Lower-for-longer Under Endogenous Technology Growth

Michaela Schmöller[1]; Martin Spitzer[2]
[1]Bank of Finland; [2]European Central Bank

What this paper does

Main objectives:

- Study lower-for-longer monetary policy strategies under endogenous technology growth
- Evaluate their effectiveness in terms of inflation and output stabilization at the ELB (over both the short- and long-run)
- Analyze their relative performance and potential trade-offs in this context

Research questions:

- What are the true ELB-induced costs when accounting for the long-run output losses through hysteresis effects in TFP?
- What are the benefits and side-effects of targeting the long-run output gap?
- How do lower-for-longer monetary policy strategies perform under endogenous technology growth?

Model

- **Medium-scale DSGE model with endogenous total factor productivity dynamics**
- **Endogenous technology growth mechanism** (Comin and Gertler (2006)):
  - Innovation through R&D
  - Technology adoption
- Otherwise **standard DSGE model features** (Smets and Wouters (2007)):
  - Calvo price and wage rigidities
  - ELB constraint
- **Monetary policy strategies:**
  - "Bygones" approach: Standard Taylor rules
  - Hysteresis-augmented Taylor rule
  - (Temporary) price level targeting
  - Average inflation targeting

Higher ELB-induced costs due to output hysteresis

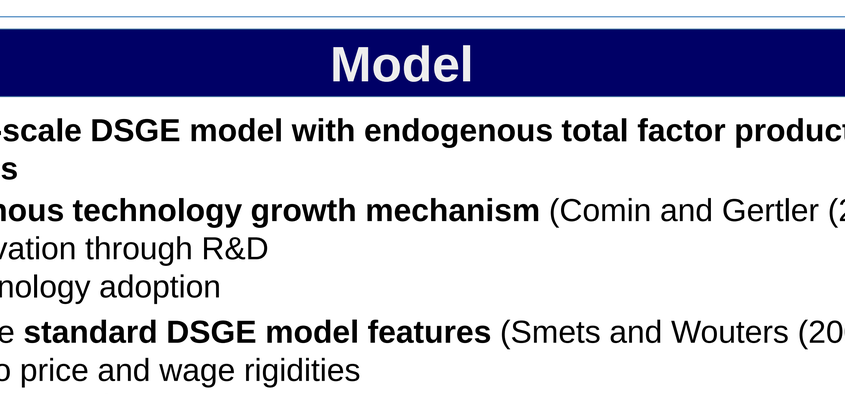

Figure 1: Impulse response in the model with and without the ELB (liquidity demand shock)

- **Demand-supply spillovers:** Weak aggregate demand induces a procyclical drop in investment in R&D and technology adoption
- **Hysteresis effects in TFP:** the fall in productivity-improving investments generates a drop of TFP relative to trend and thus permanent output losses
- **ELB-induced costs more severe** than commonly assessed owed to supply-side scarring (effect increasing in depth and length of ELB episode)

Hysteresis-augmented Taylor rule

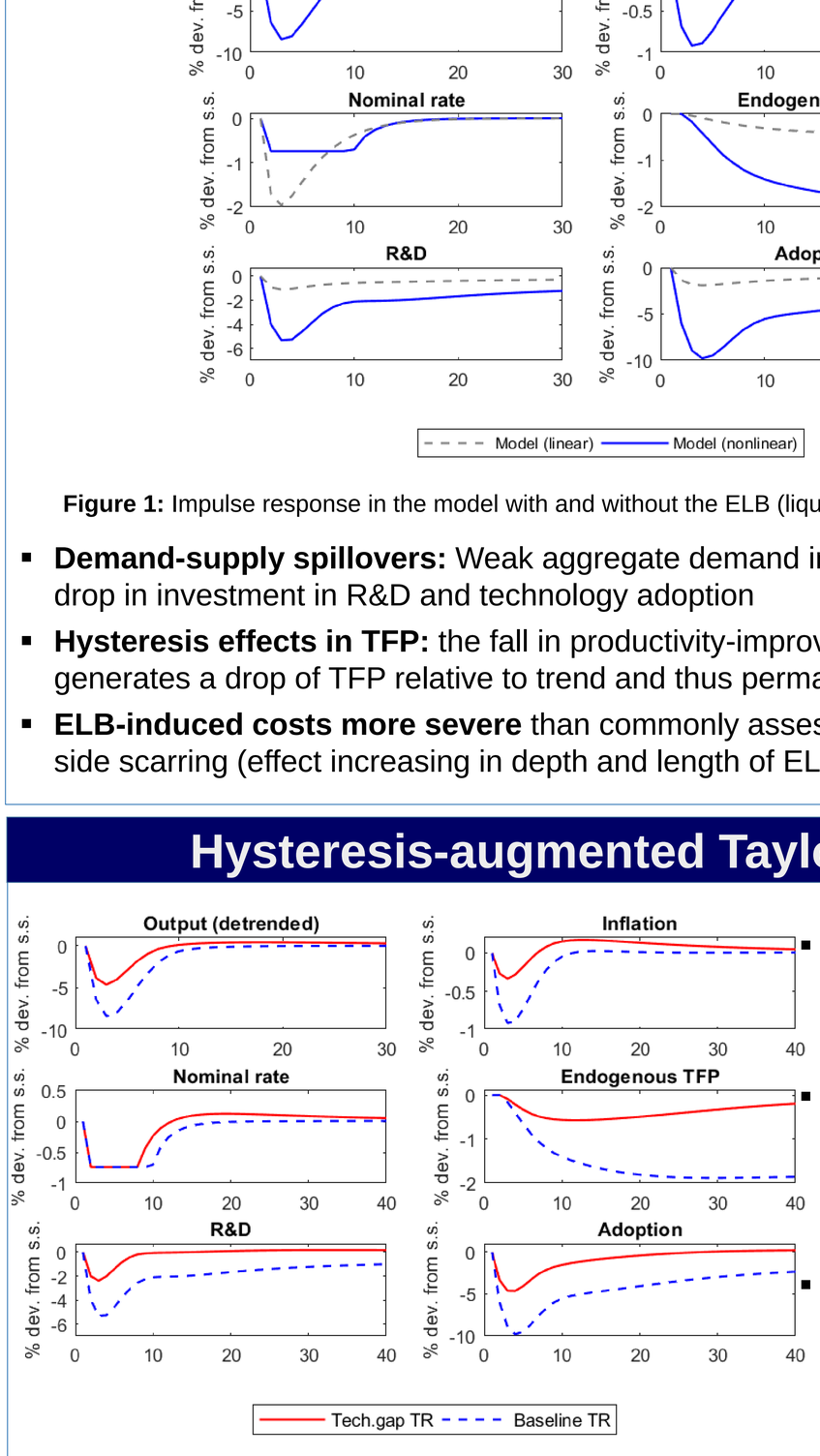

Figure 2: Impulse response under the rule targeting the technology gap

- Premature tightening under "bygones approach" in the standard Taylor rule
- Lower-for-longer feature supports inflation and closure of short-run output gap
- Targeting the technology gap fully prevents long-run output losses

Temporary price level targeting

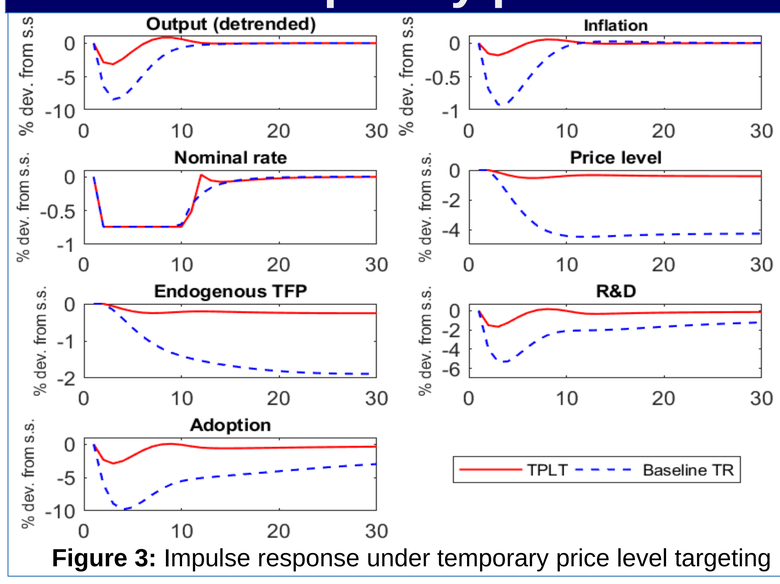

Figure 3: Impulse response under temporary price level targeting

- Inflation shortfall made up in full in subsequent overshooting episode
- Positive effect on short-run output gap
- Reduction of long-term output losses

Average inflation targeting

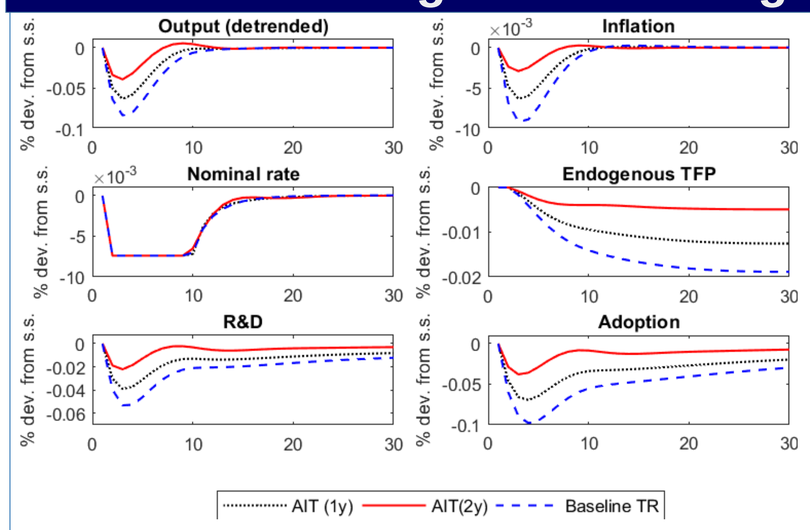

Figure 4: Impulse response under average inflation targeting

- Restricts accumulation of inflation shortfall to averaging horizon
- Beneficial effect on inflation and the short-run output gap
- Longer averaging windows associated with reduced long-run output losses

Inflation volatility vs. long-run output losses

	Long-run output gap	Inflation undershooting	Inflation overshooting
Std. TR	-1.78	-4.49	0.58
Hysteresis TR	0	-1.14	4.52
PLT	-0.34	-1.04	1.04
AIT (1y.)	-1.20	-2.89	0.14
AIT (2y.)	-0.47	-1.03	0.08
TPLT	-0.24	-0.53	0.17

Table 1: Inflation volatility and long-term output losses in the ELB-episode (long-run gap: dev. from initial steady state. (in %); inflation: cumul. dev. from target (in %))

Dynamics under inflationary shocks

- Temporary PLT permits larger permanent TFP gains
- Stronger response to offset inflation under PLT and AIT reduces the technology increases in the upswing

→ Novel channel for credibility issues: would monetary policy be ready to counteract not only improvements in the short-run output gap but also in the long-run output path?

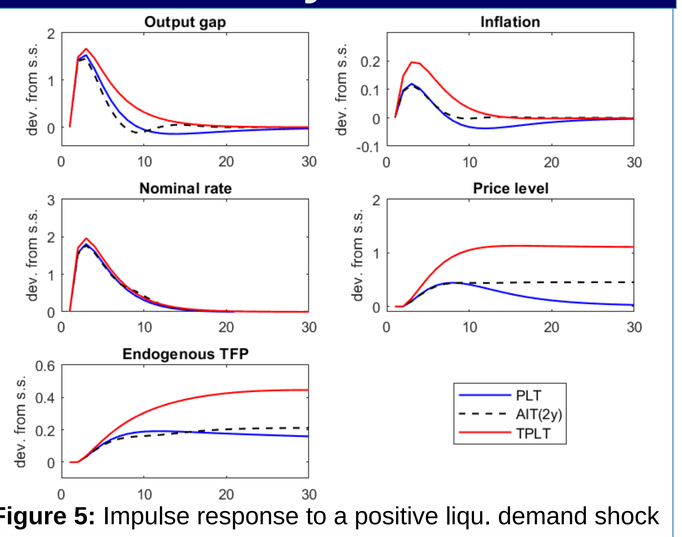

Figure 5: Impulse response to a positive liqu. demand shock

Conclusions

- **Long-run money non-neutrality**: Conduct of monetary policy affects the long-term output path
- **Losses owed to the ELB more severe** than commonly assessed owed to hysteresis effects in total factor productivity
- **Premature tightening under "bygones" strategies**
- **Lower-for-longer strategies support alignment of inflation with target** and **alleviate long-term output losses at the ELB**
- Relative advantage subject to **trade-offs**:
  - Inflation volatility vs. long-run output losses
  - Measurement of the technology gap
  - Response to inflationary shocks and related credibility issues