H0: no correlation)
Czech Republic	-0.45	0.01
Hungary	-0.05	0.73
South Korea	-0.37	0.01
Poland	-0.58	0.00
Sweden	-0.09	0.50
Australia	0.27	0.04
New Zealand	-0.32	0.02

▸ Evidence for the EA

I attempt to estimate the impact of changes in LR on GDP and inflation in Poland

- I bulid on DSGE literature for large closed economies.
- Deviations from the EH are introduced through investor segmentation and transaction/adjustment costs.
- Assets are assumed to be imperfect substitutes (in line with Preferred habitat hypothesis; Vayanos, Vila, 2009)
- I estimate the model with the Polish data
- I analyze the impact of the term premium on economic dynamics

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Main features

- An open-economy model with two types of households, firms, the government and the central bank.
- Many standard features for this kind of models:
  - Monopolistic competition, sticky prices and the Taylor rule.
  - Impact of the foreign economy
- Not standard: the mechanism that allows long-term interest rates to deviate from the Expectation Hypothesis.

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Overview

- HH have access to three type of bonds: domestic short-term (DST), domestic long-term (DLT) and foreign long-term (FLT).

- There are two types of households:
  - unrestricted HH: access to all types of assets, pay transaction and adjustment costs.
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Crucial features of the model

- No arbitrage opportunities between domestic long-term and short-term bonds require returns on them to be equal. This leads (after log-linearization) to the term structure condition:

$$r_{L,t} = E_t \frac{1}{L} \sum_{i=0}^{i=L-1} r_{t+i} + \iota(d_t^{U*} + q_t) + \zeta_{RL,t}$$

- Hence, a rise in the term premium increases long term interest rates and acts contractionary. ▸ IRF to the term premium shock
- In turn, no arbitrage between domestic long-term bonds and foreign long-term bonds implies the UI(D)P condition (after log-lin):

$$r_t - r_t^* = E_t q_{t+1} - q_t + E_t \pi_{t+1} - E_t \pi_{t+1}^* + \rho_t + \tau(d_t^{U*} + q_t)$$

$$\rho_t = \varrho_Q(q_t + d_t^{U*} - gdp_t) + \zeta_{Q,t}$$

- Hence, when the debt rises, domestic currency tends to depreciate.
- This form of the term structure and the UI(D)P are crucial in the model. Both are my value added.

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- The QE programs affected GDP and prices in Poland moderately.
- Short term interest rates have 5.1-fold stronger impact on GDP in Poland than long term rates.
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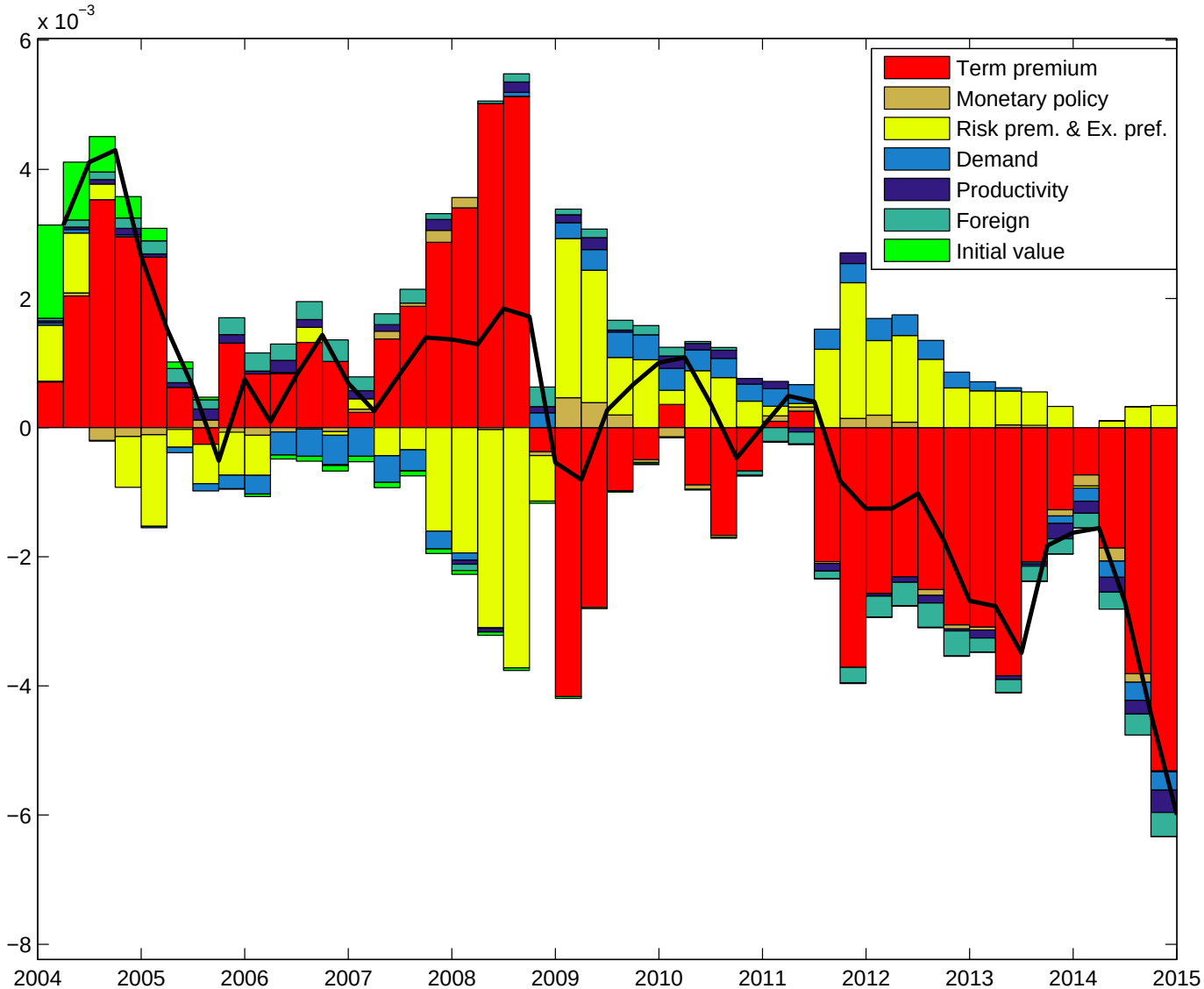
Baseline estimation

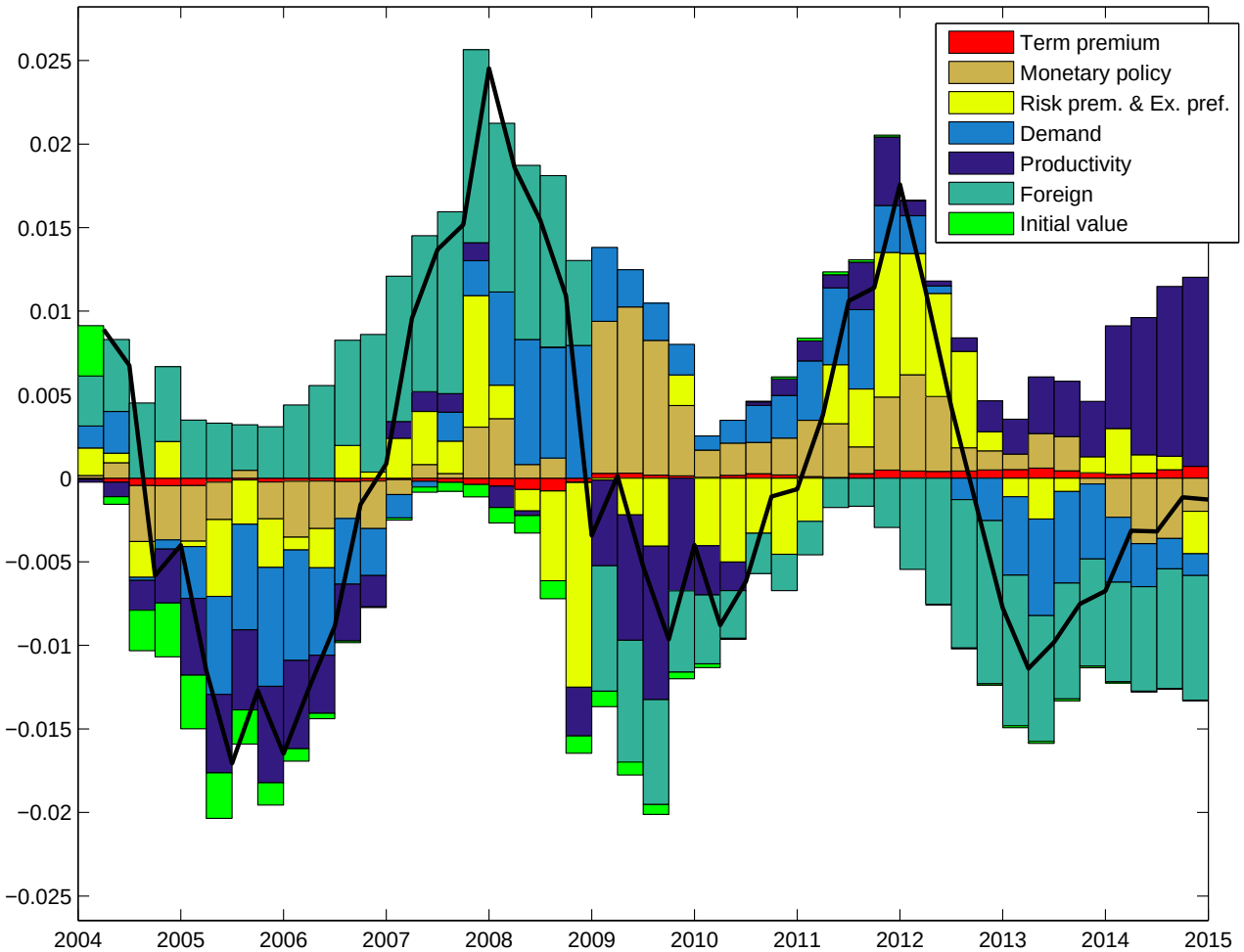
- Data for Poland and the euro area
- 2004Q1 - 2014Q2
- Bayesian methods, relatively uninformative priors
- 9 time series: GDP, 2 int rates, consumption, inflation, REER, GDP_ea, R_ea, Inf_ea
- 9 shocks: productivity, time preference, country risk premium, export preference, monetary policy, term premium, 3 shocks in foreign VAR.

Shock decomposition: term premium



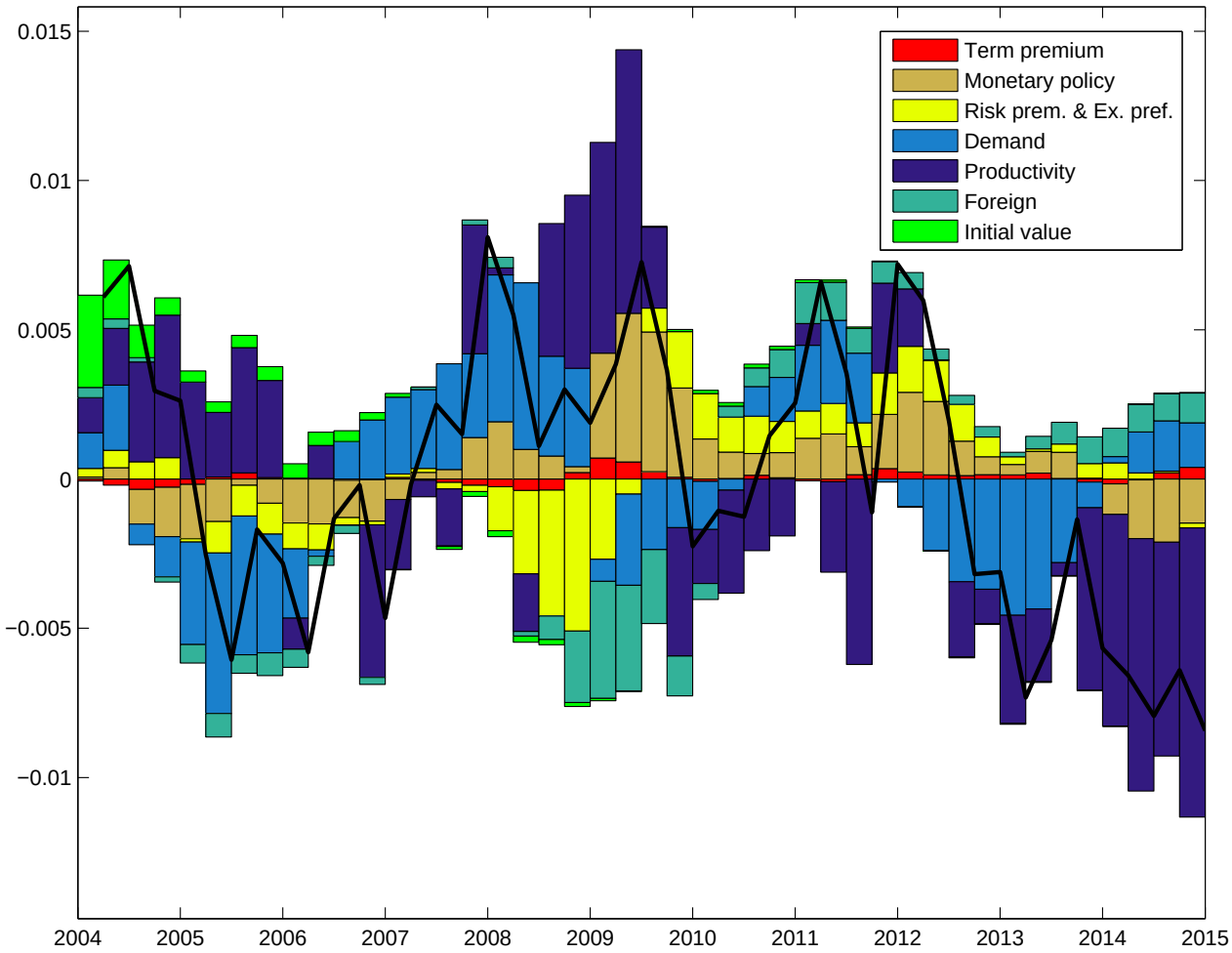
Shock decomposition: GDP

- The term premium shock accounts for 0.4% of GDP volatility

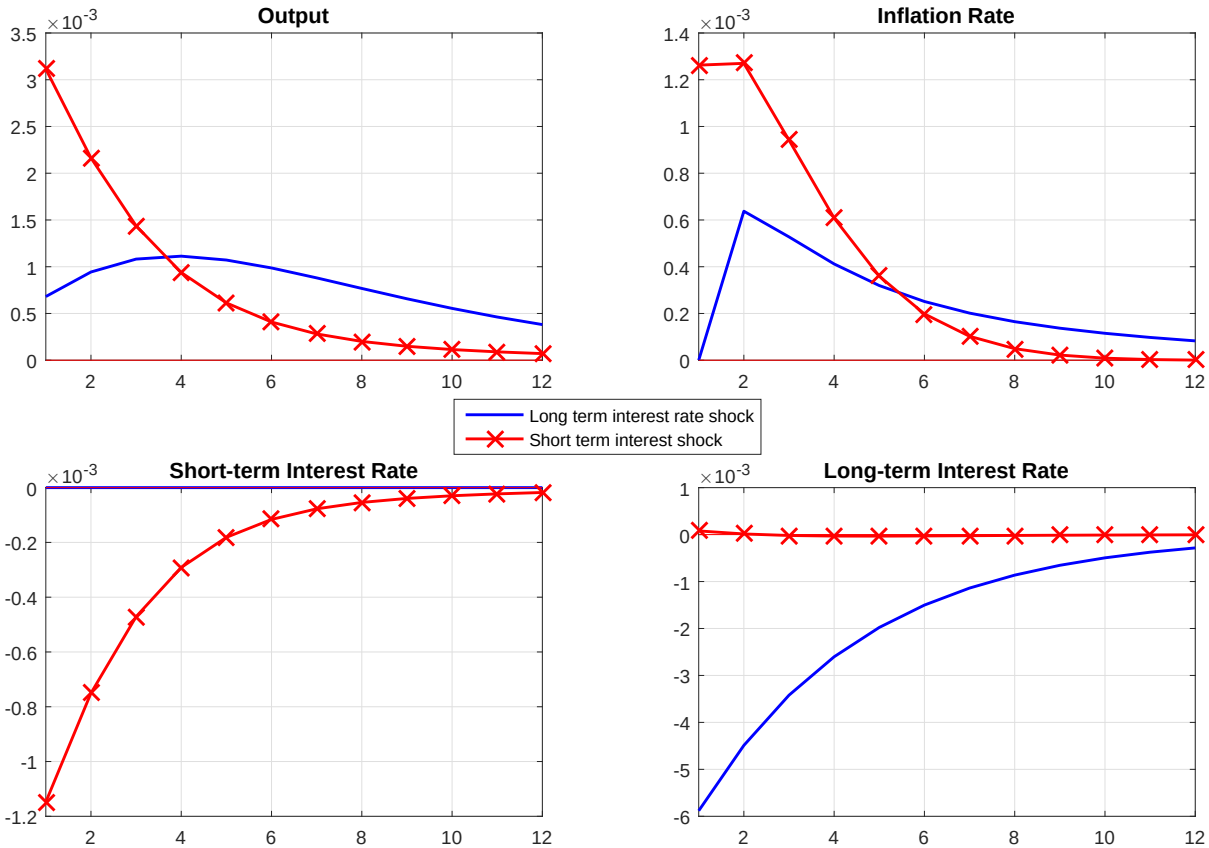


Shock decomposition: inflation

- The tp shock accounts for 0.3% of inflation volatility



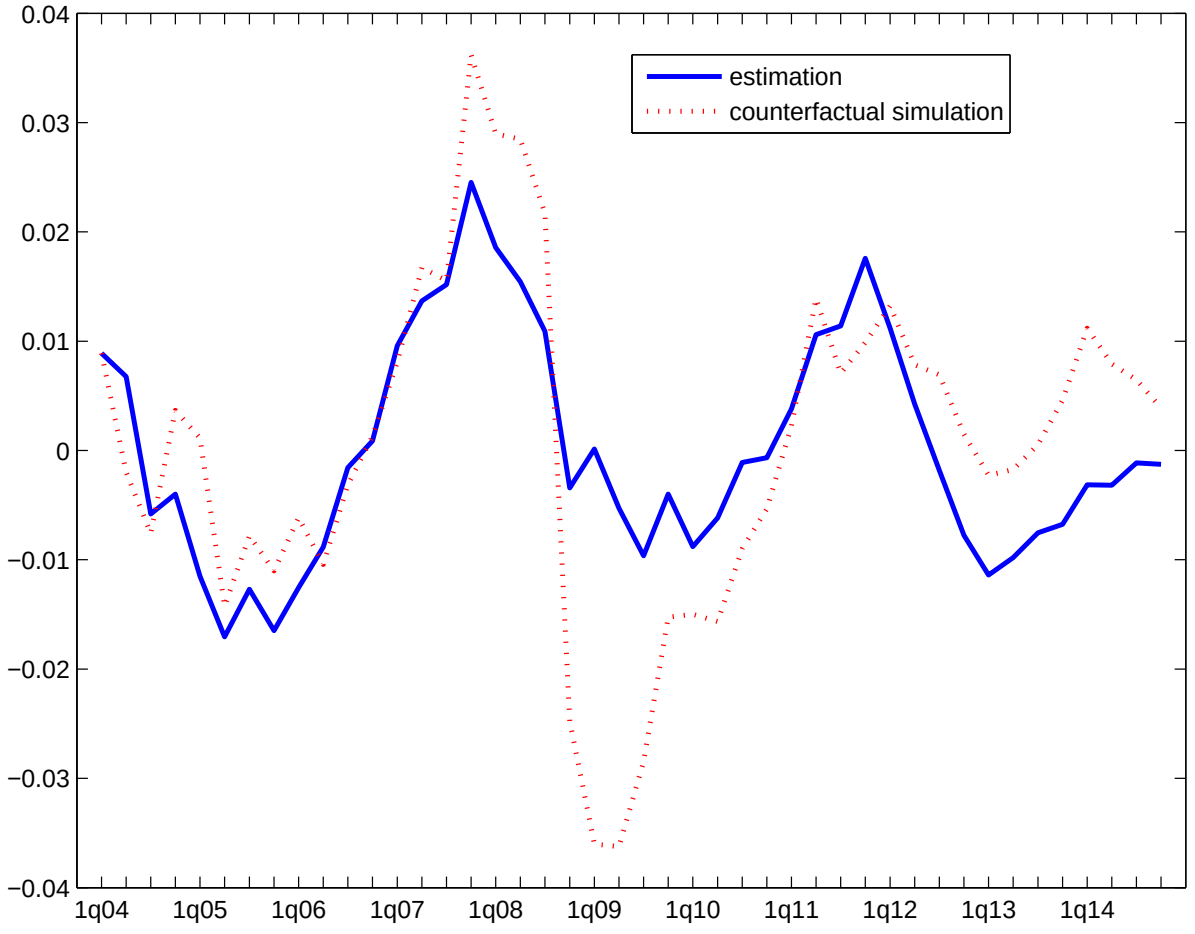
Long and short interest rates drops that lead to an equal cumulated rise in output gap



The term premium has stabilized GDP and inflation in Poland

[percentage points]	GDP	π	r	r_L	q
Baseline simulation	1.00	0.56	0.37	0.34	4.62
Benchmark simulation	1.50	0.56	0.40	0.07	3.81

Deviations from the EH: impact on historical output gap



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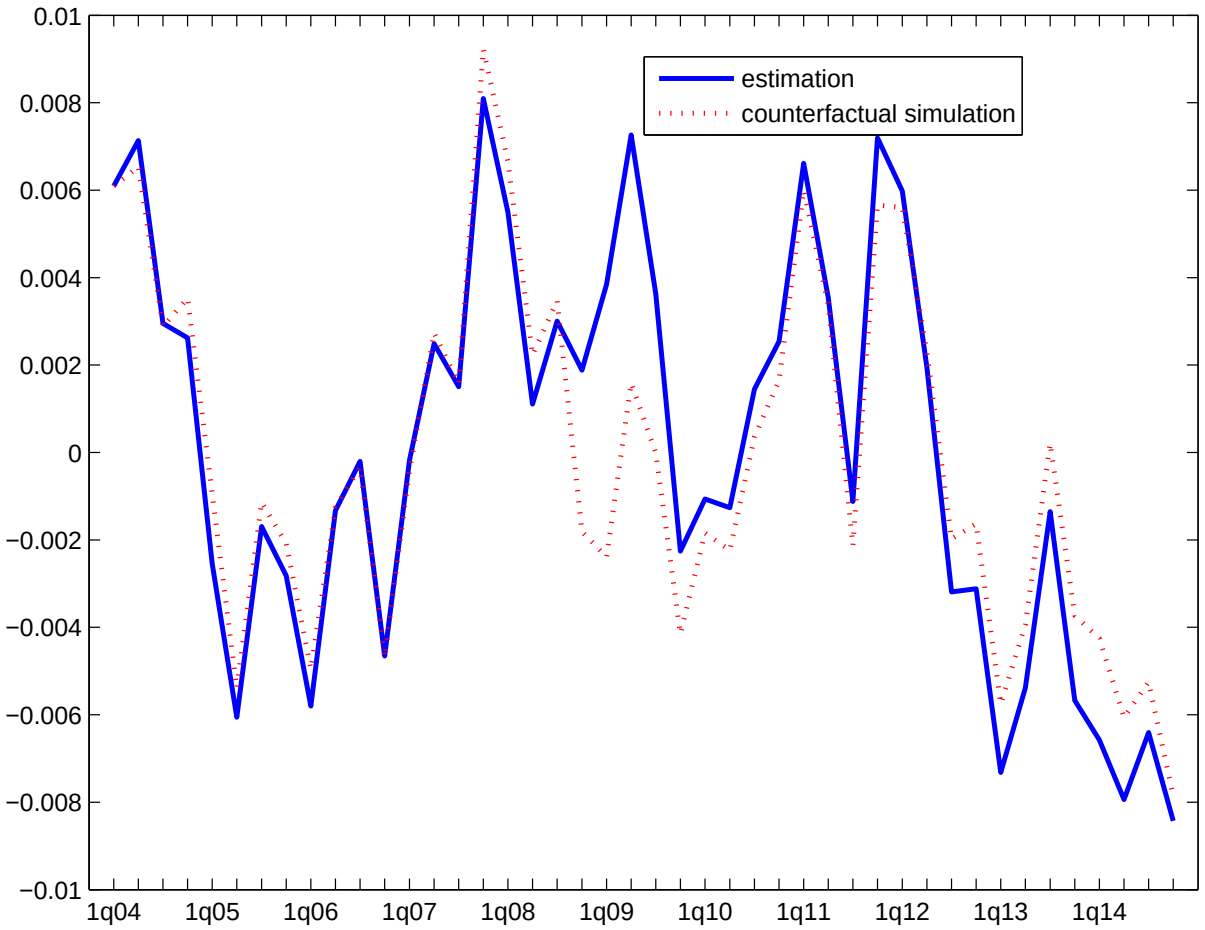

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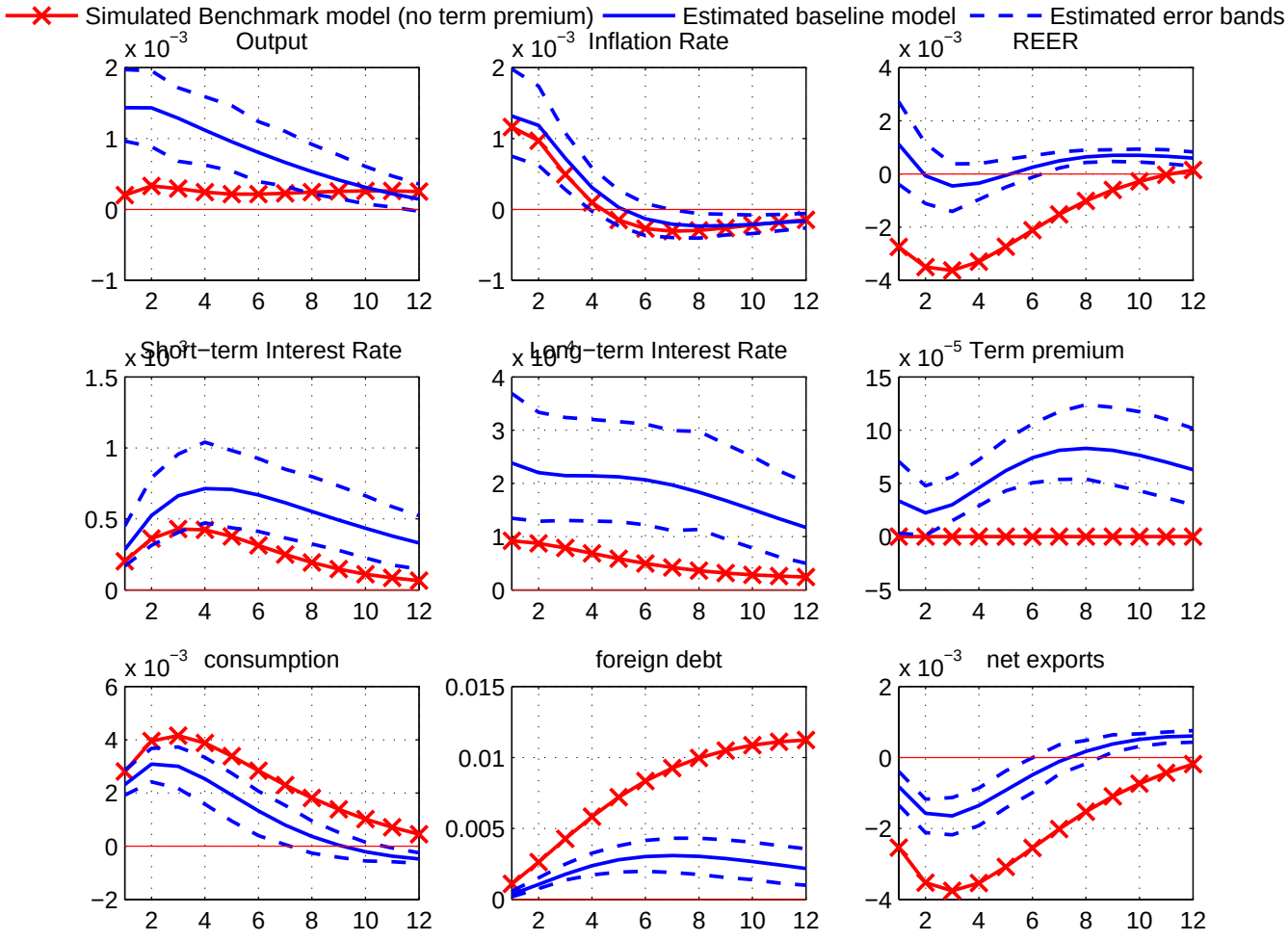
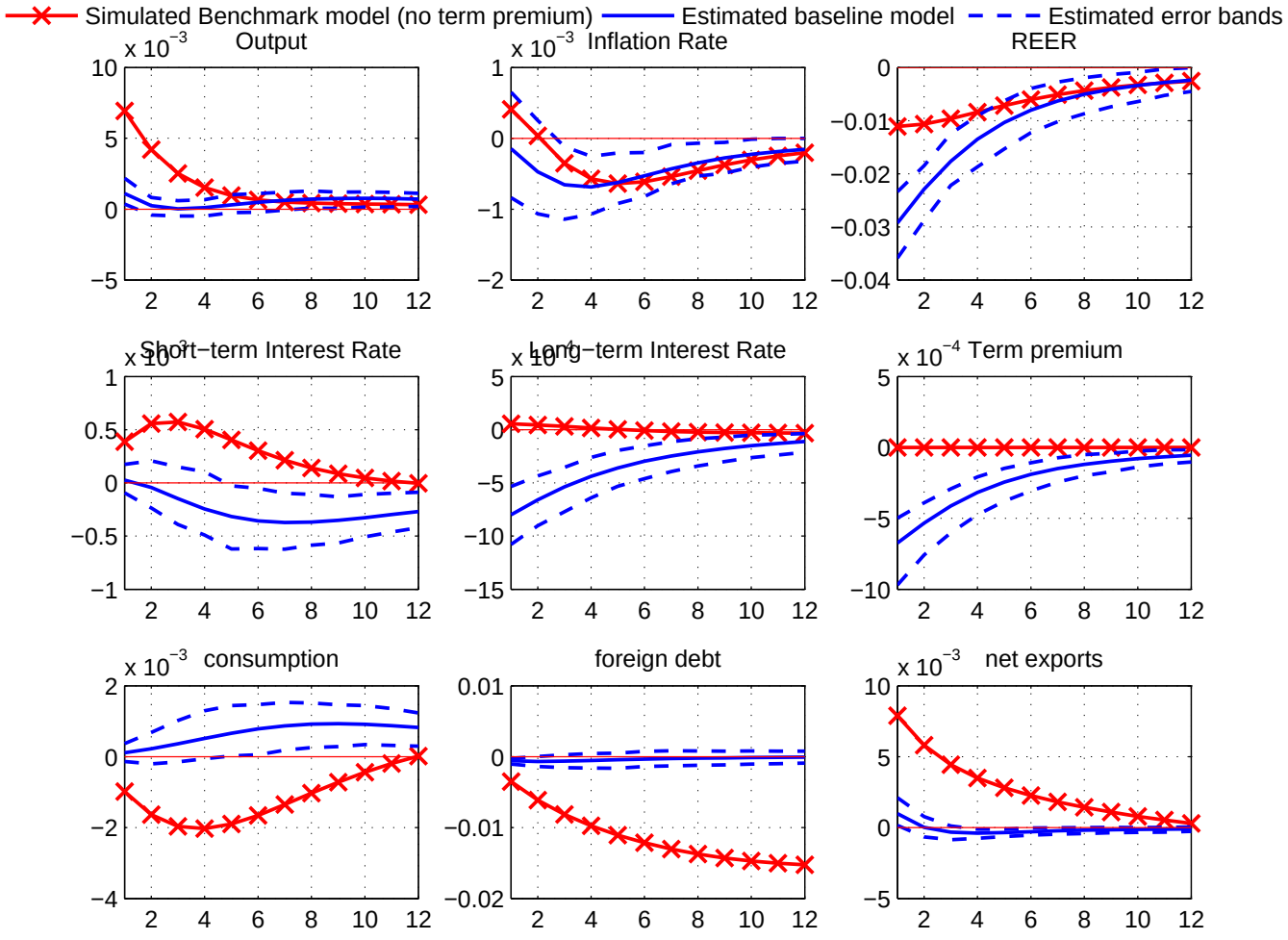
Shock name:	GDP	π
Time preference	$\uparrow$	$\leftrightarrow$
Risk premium	$\downarrow$	$\leftrightarrow$
Export preference	$\downarrow$	$\leftrightarrow$
Productivity	$\leftrightarrow$	$\leftrightarrow$
Monetary policy	$\leftrightarrow$	$\leftrightarrow$

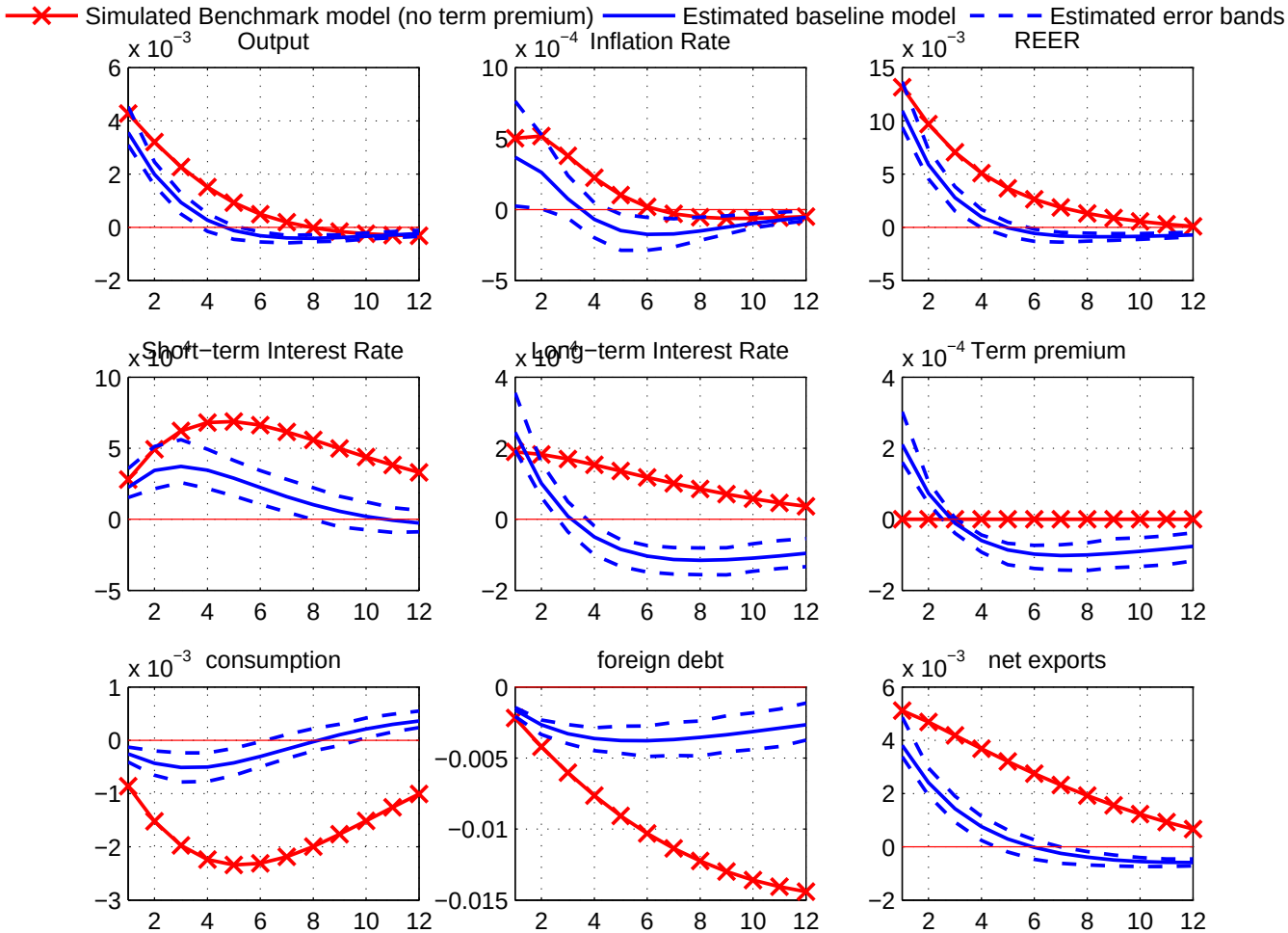
Deviations from the EH: impact on time preference shock



Deviations from the EH: impact on export preference shock



Deviations from the EH: impact on risk premium shock



My contribution

- I capture the fact that LR may deviate from the EH also in SOE in the SOE NK model
- I estimate a DSGE model with this feature for Poland and show that the term premium has stabilized GDP and inflation in Poland
- I show that long term rates impact GDP 5.1-times weaker than short term rates
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Expectations hypothesis and Fama-Bliss estimation

- EH can be formulated in two equivalent ways:
  - Long maturity yield = average of expected future short rates (plus risk premium)

$$y_0^{(N)} = \frac{1}{N} E(y_0^{(1)} + y_1^{(1)} + y_2^{(1)} + ...y_{N-1}^{(1)})(+riskpremium)$$

  - Forward rate = expected future spot rate (plus risk premium)

$$f_t^{(N)} = E_t[y_{t+N-1}^{(1)}](+riskpremium)$$

- In Fama-Bliss estimation we checked whether second equation holds, by doing a simple regression:

$$y_{t+N-1}^{(1)} - y_t^{(1)} = a + b(f_t^{(N)} - y_t^{(1)}) + \epsilon_{t+1}$$

- if b=1 then EH holds - 1% higher forward rate implies 1% higher yield in the future.
- We showed that b is close to 1 only for period up to 1 year.
- Therefore, as both formulation of EH are equivalent, long-term rates are not composition of short-term rates above one year period.

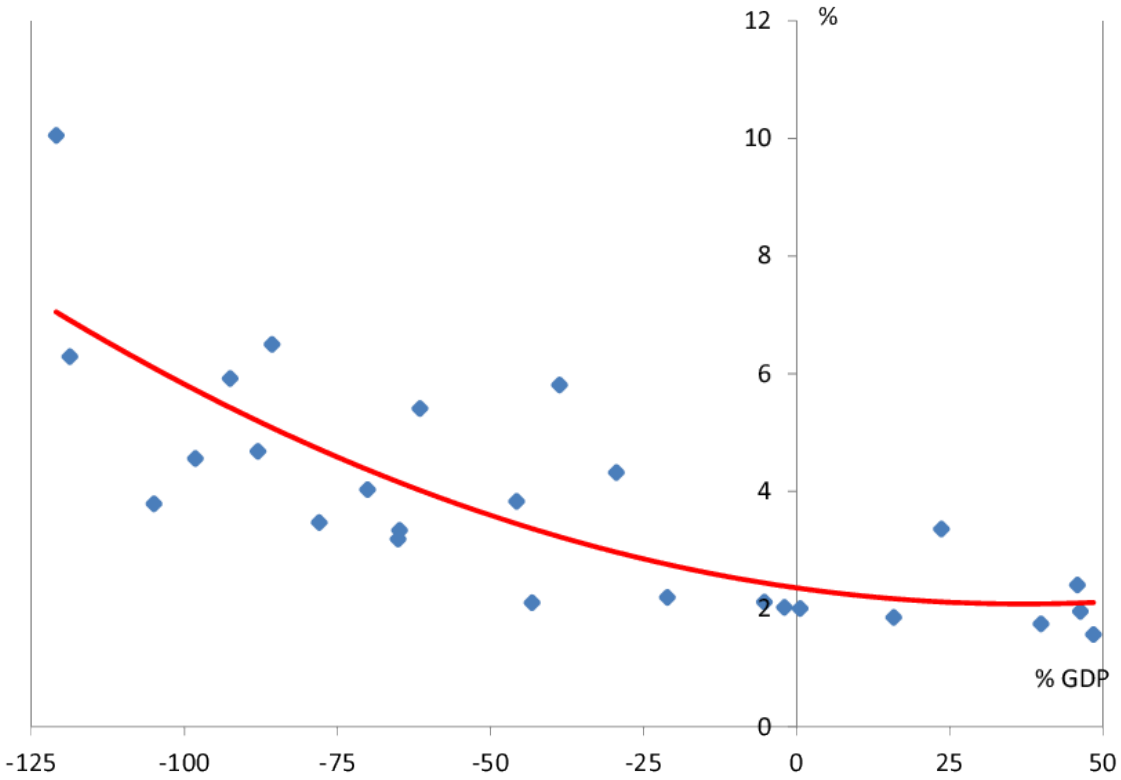
Fama-Bliss estimation: results for Poland

Time horizon (N [years])	OLS		GMM	
	b estimate	90% confidence interval for b	b estimate	90% confidence interval for b
2	1.339	(1.053; 1.625)	1.168	(0.611; 1.726)
4	0.234	(-0.110; 0,579)	0.034	(-0.460; 0.528)

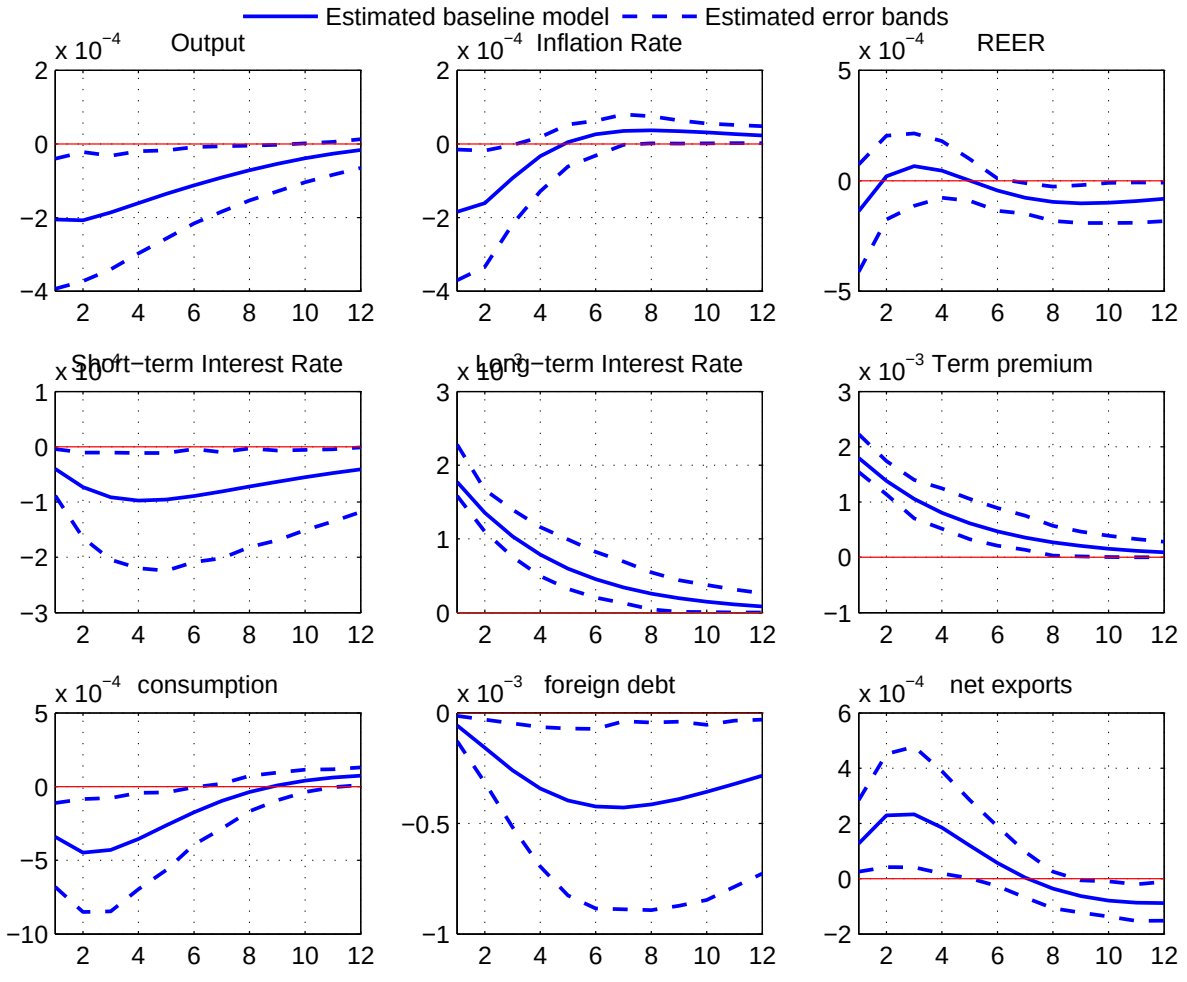
▸ Motivation

Long-term interest rates and NFA to GDP in 2013 in the EA

Return



The term premium shock



▸ Crucial features of the model