Greenflation?

Conny Olovsson and David Vestin

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July 2023

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- Humans affect the climate by emitting greenhouse gases into the atmosphere and this contributes to global warming (IPCC, 2021).
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- Fear of *greenflation*, i.e., upward pressures on inflation from higher energy prices (speech by Schnabel, 2022).
- Research questions:
  1. What are the real and inflationary implications from a green transition?
  2. How should monetary policy react during the transition?

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  - Otherwise, deviations from efficiency depends on energy's weight in production, γ, and the size of τ.
  - γ is close to zero and τ is phased in so very small deviations from efficiency.
  - Monetary policy should look through the increase in $P_e \Rightarrow$ CPI peaks at $< 1\%$ above target, i.e., limited greenflation.

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- The production functions for fossil fuel (E_1) and green energy (E_2) are both linear in labor.
- Energy services are produced by combining energy inputs:

$$C_{e,t} + e_{g,t} = \left((1-\lambda)^{\frac{1}{\varepsilon}} E_{1,t}^{\frac{\varepsilon-1}{\varepsilon}} + \lambda^{\frac{1}{\varepsilon}} E_{2,t}^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}.$$

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- The energy sector is fully competitive with flexible prices.

Fiscal and monetary policy

- The policy loosely resembles the Fit-For-55 program in EU: τ increases linearly up to 2040 so that fossil energy use falls by about 60%, after which it remains constant.
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  - No climate policy to reduce emissions in the rest of the world.
- Monetary policy follows simple Taylor rules, such as

$$I_t = \frac{1}{\beta}\Pi^* \left(\frac{\Pi_t}{\Pi^*}\right)^{\alpha_\pi}$$

where inflation can be headline, core, or wage inflation.

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If energy is used in production and nominal wages and goods prices cannot adjust, a flexible energy price and a monetary policy rule that sees through energy-price changes are no longer sufficient to implement EGT.

- Now there will be deviations from efficiency. How large?

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- $\gamma \approx 0.03$–0.05: the deviation from the efficient prices will be small.
  - In the FF55, the tax is phased in, i.e., only small changes at each point in time, which contributes to small deviations.

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- Since $R_{t+j} \leq R_{ss}$, the transition generates downward pressures on inflation!
- How much depends on α_π: Π_t can be driven to zero with a high α_π.
  - In a flex-price setting this has no cost.

Nominal rigidities 1: sticky goods prices and flexible wages

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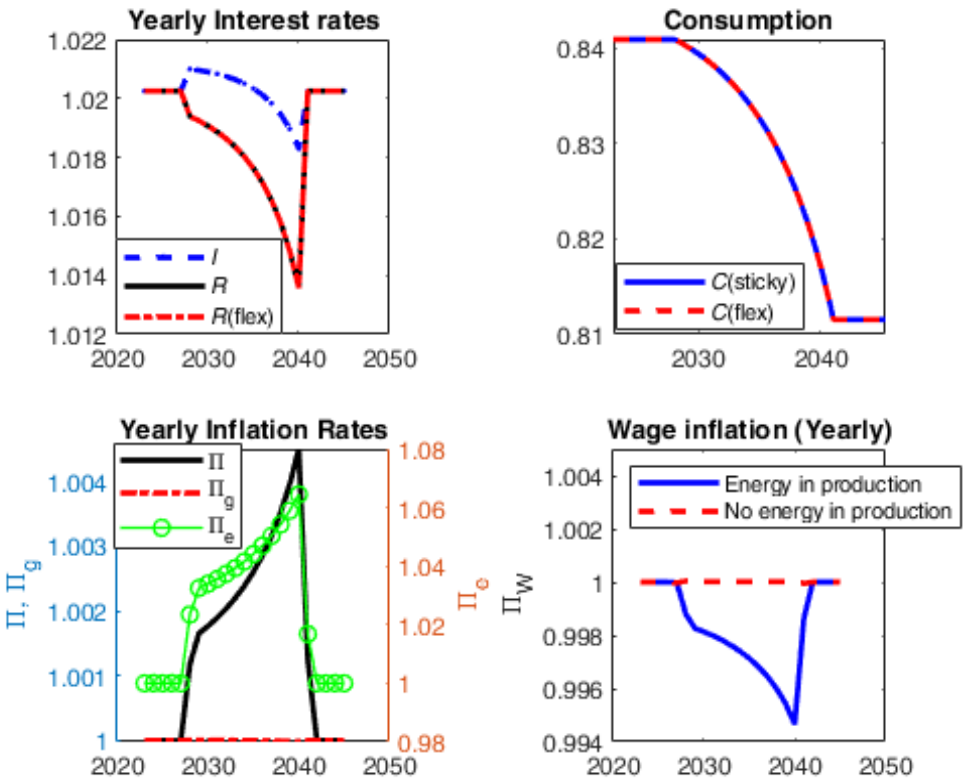
  - W and P_e can then adjust so that EGT is replicated.

Sticky goods prices, flexible wages



- B.L.: $P_e \Uparrow \Rightarrow$ CPI $\Uparrow \leq 0.5\%$.
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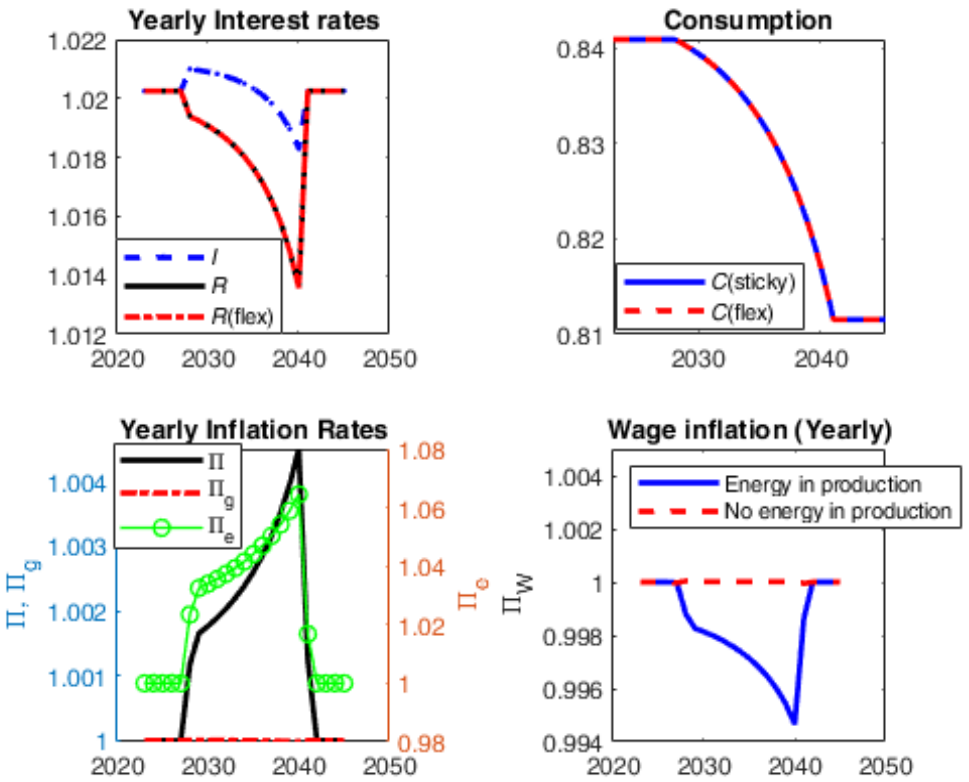

- B.L.: $P_e \Uparrow \Rightarrow$ CPI $\Uparrow \leq 0.5\%$.
  - Π remains low and it is not costly since we are replicating the EGT.
- Similar logic applies for the case with flexible P_g and sticky W.

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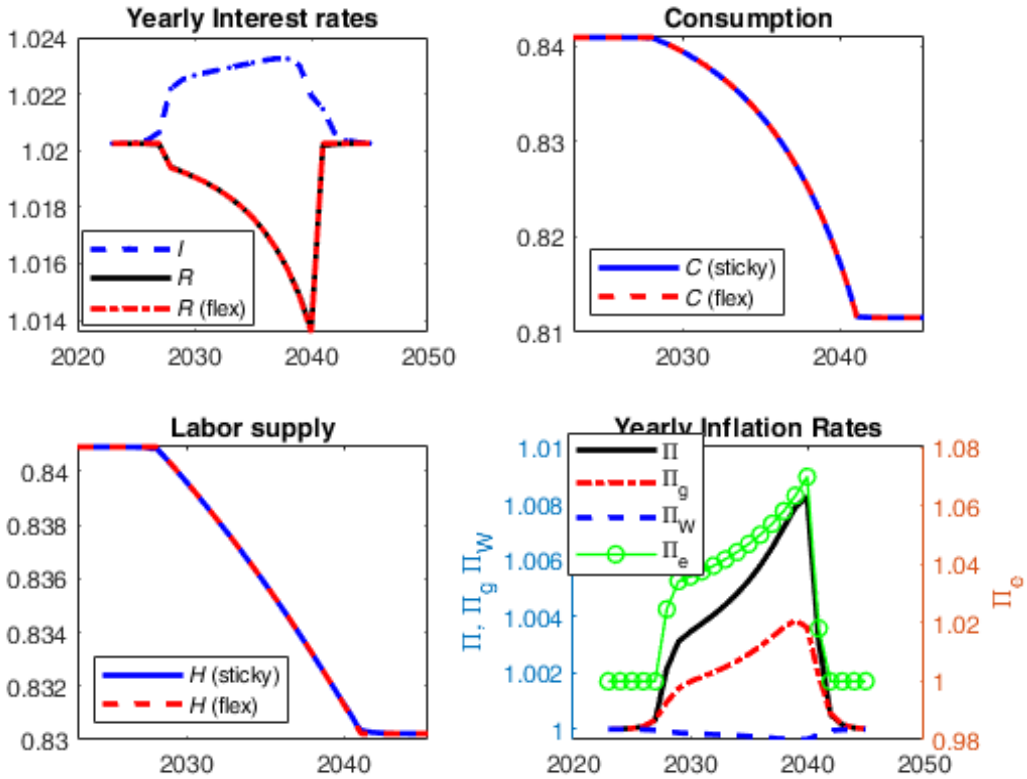
  - but not so that all three real prices are correct.
- Hence, monetary policy has to accept that either W or P_g or both will have to adjust.
- We consider a Taylor rule that incorporates both core and wage inflation:

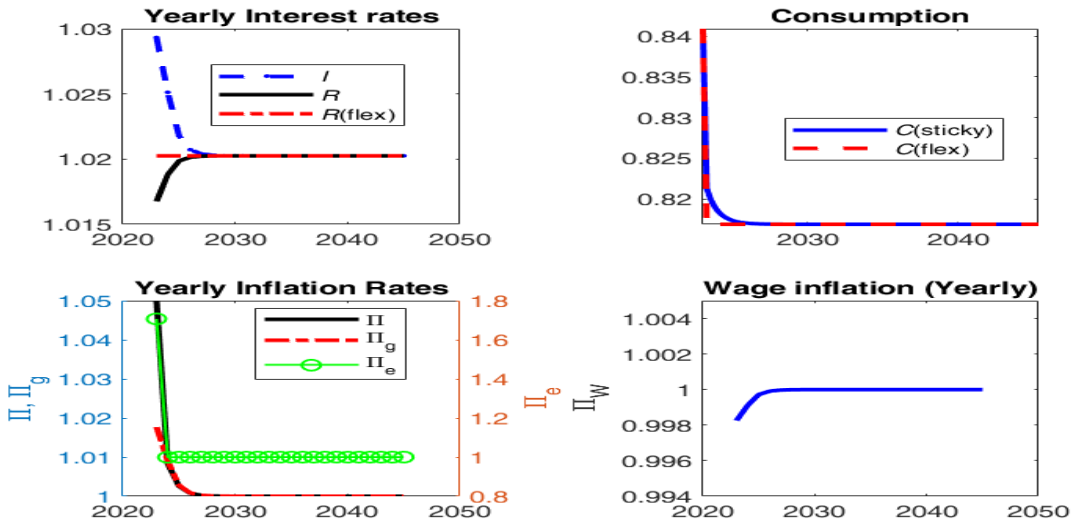
$$I_t = \frac{1}{\beta}\left[\underbrace{\Pi_g^* \left(\frac{\Pi_{g,t}}{\Pi_g^*}\right)^{\alpha_\pi}}_{\text{Core inflation}} \underbrace{\Pi_W^* \left(\frac{w_t}{w_{t-1}}\frac{\Pi_t}{\Pi_W^*}\right)^{\alpha_W}}_{\text{Wage inflation}}\right]$$



- A Taylor rule with a high α_W and a low α_π, makes it possible to closely replicate the EGT. CPI $\Uparrow\approx 0.8\%$
- VERY small deviations from efficiency.

A transition that starts immediately

Can lead to large deviations in efficiency and inflation.



Conclusions

- We show that a green transition requires the $p_e \Uparrow$ and $p_g \Downarrow$, $mc \Downarrow$, and $w \Downarrow$.
- It is optimal for the central bank to see through the increasing energy prices and focus on core inflation.
- The result is a modest *greenflation*.
- These results are in line with the empirical findings in Konradt and Weder di Mauro (JEEA, 2023), showing only limited effects on inflation from green policies.
- Contrasts with Airaudo et al. (2023): "Permanent increases in brown energy prices induce a green transition with short-run inflation and persistent output losses."