Online Appendix
Climate change mitigation and green energy investment: a stock-flow consistent model

Gustavo Pereira Serra[1] and Ettore Gallo[2].

C Appendix: Measurement equations for stochastic simulation

$$\text{dev}\ln(Y_{e,t}) = \ln\left(\frac{Y_{e,t}}{Y_e}\right)\cdot 100 \tag{1}$$

$$\text{dev}\ln(Y_{n,t}) = \ln\left(\frac{Y_{n,t}}{Y_n}\right)\cdot 100 \tag{2}$$

$$\text{dev}\ln(C_{r,t}) = \ln\left(\frac{C_{r,t}}{C_r}\right)\cdot 100 \tag{3}$$

$$\text{dev}\ln(C_{w,t}) = \ln\left(\frac{C_{w,t}}{C_w}\right)\cdot 100 \tag{4}$$

$$\text{dev}\ln(G_t) = \ln\left(\frac{G_t}{G}\right)\cdot 100 \tag{5}$$

$$\text{dev}\ln(I_{e,t}) = \ln\left(\frac{I_{e,t}}{I_e}\right)\cdot 100 \tag{6}$$

$$\text{dev}\ln(I_{n,t}) = \ln\left(\frac{I_{n,t}}{I_n}\right)\cdot 100 \tag{7}$$

$$\text{dev}R_t = (r_t - r)\cdot 100 \tag{8}$$

$$\text{dev}\omega_t = (\omega_t - \omega)\cdot 100 \tag{9}$$

$$\text{dev}\Pi_t = (\Pi_t - \Pi)\cdot 100 \tag{10}$$

$$\text{dev}\ln(L_t) = \ln\left(\frac{L_t}{L}\right)\cdot 100 \tag{11}$$

$$\text{dev}\ln(\Omega_t) = \ln(1 + \Delta\Omega_t)\cdot 100 \tag{12}$$

[1]Department of Economics, Sao Paulo State University (UNESP), Sao Paulo, Brazil. E-mail: g.serra@unesp.br
[2]Department of Economics and Management, University of Parma, Parma, Italy. E-mail: ettore.gallo@unipr.it

D Appendix: Impulse Response Functions: baseline analysis and robustness

D.1 Baseline macroeconomic results

Starting with the economic dimension, Figure D.1 illustrates the effects of a shock to investment in the non-energy sector, which is followed by the energy sector. The rise in aggregate investment – and consequently, in aggregate demand – leads to an increase in production in the non-energy sector, which, in turn, drives up energy production. The expansion in economic activity positively impacts consumption, employment, wages, and price inflation. In response, the central bank raises the discount interest rate. As the investment shock dissipates – further reinforced by the contractionary monetary policy – aggregate demand declines, gradually bringing the economy back to its steady state.

Figures D.2 and D.3 simulate increases in tax rates on other types of income and labor income, respectively. A higher τ_r, while initially reducing rentier consumption in the very short run, ultimately stimulates economic activity. This occurs because the government fully spends its tax revenue, whereas rentiers save a portion of their income. Although the central bank responds by raising the interest rate, the expansionary fiscal policy – despite maintaining a balanced budget – leads to higher rentier income in subsequent periods, positively impacting their consumption over time.

Contrarily, an increase in τ_w has no impact on overall economic activity. Since worker households and the government fully allocate their labor income and tax revenue to consumption and spending, respectively, a higher wage tax rate merely reallocates resources from worker consumption to government expenditure, without changing the aggregate demand level. Consequently, the only deviation from the steady-state equilibrium depicted in Figure D.3 appears in C_w.

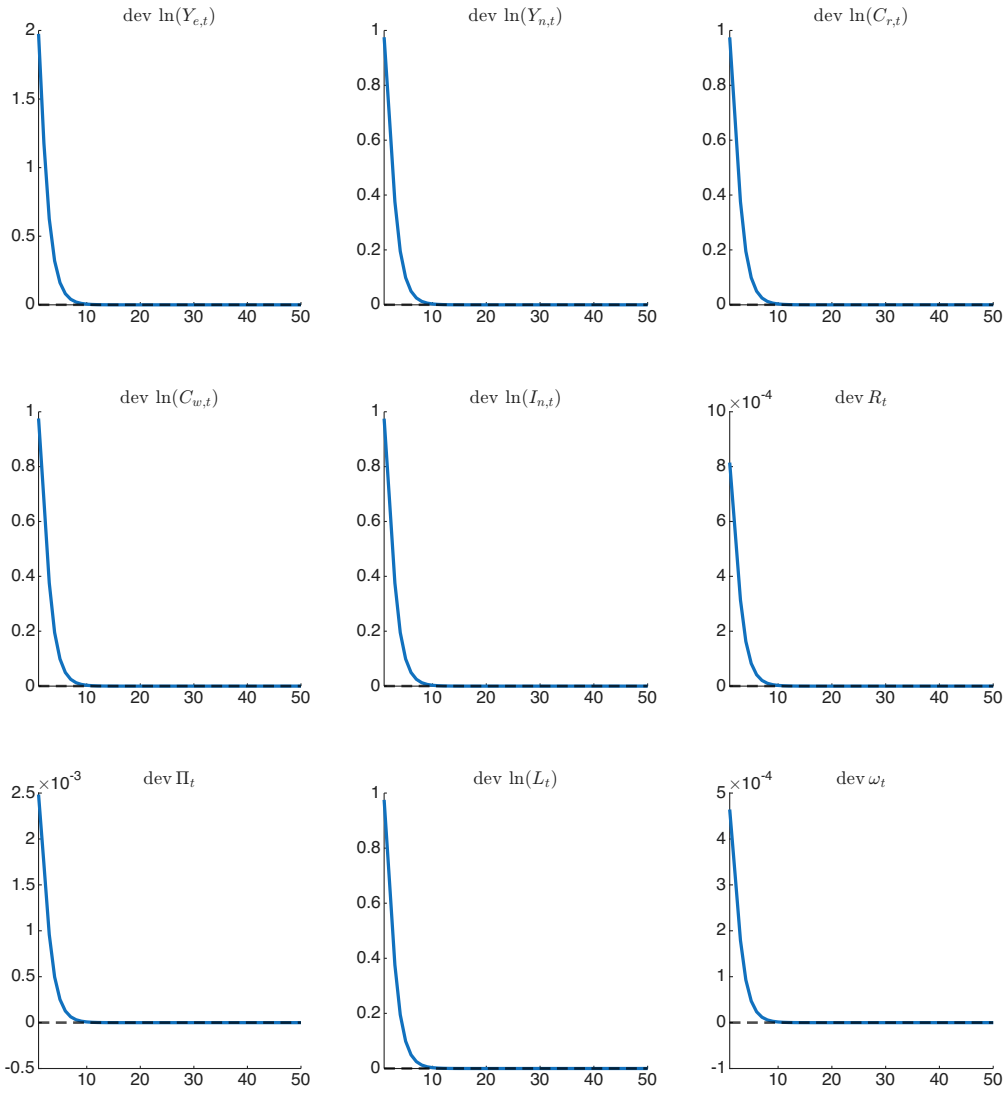

Figure D.1: Responses to a random positive shock in non-energy sector investment
Note: The graphs show, from top left to right, log deviations in energy output, non-energy output, rentier consumption, worker consumption, non-energy investment, interest rate, inflation, employment, and real wage.

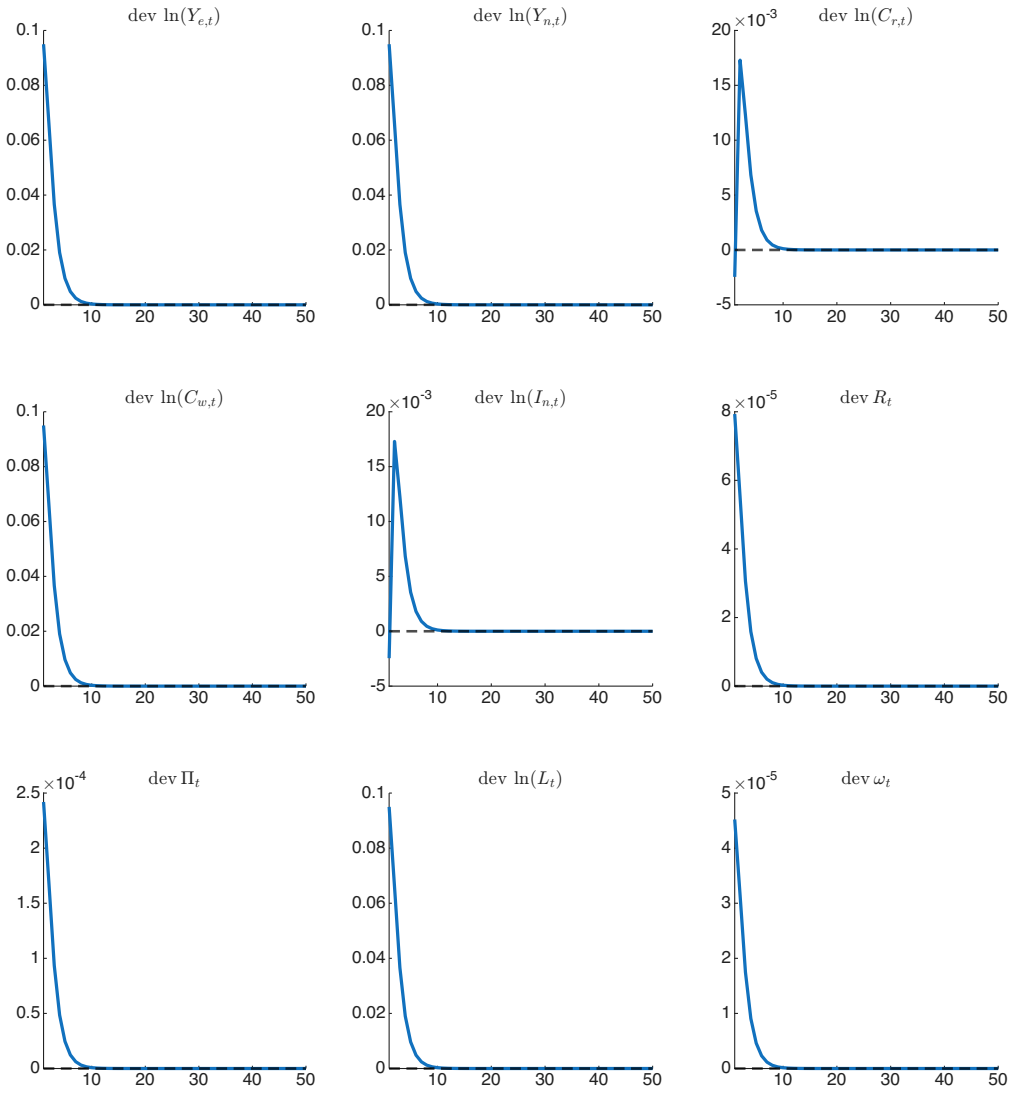

Figure D.2: Responses to a random positive shock in the tax rate on rentier income
Note: The graphs show, from top left to right, log deviations in energy output, non-energy output, rentier consumption, worker consumption, non-energy investment, interest rate, inflation, employment, and real wage.

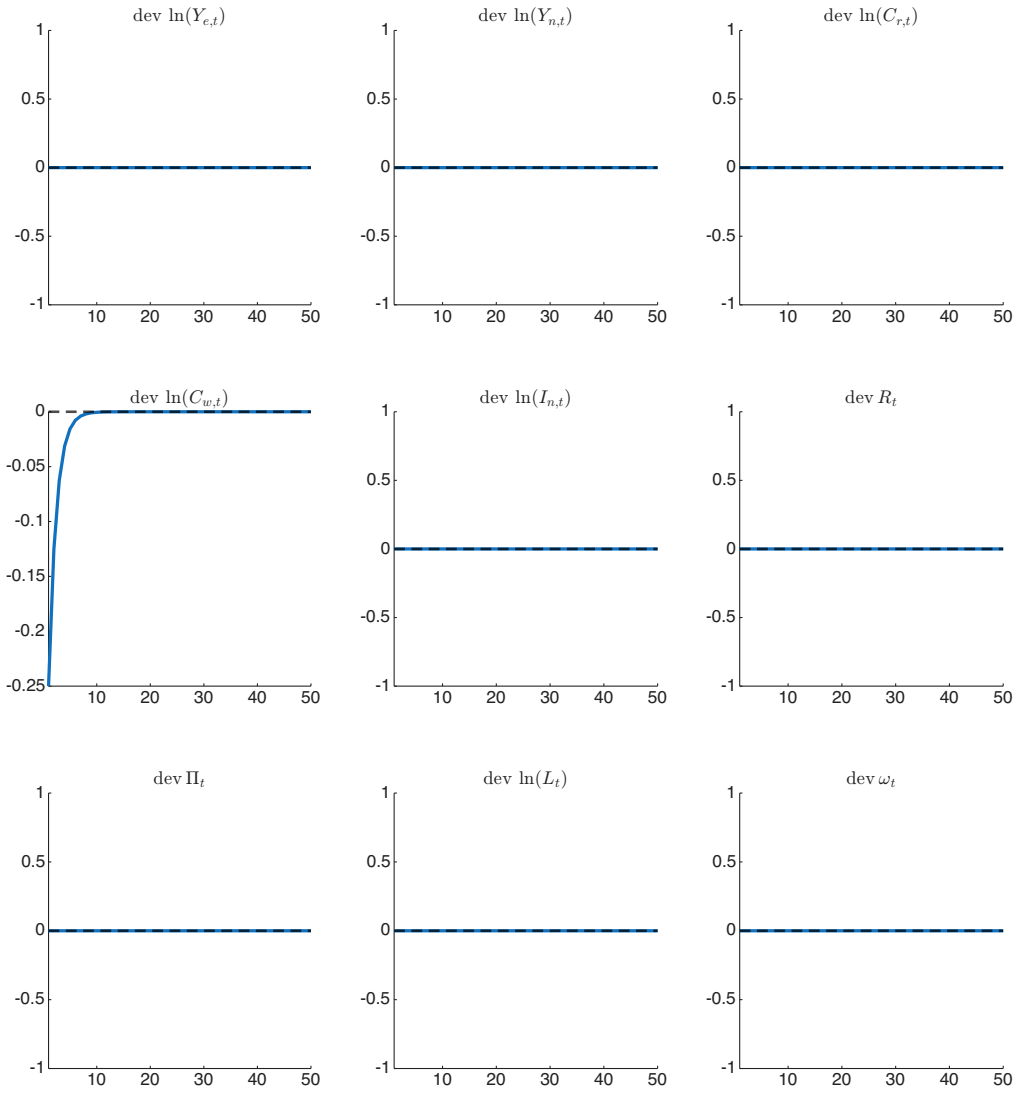

Figure D.3: Responses to a random positive shock in the tax rate on wages
Note: The graphs show, from top left to right, log deviations in energy output, non-energy output, rentier consumption, worker consumption, non-energy investment, interest rate, inflation, employment, and real wage.

D.2 IRFs comparison with different specifications of the response to government spending

Equation (25) in the paper postulates a positive effect of government spending in speeding up the low-carbon transition, through the $r(G)$ function.

To simulate the model, we have then assumed a linear effect of government spending on the green energy investment share, i.e. $r = \varphi_{\alpha,G} G$ (Equation 26). To understand how this assumption drives our results, we compare the baseline specification with a nonlinear (logarithmic)

specification of the $r(G)$ function, assuming that $r = \ln(1 + G)$ as in the equation below:

$$\alpha_{e,t} = \alpha_{e,t-1}[1 + \ln(1 + G)(\alpha_e^{max} - \alpha_{e,t-1})] \tag{13}$$

The results are shown in Figure D.4. As it can be observed, the nonlinear specification of the function merely affects the speed of the adjustment, but not its direction and – at least not significantly – the magnitude of the effects.

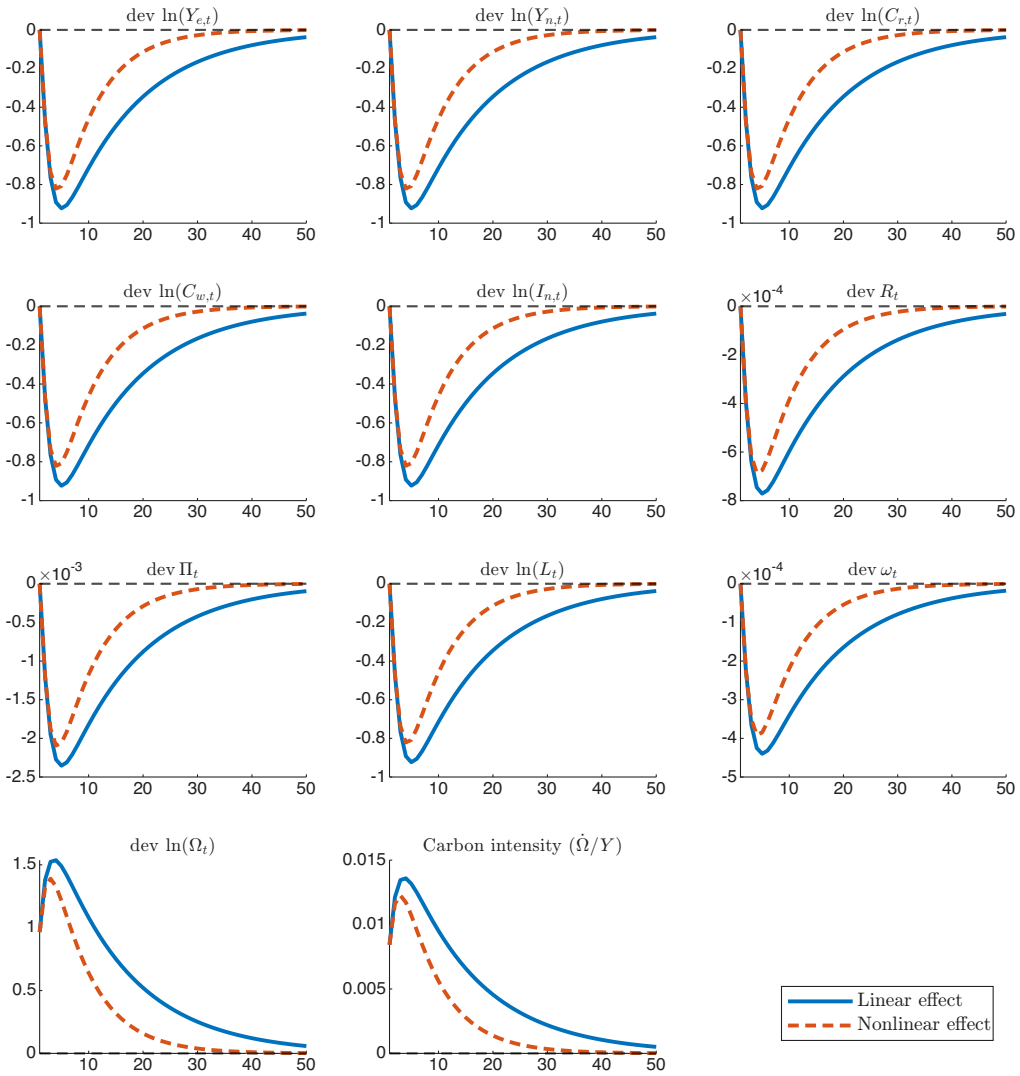

Figure D.4: Impulse responses to a random negative disturbance to the share of green energy investment (e.g., triggered by an energy shock) under different specifications of the response of the green energy investment share to government spending.
Note: The graphs show, from top left to right, log deviations in energy output, non-energy output, rentier consumption, worker consumption, non-energy investment, interest rate, inflation, employment, real wage, GHG emissions, and carbon intensity.