Appendix

Inequality along the European Green Transition

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A.1 LISS panel and cleaning

In this paper, we make use of data from the LISS panel (Longitudinal Internet studies for the Social Sciences) managed by the non-profit research institute Centerdata (Tilburg University, the Netherlands). The LISS panel is a representative online survey of Dutch households. Established in 2007, the panel comprises approximately 5,000 households and reflects the demographics of the Dutch population. Members of the panel participate in surveys on diverse topics, including health, employment, education, and social values. For this study, we utilise two components of the dataset: the Background Variables (BV) module and the Time Use and Consumption (TUC) module. We can use the 2009, 2010, 2012, 2015, 2017, 2019, 2020 and 2021 waves for our analysis. For more detailed information about the LISS panel, see Scherpenzeel and Das (2010).

Background Variables The BV module provides longitudinal data on demographics and socioeconomic characteristics such as age, gender, education, and household income. We focus on household heads aged 20 to 64, representing individuals with active labour market participation. Observations are excluded if gross household income is below half the annual minimum wage or above €500,000, or if year-on-year income changes exceed a 500% increase or fall below an 80% decrease. Observations with fewer than nine months of data in a given year are excluded to ensure data completeness. Income values are deflated to 2015 Euros using the Dutch Consumer Price Index (CPI) to account for inflation.

Time Use and Consumption We use the Time Use and Consumption (TUC) module of the LISS panel to analyse household time use and expenditures, including energy-related spending. To construct total household expenditure, we sum several expenditure categories such as mortgage or rent payments, utility bills, transportation, insurance, childcare, and food. In years where variables differ by household composition (e.g., singles vs. families), we adjust the calculations to ensure consistency and comparability across households. For energy expenditures, we focus on gas and electricity costs, which we extract from the utility-related variables in the dataset.

We identify and exclude outliers using distributional thresholds for total household expenditure and energy expenditure. Specifically, we remove observations with expenditures that significantly exceed realistic bounds or exhibit implausible year-on-year changes. We also drop observations with missing or inconsistent household identifiers to maintain the longitudinal integrity of the data. Additionally, we construct household size and composition variables, such as the number of adults and children, to normalise expenditures and enable meaningful comparisons across households. After cleaning the TUC module, we merge it with the Background Variables (BV) module using unique household identifiers.

A.2 Estimation of ϵ: further details

Using the cleaned and merged TUC and BV dataset, we normalise expenditures and income for household composition using a modified OECD equivalence scale

$$\text{scale} = 1 + 0.5 \times (\text{adults} - 1) + 0.3 \times \text{children}, \tag{A.2.1}$$

where *adults* is household size minus children younger than 14. This scale adjusts household expenditures and income to account for differing household structures.

The key variables used in the estimation are as follows:

- *Total expenditure (x)*: Total household expenditure, adjusted for the equivalence scale.
- *Expenditure share on energy (η^d)*: The proportion of total household expenditure allocated to energy-related expenses, such as gas and electricity costs.
- *Income in non-energy prices*: The logarithm of household income adjusted for equivalence scale and non-energy prices, $\log(\text{income after taxes and transfers}/(\text{scale} \cdot p_{\text{non-energy}}))$.

The IV estimates displayed in Table A.2.1 are consistent across different fixed-effect specifications.We rejected the null of homothetic preferences ($\epsilon = 0$) at the 1% significance level in all cases. Our preferred estimate, $\epsilon = 0.557$, comes from specification (3), which includes both time and individual fixed effects. Notice we use this value in the main analysis.

Above we instrument total expenditure with total household income. This instrumentation addresses potential measurement errors and the endogeneity of expenditure data. For comparison purposes, we provide below also the estimation results *without* using instrumental variables, i.e. using log(Expenditure) on the RHS. The results for estimations with different fixed effects are presented in Table A.2.2. All specifications suggest again that there is a significant degree of non-homotheticity between non-energy and energy goods. The coefficients are quite close to the IV coefficients, especially when we control for the ID and time fixed effects. This suggests that, for our most stringent estimation specification, the magnitude of the bias is relatively small.

Table A.2.1: IV estimation results of ϵ

	(1)	(2)	(3)
Log Expenditure (IV)	-0.575***	-0.583***	-0.557***
	(0.034)	(0.037)	(0.124)
Observations	18608	18608	16242
R-squared	0.190	0.186	0.189
Fixed Effects	None	Time	ID + Time
Clustering	ID + Time	ID + Time	ID + Time

Note. Standard errors in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A.2.2: Least squares estimation results for ϵ

	(1)	(2)	(3)
Log Expenditure	-0.509***	-0.504***	-0.566***
	(0.018)	(0.018)	(0.018)
Observations	18794	18794	16410
R-squared	0.187	0.198	0.685
Fixed Effects	None	Time	ID + Time
Clustering	ID + Time	ID + Time	ID + Time

Note. Standard errors in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

A.3 Estimation of the income process

Using the cleaned and processed BV dataset, we estimate the income process by regressing the logarithm of gross household income on the constructed variables. The model takes the form:

$$\begin{aligned} \log(y_{it}) =& \alpha + \alpha_t + \gamma_1 \text{ age}_{it} + \gamma_2 \text{ age}_{it}^2 + \gamma_3 \text{ age}_{it}^3 + \\ & \iota \text{ educ}_{it} + \rho \text{ occupation}_{it} + \theta \text{ gender}_{it} + \sigma \text{ size}_{it} + u_{it}. \end{aligned} \tag{A.3.1}$$

Using the residuals (u_{it}) obtained from the income regression described above, we estimate a persistent-transitory income process. This model decomposes observed income into two components: a persistent AR(1) process and a transitory shock.[1] The specification is as follows:

$$u_{it} = \kappa_{it} + \psi_{it} \tag{A.3.2}$$

$$\kappa_{it} = \rho\kappa_{it-1} + \varepsilon_{it} \tag{A.3.3}$$

where κ_{it} is the persistent component and ψ_{it} is the transitory shock. The persistent component

[1] This specification implicitly assumes the absence of measurement errors. We also explored an alternative specification that explicitly accounts for measurement errors. In this case, the variance of the measurement error cannot be separately identified from the variance of the transitory shock, and therefore must be fixed during the estimation. We set it to 0.02, following estimates from French (2004) and Heathcote *et al.* (2010) based on U.S. data. Under this assumption, the estimated variance of the transitory shock is effectively zero, suggesting the absence of transitory income shocks. This alternative specification of the income process yields only minor quantitative differences compared to our baseline scenario.

evolves according to an AR(1) process with persistence ρ and innovation ε_{it}.

We estimate the parameters ρ, σ_ε^2 (variance of persistent shocks), and σ_ψ^2 (variance of transitory shocks) using Minimum Distance Estimator (MDE).

The estimation uses moments derived from the theoretical properties of the model. Variances and covariances of income across time periods form the basis of the moment conditions:

$$\mathbb{E}[u_{it}^2] = \frac{\sigma_\varepsilon^2}{1-\rho^2} + \sigma_\psi^2, \tag{A.3.4}$$

$$\mathbb{E}[u_{it}u_{i,t-s}] = \rho^s \frac{\sigma_\varepsilon^2}{1-\rho^2}, \quad \text{for } s > 0. \tag{A.3.5}$$

The MDE procedure minimises the distance between the model-implied moments and their empirical counterparts using an identity weighting matrix. Variances capture the contributions of persistent and transitory components, while covariances identify the degree of persistence in income dynamics.

The results of the estimation are as follows:

$$\rho = 0.9500\,(\pm 0.0280), \tag{A.3.6}$$

$$\sigma_\varepsilon^2 = 0.0160\,(\pm 0.0099), \tag{A.3.7}$$

$$\sigma_\psi^2 = 0.0157\,(\pm 0.0103), \tag{A.3.8}$$

where values in parentheses represent bootstrapped standard errors. These estimates are in line with findings from prior studies such as Floden and Lindé (2001) and Krueger *et al.* (2016) for US data. The estimated persistence parameter (ρ) indicates that income shocks are highly persistent, with the AR(1) process accounting for most of the observed income variation over time.

A.4 Welfare computation

In order to calculate expenditure equivalent welfare we compare value functions in the initial steady state with the value when the policy was announced, following many papers such as Ascari and Ropele (2012) and Bakış *et al.* (2015). Below is a step by step description of our approach. To evaluate welfare, we calculate an expenditure equivalent measure (Δ) for each state of the household:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \left(\prod_{j=0}^{t} \beta(j) \right) U((1+\Delta_i)x_i^*, p^e) = \mathbb{E}_0 \sum_{t=0}^{\infty} \left(\prod_{j=0}^{t} \beta(j) \right) U\big(x_{it}, p_t^e\big), \tag{A.4.1}$$

where $\beta(j)$ is the discount factor between $j-1$ and j, with $\beta(0) = 1$. This measure represents the percentage change in expenditure required in the initial steady state to make a household indifferent between remaining in the initial steady state and transitioning to the new steady state or policy scenario.

Recall that expectations are taken over idiosyncratic shocks to income and discount factors. The indirect utility function is:

$$U(x_{it}, p_t^e) = \frac{1}{\epsilon}(x_{it})^{\epsilon} - \frac{\nu}{\gamma}(p_t^e)^{\gamma} - \frac{1}{\epsilon} + \frac{\nu}{\gamma}, \tag{A.4.2}$$

Defining $\kappa \equiv \frac{\nu}{\gamma}(p^e)^{\gamma} + \frac{1}{\epsilon} - \frac{\nu}{\gamma}$ one can rewrite the left-hand side of Equation (A.4.1) as

$$\begin{aligned}
&\mathbb{E}_0 \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right) U((1+\Delta_i)x_i^*, p^e) = \\
&\qquad (1+\Delta_i)^{\epsilon}\mathbb{E}_0 \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\frac{1}{\epsilon}(x_i^*)^{\epsilon} - \mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa \\
&\qquad +(1+\Delta_i)^{\epsilon}\mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa \\
&\qquad -(1+\Delta_i)^{\epsilon}\mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa \\
&\qquad = (1+\Delta_i)^{\epsilon}\underbrace{\mathbb{E}_0 \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\left(\frac{1}{\epsilon}(x_i^*)^{\epsilon} - \kappa\right)}_{V_{ss}^*} \\
&\qquad - \mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa + (1+\Delta_i)^{\epsilon}\mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa \\
&\qquad = (1+\Delta_i)^{\epsilon}\left(V_{ss}^* + \mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa\right) - \mathbb{E}_0^b \sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa
\end{aligned}$$

The expectation operator $\mathbb{E}_0^b$ only takes into account uncertainty with respect to the discount factor.

To compute the steady-state value function V_{ss}^*, we use iterative policy function updates:

$$V_{ss}^*(a_i, y_i, \beta_i) = U(x_i^*, p^c, p^e) + \beta_i \mathbb{E}_t\left[V_{ss}^*(a_i^*, y_i', \beta_i')\right],$$

where x_i^* and a_i^* are the optimal expenditure and asset decisions from the policy functions.

To compute the right-hand side of Equation (A.4.1), we first then compute the sequence of value functions V_t using backward induction, starting from the terminal steady state. At each step:

$$V_t^*(a_{it}, y_{it}, \beta_{it}) = U(x_{it}^*, p_t^c, p_t^e) + \beta_{it}\mathbb{E}_t\left[V_{t+1}(a_{it+1}^*, y_{it+1}, \beta_{it+1})\right].$$

where variables with stars are again the optimal policies along the transition. Since $V_1^*(a_{it}, y_{it}, \beta_{it})$

summarizes the infinite sequence on the right-hand side of Equation (A.4.1), we can rewrite it as

$$(1+\Delta_i)^{\epsilon}\left(V_{ss}^{*}+\mathbb{E}_0^b\sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa\right)-\mathbb{E}_0^b\sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa=V_1^{*}$$

and solve for Δ_i to get

$$\Delta_i=\left(\frac{V_1^{*}+\mathbb{E}_0^b\sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa}{V_{ss}^{*}+\mathbb{E}_0^b\sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)\kappa}\right)^{\frac{1}{\epsilon}}-1. \tag{A.4.3}$$

Finally, we follow Krusell *et al.* (2009) to rewrite the infinite sum over the discount factors. Define $d\equiv\mathbb{E}_0^b\sum_{t=0}^{\infty}\left(\prod_{j=0}^{t}\beta(j)\right)$ and let $\bar{d}_i$ be the value of d when $\beta(1)=\beta_i$ with $i=\{\text{low},\text{high}\}$. The column vector $D=\begin{pmatrix}\bar{d}_{\text{low}}\\ \bar{d}_{\text{high}}\end{pmatrix}$ then solves

$$D=\mathcal{I}+B\Gamma_{\beta}D$$

where $\mathcal{I}=\begin{pmatrix}1\\1\end{pmatrix}$ and $B=\begin{bmatrix}\beta_{\text{low}} & 0\\ 0 & \beta_{high}\end{bmatrix}$. Solving yields $D=(I-B\Gamma_{\beta})^{-1}\mathcal{I}$ such that Equation (A.4.3) becomes

$$\Delta_i=\left(\frac{V_1^{*}+\bar{d}_i\kappa}{V_{ss}^{*}+\bar{d}_i\kappa}\right)^{\frac{1}{\epsilon}}-1. \tag{A.4.4}$$

A.5 Green Transition: Other figures

Figure A.5.1 shows the dynamics of capital and labour along the transition, all relative to the baseline transition, as in the main text. Figures A.5.2-A.5.4 show the same figures as in the subsection 4.2 in the main text but with the variables expressed in deviations from the initial steady state, to highlight the dynamics of the levels of the variables.

Figure A.5.1: Dynamics of capital and labour across sectors along the transition.

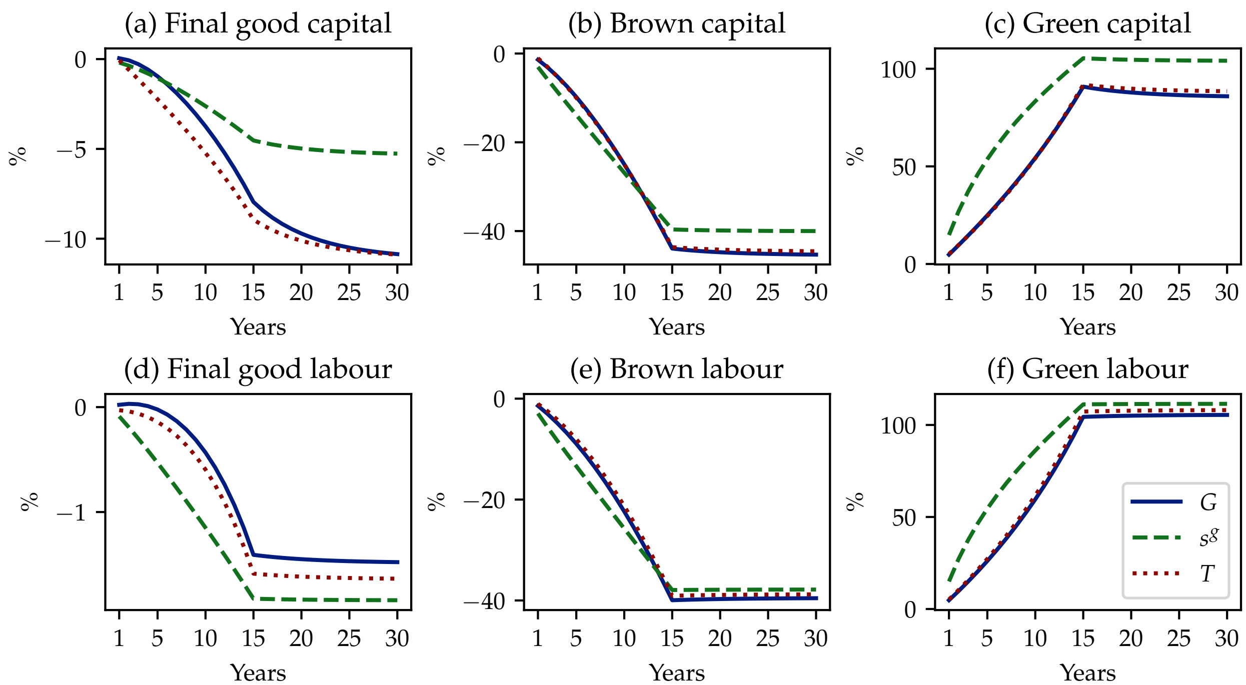


Figure A.5.2: Dynamics of relative energy prices and energy quantities for the three policies in terms of *deviations from the initial steady state*.

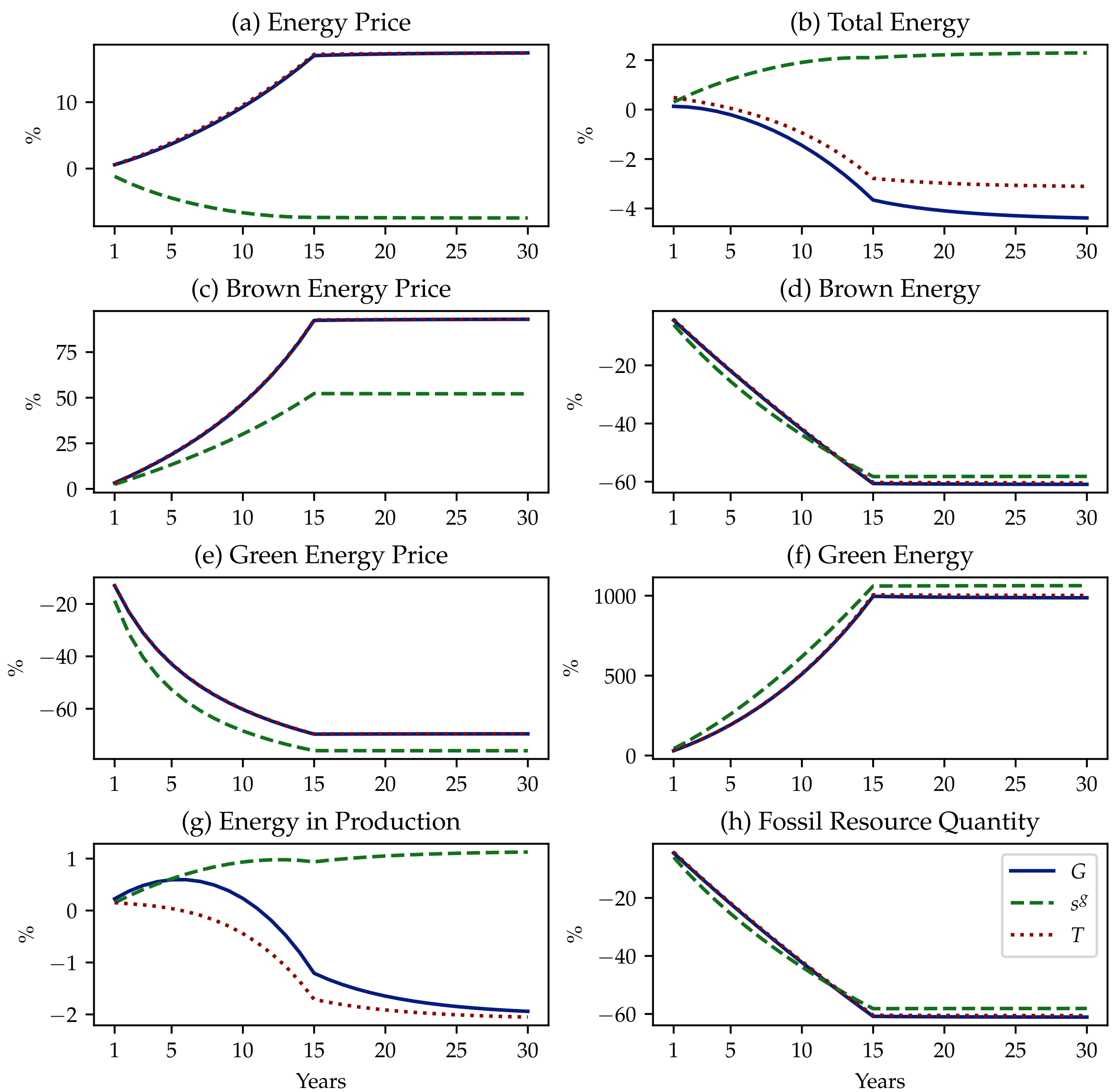


Figure A.5.3: Responses of output, capital, non-energy consumption and energy consumption for the three policies in terms of *deviations from the initial steady state*.

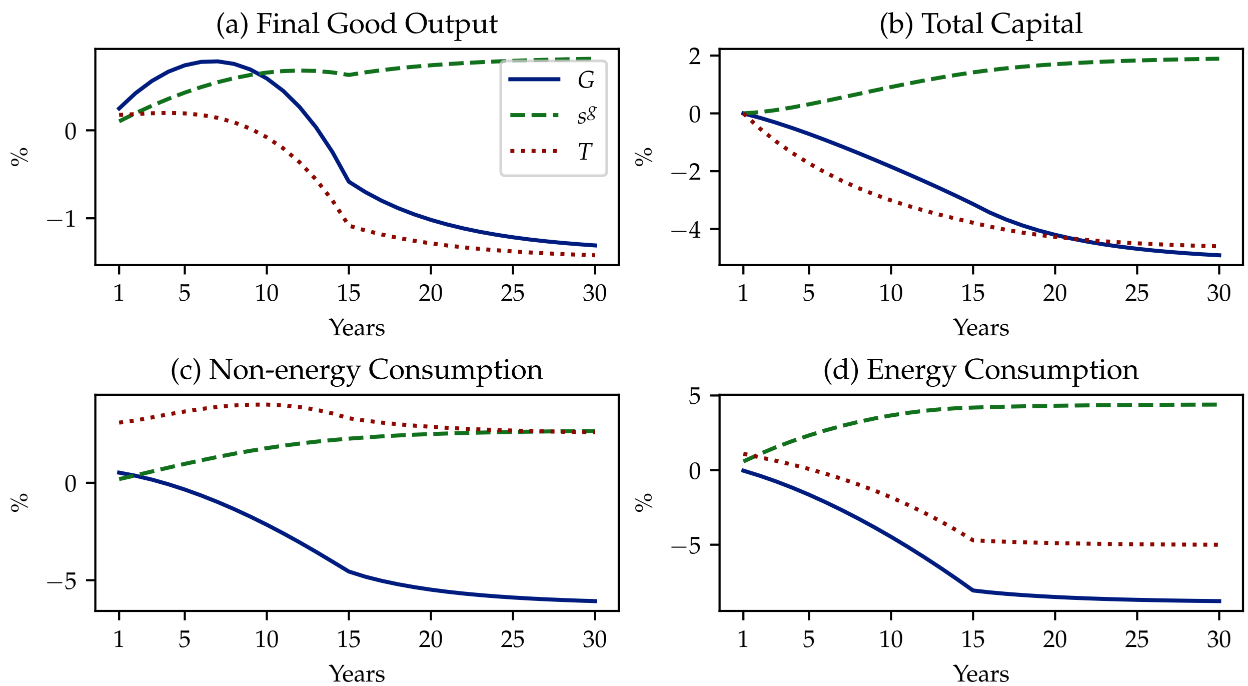


Figure A.5.4: Dynamics of wages and returns to capital for the three policies in terms of *deviations from the initial steady state*.

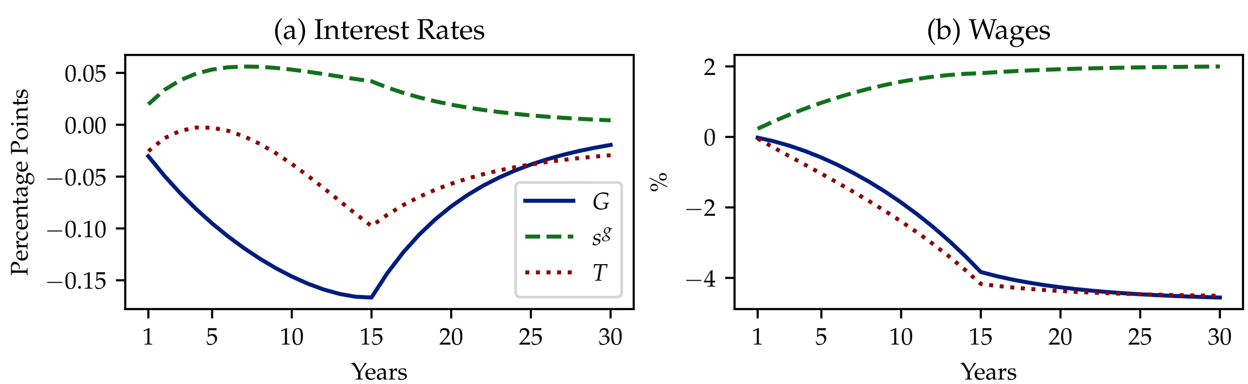


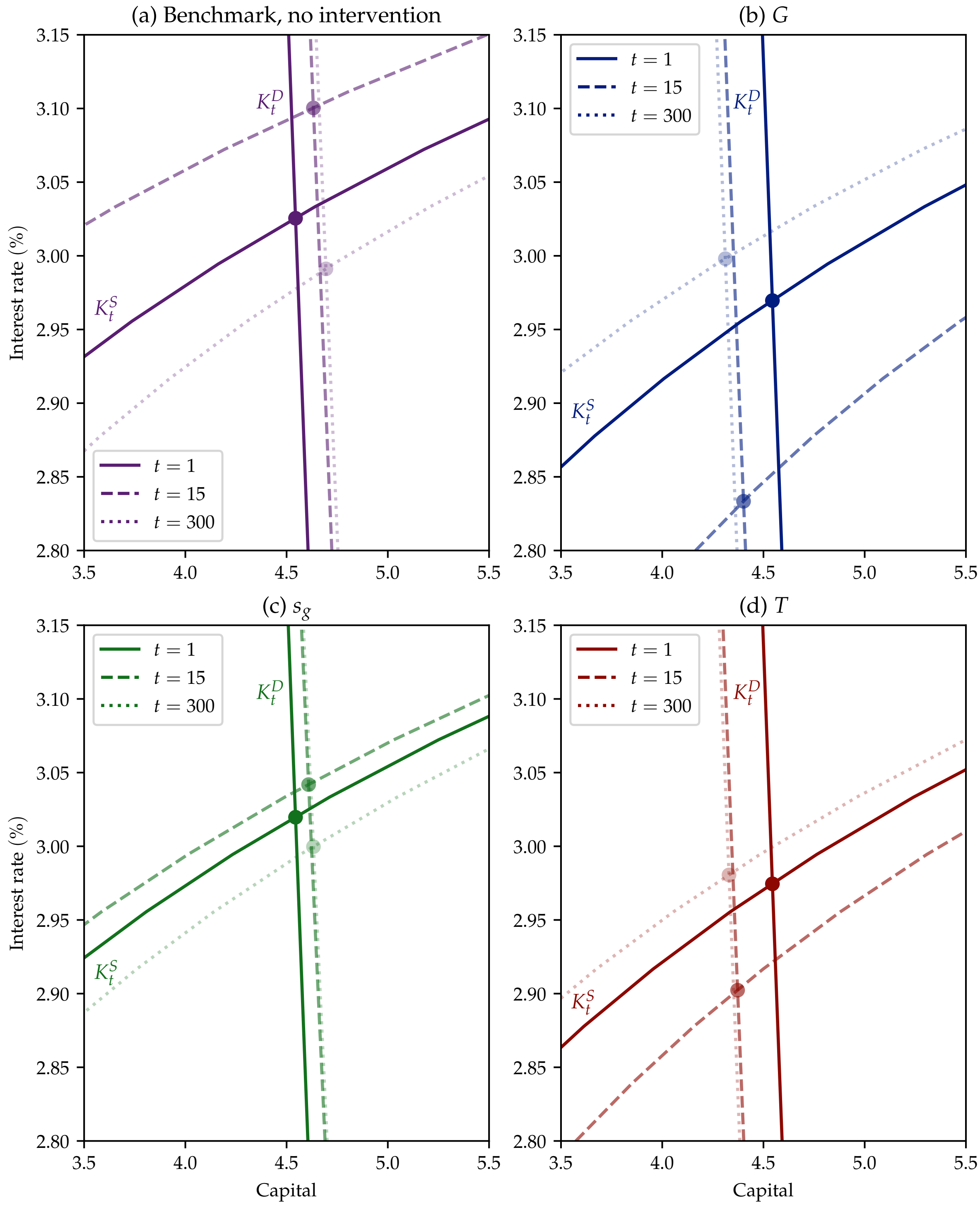
Figure A.5.5 plots the asset market equilibrium along the transition, resembling the famous Figure IIb in Aiyagari (1994). The figure in Aiyagari (1994) describes steady state determination, where agents face a constant, steady state interest rate. In our case, however, we construct the asset market equilibrium repeatedly along the perfect foresight transition, so we cannot rely on solving the household problem for different steady state interest rates. This is because along the transition, agents observe the entire paths of interest rates. Note that the issue above does not hold for the firm, since these solve a static problem. We then construct the figure as follows:

1. Construct the capital supply schedule of households in the initial steady state.
2. Choose a point in time, t, along the transition.
3. Create the capital demand schedule as a function of different interest rates at time t. In particular, for a grid of interest rates, solve for the total capital stock demanded by all firms in the model, using their first-order conditions with respect to capital. All other quantities and prices are fixed to their equilibrium value at time t.
4. Shift the capital supply schedule created in Step 1 to the equilibrium interest rate and capital stock observed at time t.

The key idea is that, since we can easily construct the capital demand curve from the static firm problem and we know the equilibrium interest rate and capital stock from the GE transition, we know where the supply curve has to cross the demand curve at that particular point in time. By shifting the initial steady state capital supply curve, the implicit assumption we make is that its shape does not change along the transition.

Figure A.5.5 shows the result of this procedure for $t = \{1, 15, 300\}$. The top left Panel shows the case when only green technology is growing exogenously. The other three Panels show the results for our different revenue recycling strategies, when carbon taxes get adjusted as well. To compare this figure to the transitional dynamics in the main text, recall that the figures in the main text show deviations from the baseline case in which the green technology is growing exogenously. Here instead, we show the absolute values.

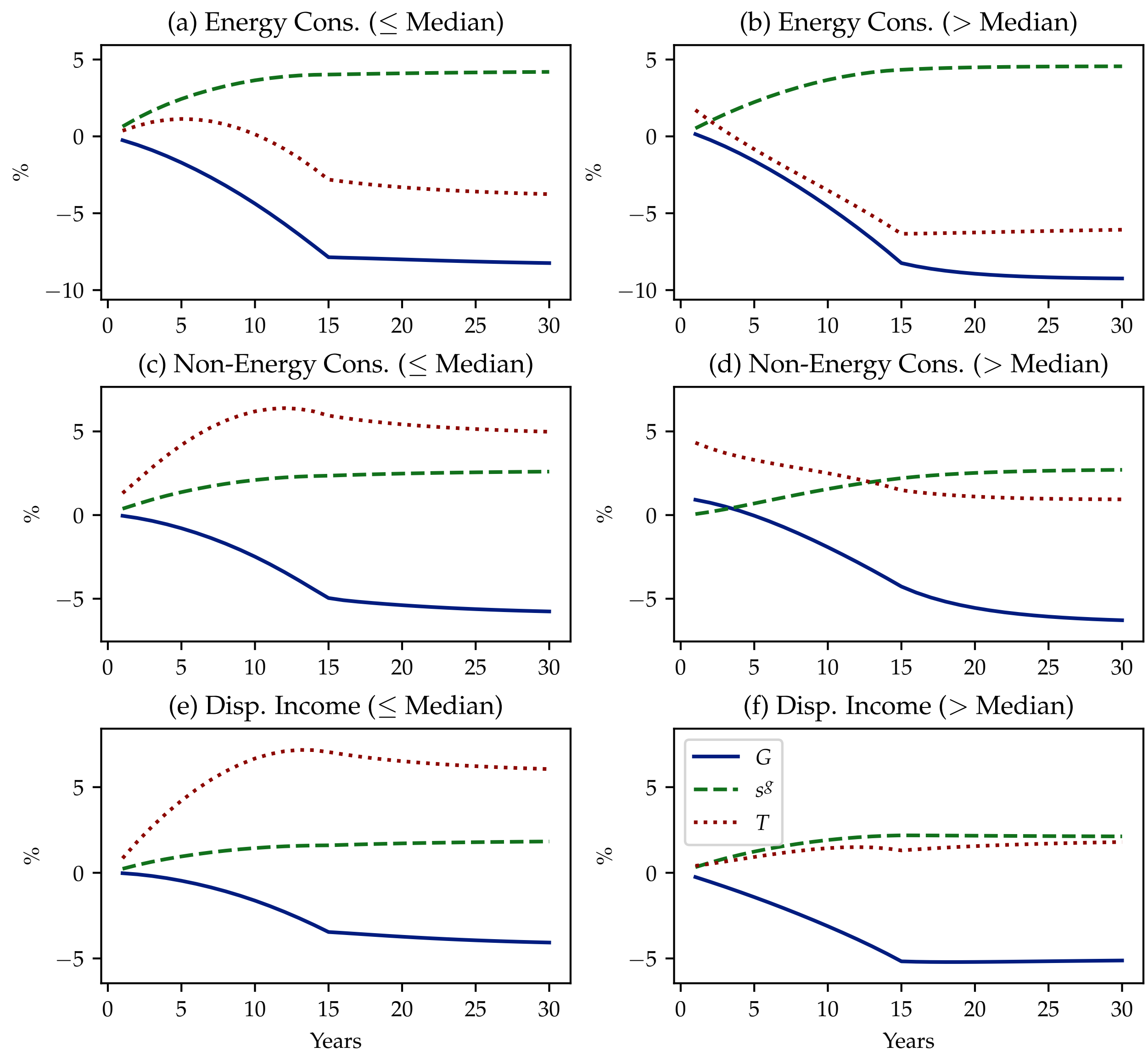
Figure A.5.5: The asset market: demand and supply of capital along the transition



Note. This figure shows the asset market equilibrium for different points along the transition. To construct it, we first trace out the capital demand function from the static profit maximization problem of the firm. We then shift the capital supply schedule of households in the initial steady state to the equilibrium interest rate and capital stock that we observe along the transition at that point in time. The top left Panel shows the transition due to the exogenous increase in the green technology. The other three Panels show the results for our different revenue recycling strategies, when carbon taxes get adjusted as well.

Figure A.5.6 corresponds to Figure 9 in the subsection 4.3 in the main text but with the variables expressed in deviations from the initial steady state, to highlight the dynamics of the levels of the variables.

Figure A.5.6: Dynamics of energy consumption, non-energy consumption and disposable income above and below the median of the wealth distribution for the three policies in terms of *deviations from the initial steady state*.



A.6 Green transition with no policy intervention

Figure A.6.1: Energy Prices and Quantities with no policy intervention

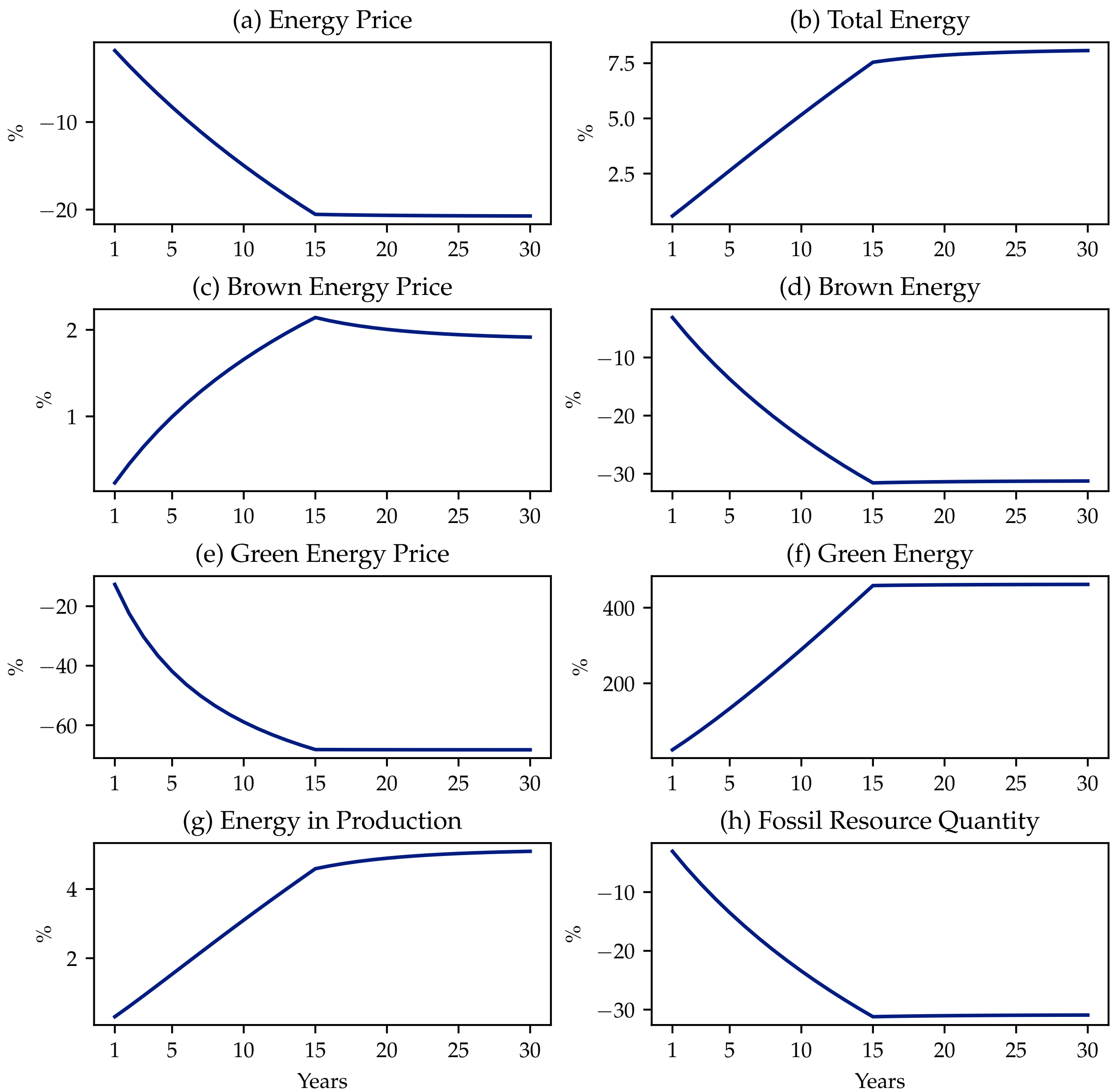


Figure A.6.2: Output, Capital, and Consumption with no policy intervention

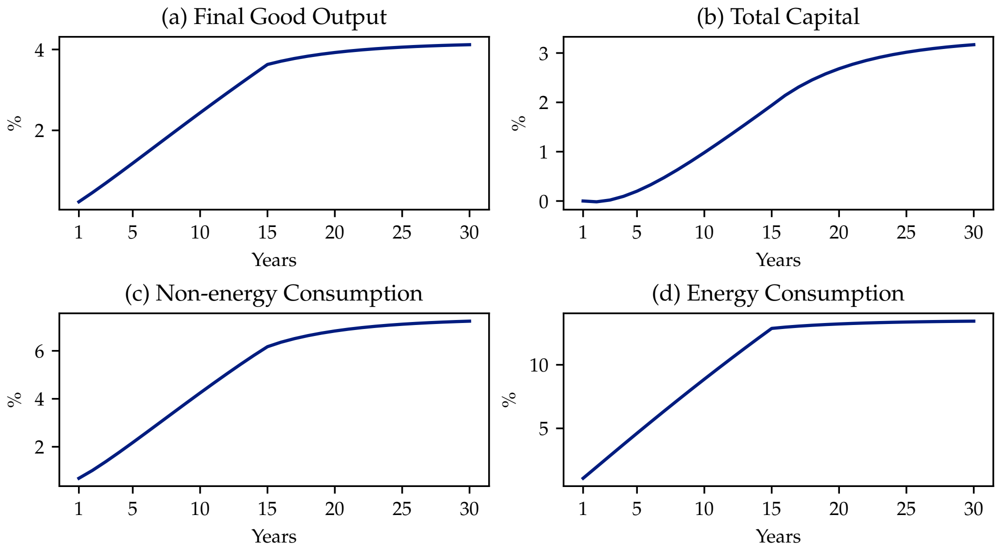


Figure A.6.3: Factor Prices with no policy intervention

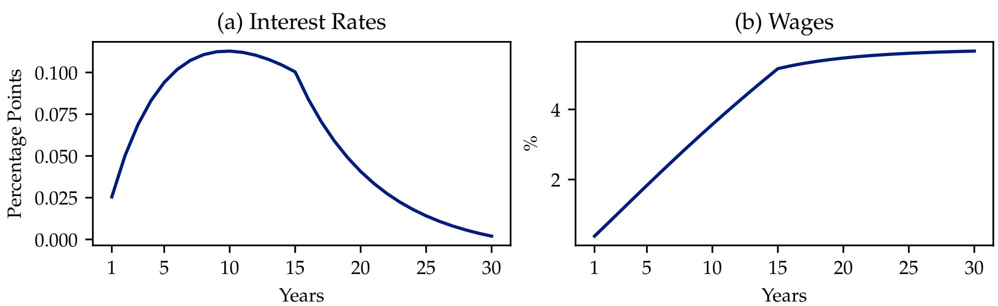
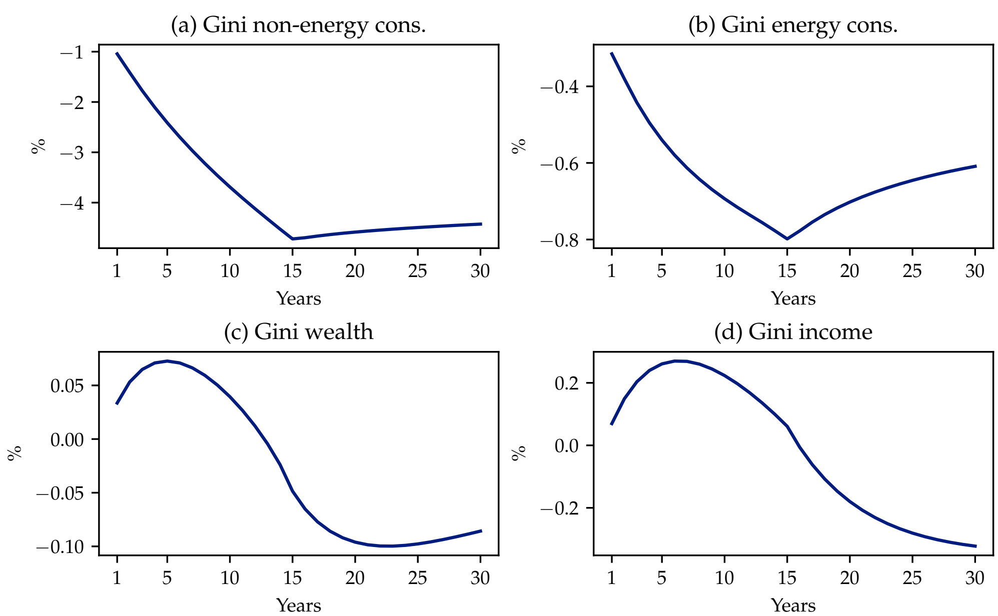


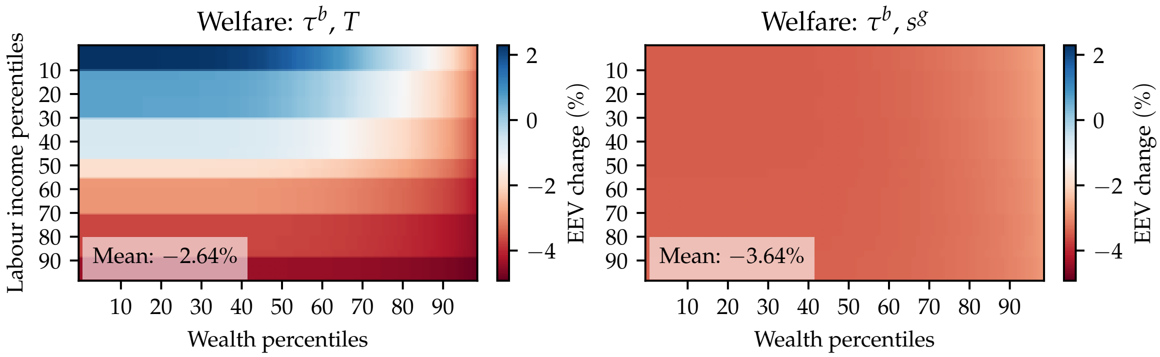
Figure A.6.4: Gini with no policy intervention



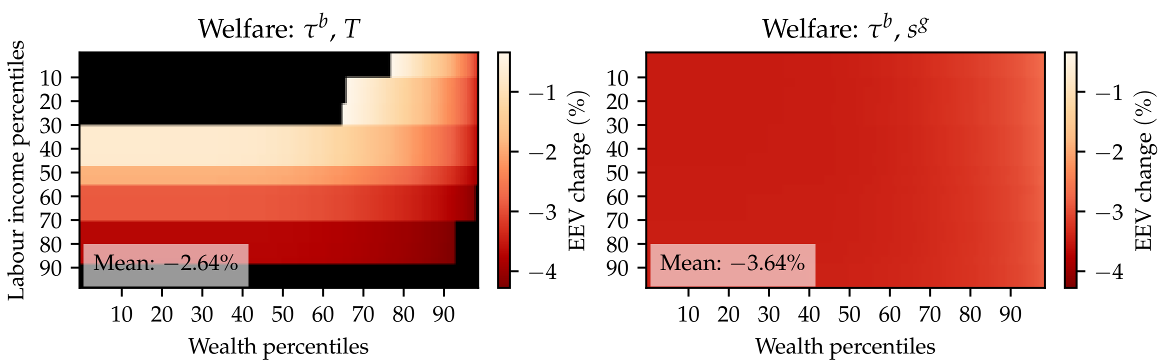
A.7 Welfare heatmaps for homothetic preferences

Figure A.7.1: Welfare heatmaps for homothetic preferences

(a) Heat map of EEVs for ϵ=0



(b) Heat map of EEVs for ϵ=0 with the same limits as Figure 11



Note. The black areas in the bottom left Panel represent values outside of the specified range. The black area in the top left represents values larger than -0.7, whereas the black are in the bottom right represents values smaller than -4.3

In this section, we show the welfare consequences under homothetic preferences, that is, when we set $\epsilon = 0$. For this purpose, Panel (a) of Figure A.7.1 plots again the heat maps illustrating the distribution of EEVs across wealth and income percentiles under scenarios T and s_g. Since now expenditure shares are constant along the income and wealth distribution, households face the same burden from rising relative energy prices. This can be seen from the fact that the variance of the welfare distribution in the subsidy scenario s_g is lower in the homothetic case than under the non-homothetic case. Vice versa, poorer households, in the homothetic case, spend a lower fraction of their expenditure on energy, such that the net budget gain from uniform lump-sum transfers is higher. As a result, the variance of the welfare distribution is higher and some households even gain in the transfer scenario.

This welfare gain is clearly visible in Panel (b) of Figure A.7.1. In this figure, we apply the same range over which EEVs are coloured as Figure 11 in the main text. We see that especially the top left and the bottom right corner are now black. This implies that the EEVs in the homothetic case are, respectively, larger and smaller than under the non-homothetic benchmark. In other words, in the top left, poorer households have a larger welfare gain (a smaller welfare loss) under $\epsilon = 0$. Vice versa for rich households in the bottom right. Moreover, the right figure of Panel (b), depicting the subsidy scenario s_g, is now almost one colour, reflecting the identical expenditure shares between households.

A.8 Learning-by-doing

The baseline version of the model does not consider induced innovation and there is no interaction between the carbon tax and the growth rate of the clean technology parameter Z_g. In order to understand to what extent this channel could influence the equity-efficiency trade-off in the model, we introduce learning-by-doing in the green energy sector in a reduced and simple form.

In particular, for this exercise we specify green technology as

$$Z_g = \tilde{Z}_g E_g^{\lambda}.$$

The functional form is taken from Krueger *et al.* (2016), who model a pure demand externality between consumption and total output. Under this specification, Z_g is a function of a base technology parameter $\tilde{Z}_g$ and green energy production E_g. The parameter $\lambda > 0$ is related to the learning rate in the economy as will become clear below.

In the spirit of an externality, energy producers do not take this channel into account when choosing their inputs. When we now solve for the solution to the firm maximization problem, energy production reads $E_g = \left(\tilde{Z}_g K_g^{\alpha_g} L_g^{1-\alpha_g}\right)^{\frac{1}{1-\lambda}}$.

Learning rates of technologies In the following, we attempt to relate our simple setup to green learning rates in the literature.

The cost-minimisation of the green energy Cobb-Douglas production function yields

$$c(r+\delta, w, E_g) = \frac{1}{Z_g}\left[\left[\left(\frac{\alpha_g}{1-\alpha_g}\right)^{1-\alpha_g} + \left(\frac{\alpha_g}{1-\alpha_g}\right)^{-\alpha_g}\right](r+\delta)^{\alpha_g}(w)^{1-\alpha_g} E_g\right]$$

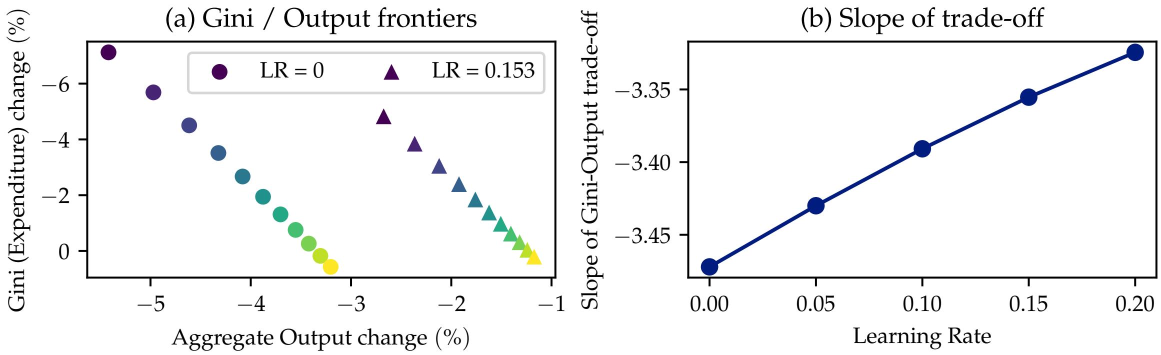
Denote the cost of one unit of energy by $c(r+\delta, w, 1)$, which equals

$$\frac{1}{Z_g}\left[\left[\left(\frac{\alpha_g}{1-\alpha_g}\right)^{1-\alpha_g} + \left(\frac{\alpha_g}{1-\alpha_g}\right)^{-\alpha_g}\right](r+\delta)^{\alpha_g}(w)^{1-\alpha_g}\right].$$

Using our formulation for the learning-by-doing technological progress implies

$$c(r+\delta, w, 1) = \frac{1}{\tilde{Z}_g E_g^{\lambda}}\left[\left[\left(\frac{\alpha_g}{1-\alpha_g}\right)^{1-\alpha_g} + \left(\frac{\alpha_g}{1-\alpha_g}\right)^{-\alpha_g}\right](r+\delta)^{\alpha_g}(w)^{1-\alpha_g}\right].$$

Figure A.8.1: Equity-efficiency frontiers and slope of trade-off



Note. Panel (a) depicts the equity-efficiency frontier for both the case without learning-by-doing (dots) and the one with a learning rate of 0.153 (triangles) at the final steady state. The numbers are relative to the respective terminal steady states without any policy intervention at which a share of green energy of 30% is attained. The figure in Panel (b) depicts the slope of the equity-efficiency trade-off as a function of the learning rate. A lower number implies a larger increase in inequality for any gain in output.

Importantly, we distinguish the level of energy currently produced, which matters for the level of the green technology parameter, and the unit of energy which is bought at cost $c(r+\delta, w, 1)$, which is set to unity. Define $a \equiv \frac{1}{\tilde{Z}_g}\left[\left[\left(\frac{\alpha_g}{1-\alpha_g}\right)^{1-\alpha_g} + \left(\frac{\alpha_g}{1-\alpha_g}\right)^{-\alpha_g}\right](r+\delta)^{\alpha_g}(w)^{1-\alpha_g}\right]$, such that we can write

$$c(r+\delta, w, 1) = aE_g^{-\lambda}. \tag{A.8.1}$$

We interpret this very simplified setup as an instance of the "one-factor learning curve", as described in Rubin *et al.* (2015), where the unity cost of the technology and its cumulative output form a log-linear relationship. One can then relate λ to the learning rate (LR) as $LR = 1 - 2^{-\lambda}$.

Calibration of λ We rely on estimates of learning rates in Rubin *et al.* (2015) and Arkolakis and Walsh (2023) to calibrate λ. Rubin *et al.* (2015) document one-factor learning rates of 12%, 23%, and 11% for wind, solar, and biomass power generation, respectively. Averaging these values yields a learning rate of 15.3%, which corresponds to a λ of approximately 0.24.

This value aligns well with the estimates of Arkolakis and Walsh (2023), who regress total cost on cumulative installed capacity using data from the International Renewable Energy Agency. Their preferred coefficients imply values of $\lambda = 0.2$ for wind and $\lambda = 0.35$ for solar, placing our benchmark value of $\lambda = 0.24$ squarely within their empirical range.

The equity-efficiency trade-off under learning-by-doing We illustrate the changes to the equity-efficiency trade-off in Figure A.8.1. In Panel (a) it depicts the two equity-efficiency frontiers for a case of no learning-by-doing and one with a learning rate of 0.153. Clearly, the line shifts in, indicated a lower overall cost of the green transition, as expected. However, the slope of the curve changes only very slightly. To further illustrate the changes of the slope as a function of learning-by-doing, Panel (b) depicts the slope as a function of the learning rate. As can be seen, a higher learning rate flattens the slope, indicating that the inequality cost of mitigating one percentage point of output loss becomes smaller. From a policy perspective, learning-by-doing would thus strengthen the case for subsidizing green investment via carbon tax revenues, rather than rebating them.

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