Discussion of: The New Keynesian Climate Model

By Jean-Guillaume Sahuc, Frank Smets and Gauthier Vermandel

Philipp Pfeiffer European Commission

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Disclaimer

Note: The views expressed in this discussion are those of the author and should not be attributed to the European Commission.

What the authors do

- Examining monetary policy challenges posed by climate change:
 - 1. Climateflation: Inflationary effects of warming planet (productivity)
 - 2. Greenflation: Inflationary effects of climate mitigation policies (carbon taxation)
- Break down their quantitative importance using an extended textbook MP model: Large inflationary effects from both channels
- Added-value of the New-Keynesian climate model (NKCM) to standard macro analysis:
 - Climate mitigation: Abatement costs
 - Productivity damages from climate change
 - Approaches to attenuate forward-looking dynamics
- Added-value to climate modelling:
 - Employs Bayesian estimation for greater empirical grounding.
 - Captures anticipatory behaviour of agents, contrasting with recursive CGE models.
 - Maintains tractability

My discussion

- 1. Quantitative results on greenflation and climateflation
- 2. Modelling choices:
 - Monetary policy conduct matters
 - Clarify role of "behavioural features"
 - Insights from multi-sector models
- 3. Other aspects:
 - Welfare: Damages vs mitigation
 - Volatility and disaster risk

Huge impact of climate and green inflation

FIGURE 3. Model-implied projections based on alternative control rates of emissions



Huge impact of climate and green inflation

FIGURE 5. Decomposition of aggregate supply during transition



Some observations

- Paris agreement: Long-run output costs of around 1% (of trend GDP)
 Below other estimates (when including damages).
- > Paris agreement scenario implies on average 3-4 pp. higher inflation for decades
- Decomposition reveals substantial climateflation and greenflation even today!
 - But: Low carbon tax today & limited forward-looking behaviour & flat Phillips curve.
- Difficult to disentangle: "Standard" term's contribution extremely deflationary
 Perhaps some climate features remain in the "semi-linearization"?

Literature leaning towards limited impact of greenflation

- \blacktriangleright Adverse supply shock may be inflationary, but demand suppression is deflationary \longrightarrow net effect small
- Empirical evidence of carbon taxation (EU, Canada; OECD) also points to limited inflationary or even deflationary effects (Konradt and di Mauro, 2021; Moessner, 2022)
- Breckenfelder et al. (2023) find limited inflationary effects of carbon pricing policies.
- Simulations with larger models find a relatively modest impact

Smaller greenflation in large-scale DSGE models



Notes: ECB's E-NAWM (Coenen et al., 2023)



Notes: IMF GMMET, WEO 2022

Consumer price inflation - lump-sum recycling





Inflation impact depends critically on monetary policy

- Supply-driven climateflation and greenflation create inflation-output trade-off,
- ► In the NK(C)M, the Taylor rule follows:

$$\frac{r_t}{\overline{r}} = \left(\frac{r_{t-1}}{\overline{r}}\right)^{\rho_r} \left[\left(\frac{\pi_t^*}{\pi}\right) \left(\frac{\pi_t}{\pi^*}\right)^{\phi_\pi} \left(\frac{y_t}{y_t^n}\right)^{\phi_y} \right]^{1-\rho_r} \left(\frac{\pi_t^*}{\pi_{t-1}^*}\right)^{\phi_\pi^*}$$

▶ Relatively strong output gap stabilization: $\phi_y \approx 0.5$ (prior: 0.5; SW: ≈ 0.1)

- Inflation stance seems weak $\phi_{\pi} \approx$ 0.6 (tight prior: 0.75; SW: \approx 2)
- Measure: GDP inflation (carbon taxes only on producer side)
- Suggestion: Explore the role of systematic monetary policy.
- Monetary policy conducted at world level (more below).

Attenuating forward-looking behaviour

- > The model features several mechanisms to attenuate forward-looking behaviour:
 - 1. Exogenous exit probability for firms
 - 2. Discounted Euler eq: $\hat{c}_t = \mathbf{m} E_t[\hat{C}_{t+1}] \sigma (i_t E_t[\pi_{t+1}] r_t^n)$
 - 3. Credibility of climate policy: E_{t,t+S}[τ̃_{e,t}] = φτ̃_{e,t}
 ▶ Prior choice: U[0, 1], posterior ≈ 0.5.
- Ferrari and Nispi Landi (2022) show the importance of expectations.
- ▶ How do these features change the standard (non-climate) model predictions?
- Suggestion: Study the implications of these features, including in a model version without climate features.

Policy credibility and transition costs: E-QUEST



Delaying investment raises the economic costs of adapting to the new targets.

Multi-sector vs single good

- Successful green transition hinges on shifting electricity production from fossil fuels to renewable energy sources.
 - The key parameter is the elasticity of substitution (EoS) between green and "dirty" energy.
 - With more sectoral disaggregation, abatement can happen via input (energy source) substitution towards the clean good, mitigates the negative aggregate productivity effect.
- NKCM's stylized framework: One sector with abatement costs (Nordhaus, 1992)
 Is it possible to map the abatement costs assumptions to sectoral transition costs?
- Multi-sector view and relative prices relevant for MP:
 - Different price stickiness across sectors (Del Negro et al., 2023; Olovsson and Vestin, 2023)
 - Optimal policy to "see through" energy prices.
 - Answer questions such as: "Can MP support the required investment?"

Key parameter: The elasticity of substitution (EoS)





Notes: GDP costs in EC's E-QUEST (Varga et al., 2022)

- Large uncertainty surrounds abatement costs (see Weitzel et al. (2019) for bottom-up estimates) and the EoS
- Suggestion: Explore the sensitivity.

Welfare costs: Is laissez-faire desirable?



- ► GDP versus consumption
- At what time is carbon taxation improving upon laissez-faire (damages vs abatement costs)?
- How much damage is already "committed"?



Notes: Kotz et al. (2024)

Averages and volatility

- Climate change will not only raise average temperatures but also increase volatility and disaster risk: What is more relevant for (*local*) MP?
- Schmitt-Grohe and Uribe (2005) suggest that optimal monetary preferences for low inflation volatility
- Alessandri and Mumtaz (2021): Less predictable climate conditions reduce growth
- Monetary policy less effective at higher rates of inflation:
 - Less room for manoeuvre: At higher (trend) inflation levels, firms' pricing decisions are relatively less sensitive to their marginal costs and, hence, the output gap.

Other points

- Challenges different for MP conducted at the national (regional) level.
- Mix of data: Use annual data?
 - OECD vs World data
 - Quarterly vs smoothing: Could be handled by Kalman filter with missing observations
 - World data "averages out" volatility?
- Stronger role for fiscal policy and interaction with MP and inflation
 - Choice among green policies matters for inflation (Del Negro et al., 2023)
 - Revenue recycling matters mitigation costs (Varga et al., 2022)
- Limited credibility for carbon taxation. What about the limited credibility of MP?
- Notation not always aligned in the paper.