Income inequality and the German export surplus

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Presentation at the EEA/ ESEM conference, 29/08/2023

The German export surplus has attracted much attention

ECB president Christine Lagarde (2018):

> *"For our part, the IMF has indicated that this surplus is too large—even considering the need to save for retirement in an aging society."*

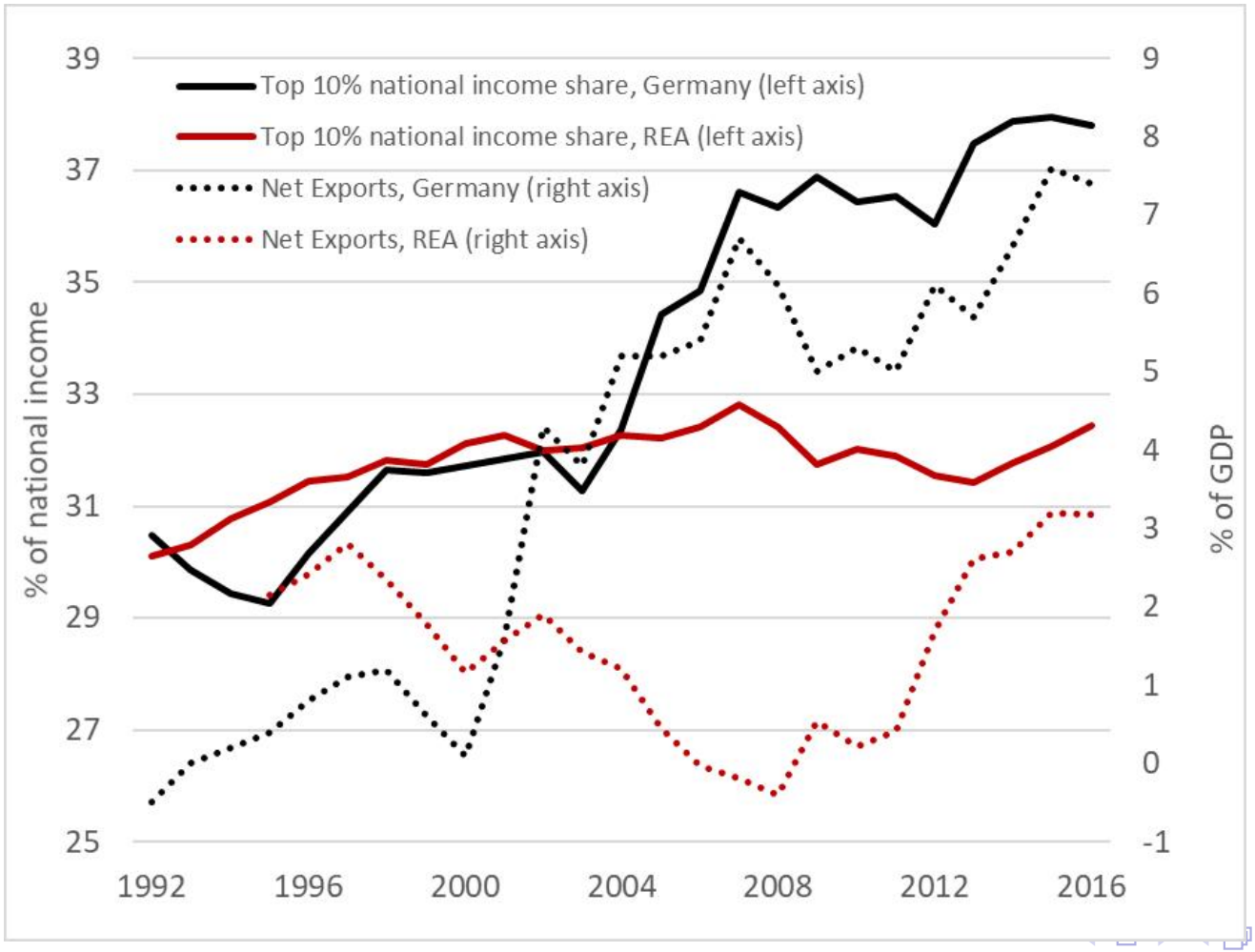
European Commissioner Pierre Moscovici (2017):

> *"not healthy" for Germany and "creates significant economical and political distortion for the whole of the eurozone".*

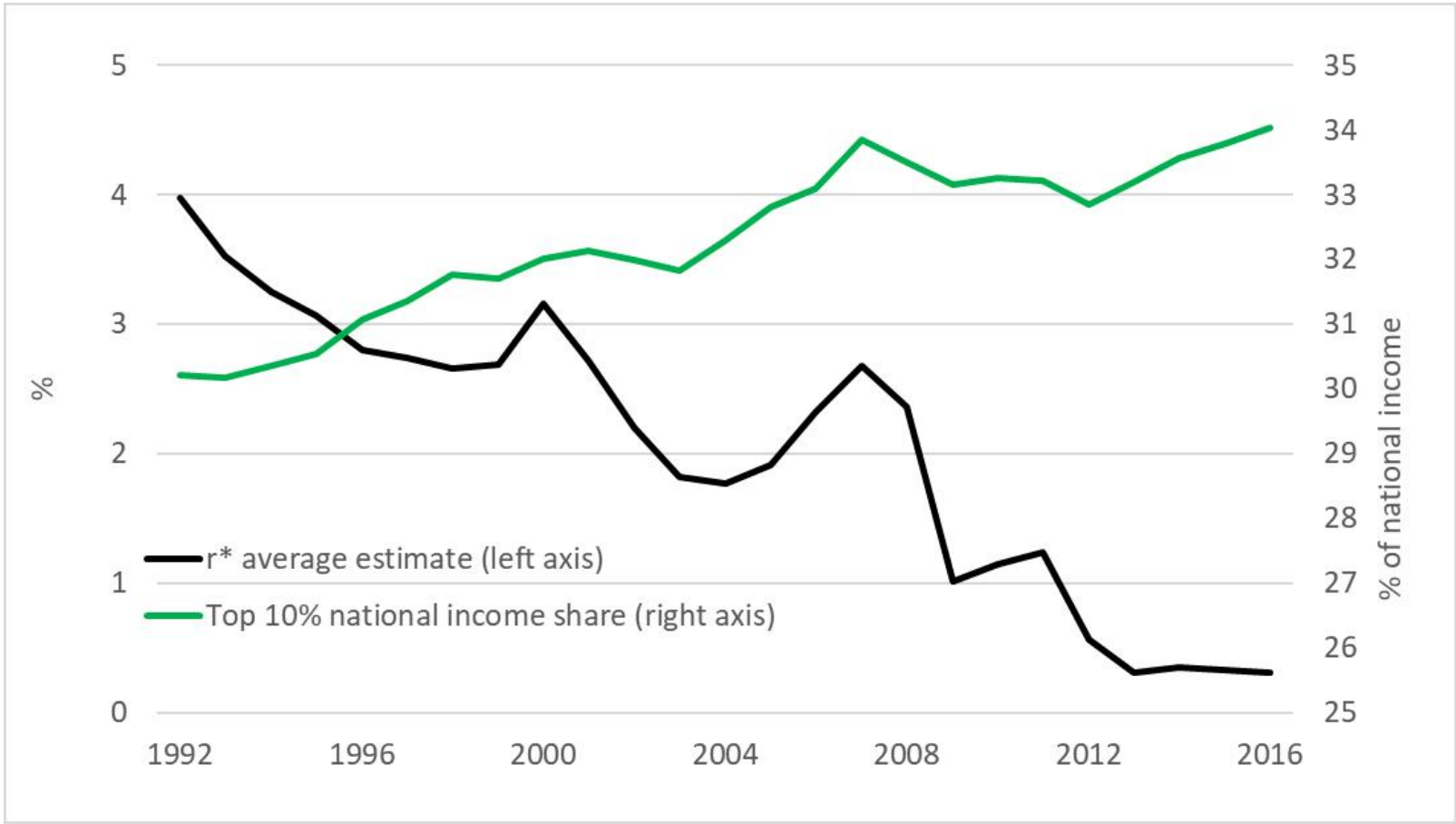
US treasury (2013):

> *"Germany's anemic pace of domestic demand growth and dependence on exports have hampered rebalancing at a time when many other euro-area countries have been under severe pressure to curb demand and compress imports in order to promote adjustment. The net result has been a deflationary bias for the euro area, as well as for the world economy."*

German net exports increase associated with an increase in top-end income inequality



Top-end income-inequality in the EA has increased, r* has declined



Paper connects these trends in an open economy model

- Develop a model of DE, the REA and the Rest Of the World (ROW). Rich households (top 10%) have "Capitalist Spirit" type Preferences (CSP) over their wealth. CSP allow the model to match the empirically observed high Marginal Propensity to Save (MPS) out of permanent income changes of rich households.
- $\rightarrow$Income increase of DE rich households at the expense of non-rich households raises saving at the macro-level and thus DE net exports, lowers the Euro Area real interest rate.

Paper connects these trends in an open economy model (cont'd)

- Feeding the empirically observed increase in income inequality into the model
  - $\Rightarrow$ increase in net exports by about 3.2 p.p- 3.6 p.p. of GDP by 2016.
  - Decline in the EA real interest rate by about 1 percentage point.
- Builds on the closed economy model of Rannenberg (2023) which links the decline in the US natural interest rate r*, the increase in household indebtedness and house prices to the increase in income inequality. Other contributions linking r* and income inequality using CSP: Straub (2017) and Mian et al. (2021).

Literature on the origin of the German export surplus

- Two papers on role of income distribution. No attempt to quantitatively link the long-run trends of income inequality and net exports. No consideration of labor income inequality:
  - Gruening et al. (2015): Qualitative effect of rising inequality in DE and UK on net exports, very stylized Small Open Economy model (exogenous investment, constant employment), where rich HH have CSP.
  - Hoffmann et al. (2021) investigate effects of transitory wage push shocks on DE net exports in an estimated DSGE model of DE, REA and ROW. Marginal contribution to net exports (opposite direction). No CSP, abstract from labor share trend by assumption (demeaned real wage growth).
- Faster aging in DE vs. rest of the world: Schoen and Staehler (2020), Ruppert and Staehler (2022) simulate an open economy OLG model. 1-3 percentage points average net export increase over 2000-2018. But only temporary effect, especially if China's demographic change is incorporated.

Literature on the German export surplus (cont'd)

- Contribution of DE labor market and tax reforms has *mostly* been found to be small or marginal (Hochmuth et al. (2019), Ruppert and Staehler (2022), Gadatsch et al. (2016) and Kollmann et al. (2015)).
- Kollmann et al. (2015): Estimated DSGE model of DE, REA and ROW. "Private saving shock" main driver of the net exports increase. Consistent with our simulation, which generates higher household saving (by the rich) due to rising income inequality. Our simulated increase similar to their "saving shock" contribution both in magnitude and time profile.
- Empirical literature on inequality and the current account: Behringer and van Treeck (2018): Decline in the labor share improves the current account, increase in top 5% *personal* income share worsens it. Kumhof et al. (2022): Effect of increase in top 5% national income share depends on stock market capitalization.

Outline

Outline

Rich households (top 10%)

- Infinitely lived. Earn labor $w_{r,t}^{DE} \tilde{N}_{r,t}^{DE}$ and profit $\tilde{\Xi}_t^{DE}$ income, pay lump sum taxes. Sole owners of firms (see Schroeder et al. (2020)). Invest in dom. assets $\tilde{b}_{r,dom,t}^{DE}$, REA gov. bonds $\tilde{b}_{REA,t}^{DE}$ and ROW gov. bonds $\tilde{b}_{ROW,t}^{DE}$. Rich households from all regions invest in gov. bonds of all regions. Results are robust to allowing for physical capital.
- Derive utility from consumption $\tilde{C}_{r,t}^{DE}$ and disutility from labor $\tilde{N}_{r,t}^{DE}$. With "Capitalist Spirit" type Preferences (CSP): Derive utility from their asset holdings. Allows matching the high marginal propensity to save out of permanent income increases of rich households (Dynan et al. (2004), Kumhof et al. (2015)). ▸ utility function
- DE and REA assets perfect substitutes.
- NOCSP model variant: $\chi_{b,r}^{DE} = \chi_{b_{ROW},r}^{DE} = 0$.

Non-rich households (bottom 90%)

- Infinitely lived. Earn only wage income $w_{n,t}^{DE} \tilde{N}_{n,t}^{DE}$, borrow from rich-households via financial intermediaries, at interest rate $R_{L,t}$. Borrowing friction (financial intermediation cost) creates positive relationship between debt-to-income ratio and $R_{L,t}$.
- Standard preferences. ▸ utility function

Outline

Four layers of firms

1. Labor assemblers: combines labor of rich and non-rich households to produce a homogeneous labor input $N_t^{DE} = z_{r,t}^{DE} N_{r,t}^{DE} + z_{n,t}^{DE} N_{n,t}^{DE}$. $z_{r,t}^{DE}, z_{n,t}^{DE}$: Labor productivity of rich/ non-rich households. Details I use changes in the relative labor productivity of rich households to generate an increase in in labor income inequality (i.e. increases in the top 10% national income share not associated with a decline in the labor share.)
2. Intermediate goods firms produce domestic output varieties using the homogeneous labor input N_t^{DE}. Operate under monopolistic competition. I use changes in the their market power (price markup) to replicate the decline in the empirical labor share.
3. Goods assemblers produce domestic output good Y_t^{DE} from these varieties. Some goods sold in REA and ROW.
4. Final goods firms produce final consumption good by combining domestically and foreign produced goods in a CES basket.

Outline

Government

- Passive: Holds government debt and expenditure ratios and share of taxes in each household groups income constant constant.

Capitalist spirit preference parameters: empirical targets

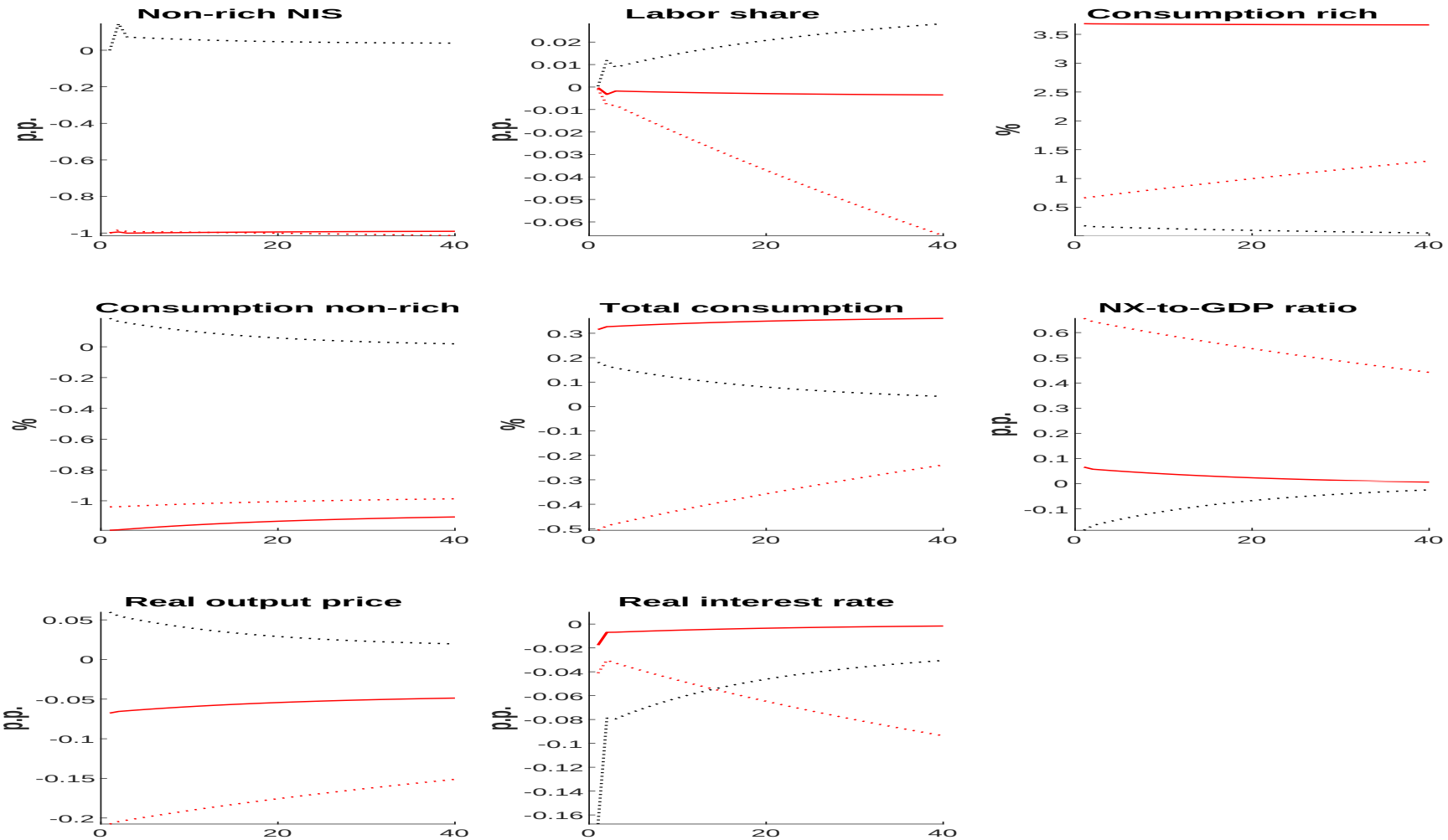
- First target: Estimates of the ratio between the interest rate and individual discount rate, specifically for rich households (computed from Pleeter and Warner (2001) and Harrison et al. (2002) see Rannenberg (2019), Rannenberg (2023) for details)⇒utility weight on wealth.
- Second target: Rich household saving behavior
  - DE and REA: Estimate of the MPC out of wealth of the top 10% of households (Garbinti et al. (2020) for Germany, and an average of the estimates for France, Belgium, Spain and Italy by Garbinti et al. (2020) and Arrondel et al. (2019)). Would prefer MPS out of a permanent income increase, but not available to our knowledge
  - ROW: Estimate of US rich household MPS out of a permanent income increase (Dynan et al. (2004), following Kumhof et al. (2015)).

Other parameters

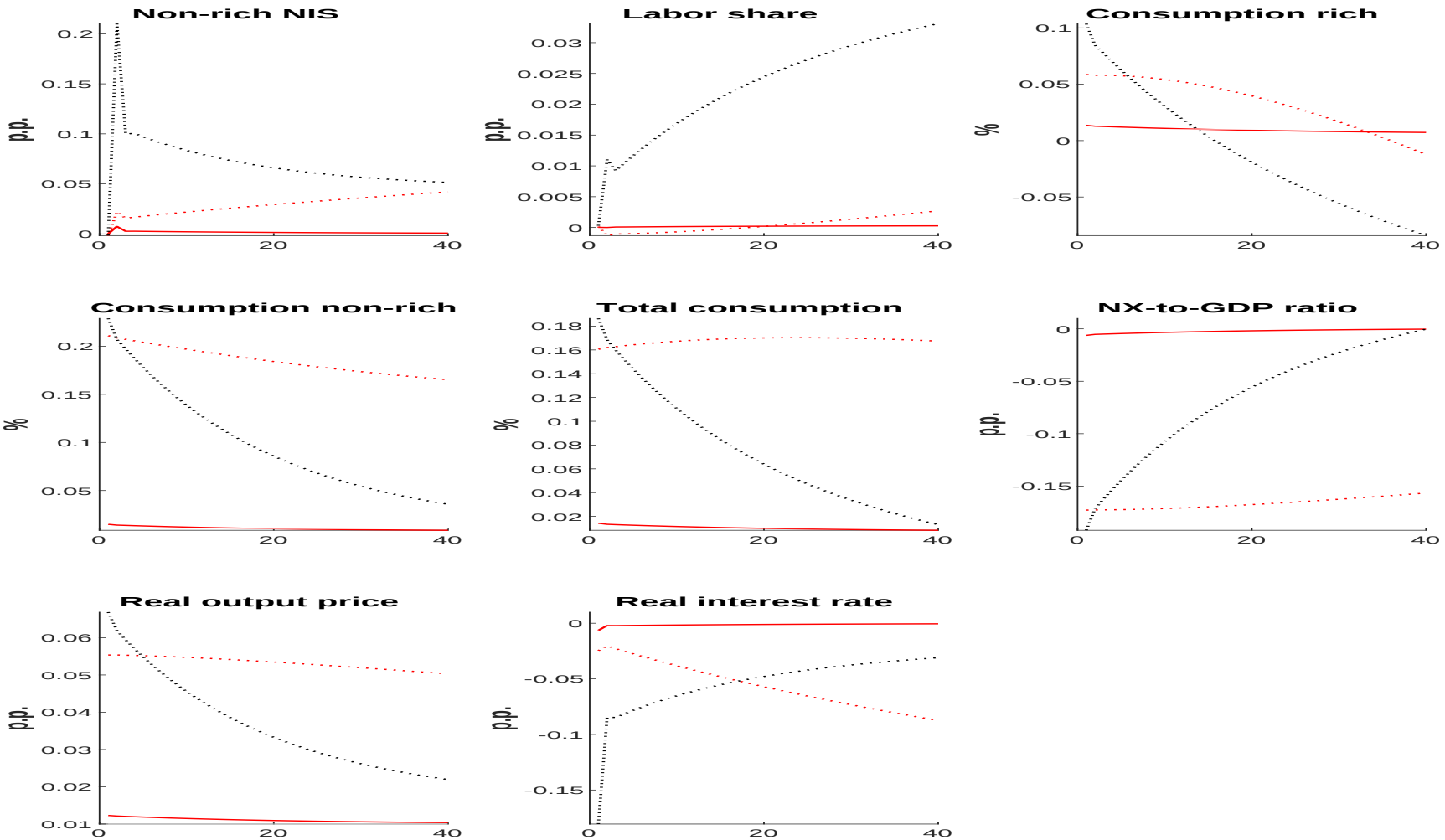
- Most other parameters set such that the steady-state of the model matches empirical target values.
- Parameters affecting only the dynamics of the model calibrated based on the literature and the empirical evidence.

Permanent inequality increase (wage dispersion) - DE

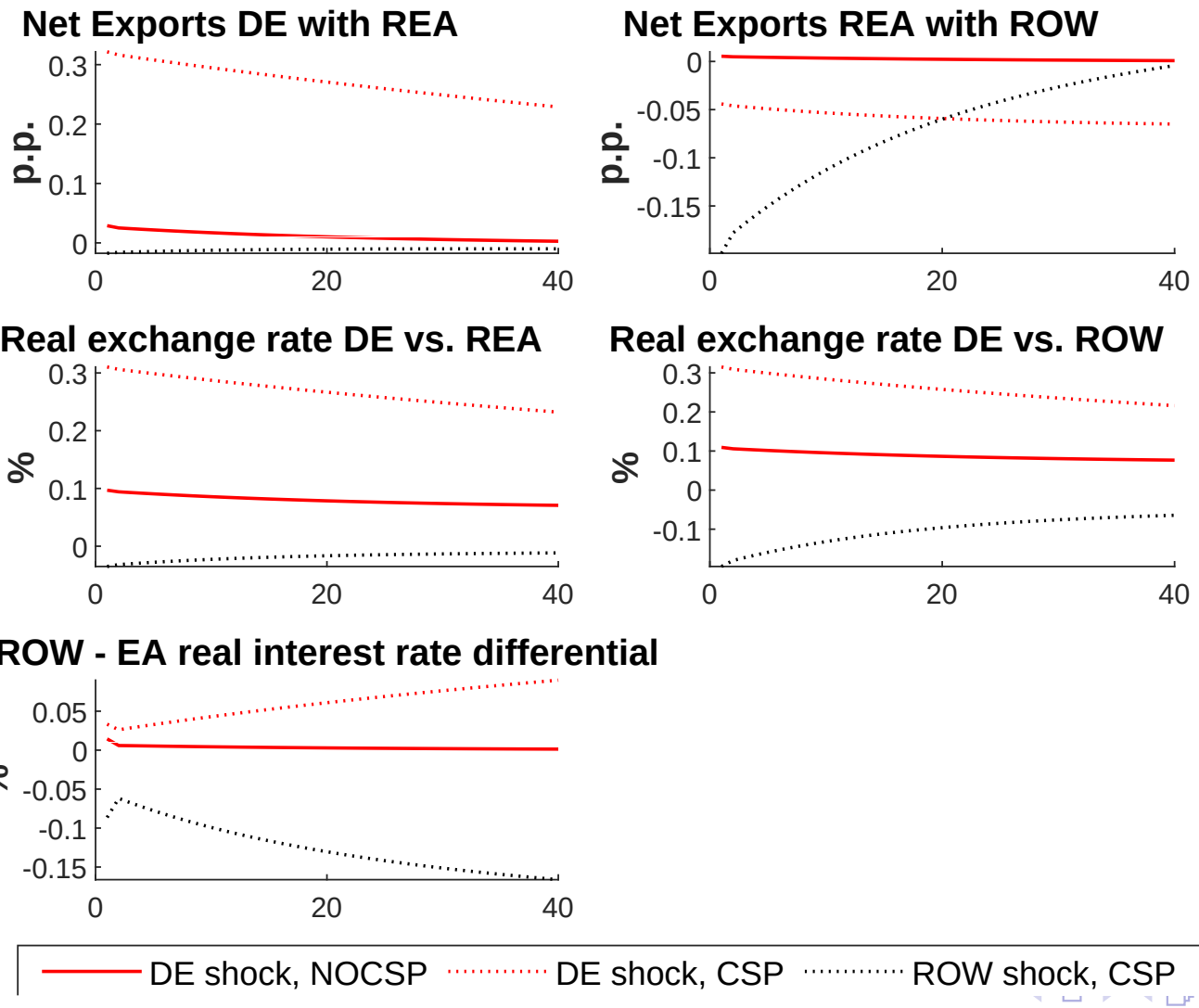
FC



Permanent inequality increase (wage dispersion) - REA ▸ ROW



Permanent inequality increase (wage dispersion) - int. variables



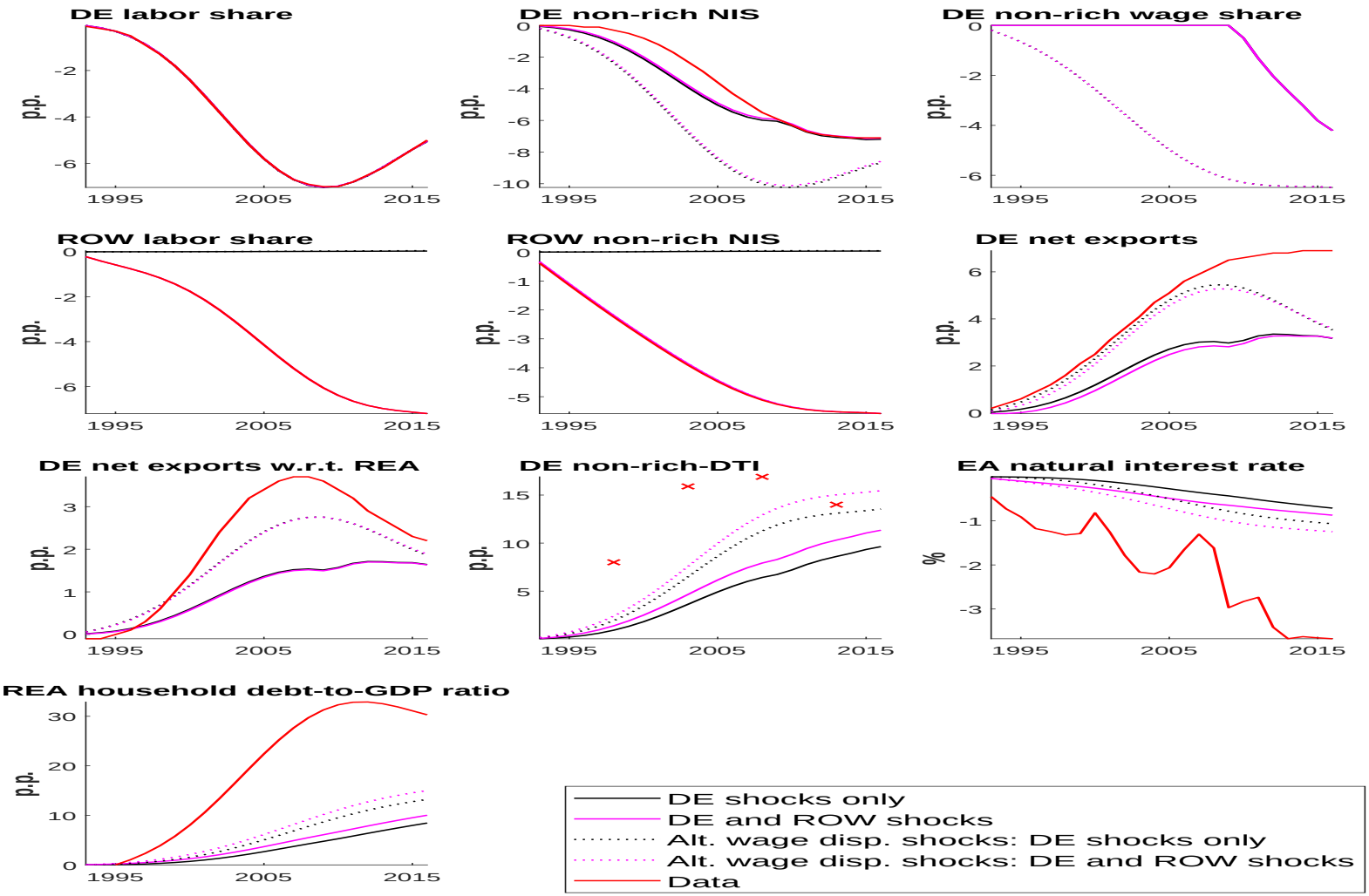
Simulation of historical inequality increase

- First simulation: DE inequality increase only
  - DE markup shock: Makes simulation match the trend of the DE labor share.
    - Rannenberg (2023), Farhi and Gourio (2018) and Caballero et al. (2017) do so for the US case.
  - Set DE Wage inequality shock to match the empirical decline of the top 10% national income share occurring on top of the decline already replicated by the price markup increase.
- Second simulation: As first, but do add ROW shocks set to target ROW labor and bottom 90% national income share.

Simulation historical inequality increase (cont'd)

- Households expect shocks to be permanent once they appear, because they are set to match data trends.
- Repeat the above two simulations for an alternative parameterization of the DE wage inequality shock.
  - Equate shock to the path of (an estimate of the) labor income share of the top 10% of households from the German household survey SOEP (Wagner et al. (2007)).

Simulation historical inequality increase



Conclusion

- I investigate the effect of rising income inequality on the DE export surplus in an open economy model with rich households (the top 10%) and non-rich households .
- Rich households derive utility from their wealth, therefore save part of a permanent income increase.
- Feeding the increase in DE inequality observed over the 1992-2016 period into the model generates an increase of net exports of about three percent of GDP by the end of the simulation period and a decline of the Euro Area real interest rate by about one percentage point.z
- Results robust to allowing for physical capital, nominal rigidities + monetary union between DE+REA.

Utility functions

Return

- Rich household period t utility flow:

$$\frac{\left(pop_r \tilde{C}_{r,t}^{DE}\right)^{\mathbf{1}-\sigma^{DE}}}{1-\sigma^{DE}} - \frac{\chi_{N,r}^{DE}}{1+\eta^{DE}}\left(pop_r \tilde{N}_{r,t}^{DE}\right)^{\mathbf{1}+\eta^{DE}} + \left(\begin{array}{c} \frac{\chi_{b,r}^{DE}}{\mathbf{1}-\sigma_{b,r}^{DE}}\left(pop_r\left(\tilde{b}_{r,dom,t}^{DE} + q_{REA,t}^{DE}\tilde{b}_{REA,t}^{DE}\right)\right)^{\mathbf{1}-\sigma_{b,r}^{DE}} \\ + \frac{\chi_{b_{ROW},r}^{DE}}{\mathbf{1}-\sigma_{b_{ROW},r}^{DE}}\left(pop_r q_{ROW,t}^{DE}\tilde{b}_{ROW,t}^{DE}\right)^{\mathbf{1}-\sigma_{r,b}^{DE}} \end{array} \right)$$

- Rich household domestic currency assets Euler equation:

$$\Lambda_{r,t}^{DE} = \beta_r^{DE} E_t\left\{RR_t^{DE}\Lambda_{r,t+\mathbf{1}}^{DE}\right\} + \chi_{b,r}^{DE}\left(b_{r,t}^{DE}\right)^{-\sigma_{b,r}^{DE}}$$

- Non-rich household period t utility flow

$$\frac{\left(\left(1-pop_r\right)\tilde{C}_{n,t}^{DE}\right)^{1-\sigma^{DE}}}{1-\sigma^{DE}} - \frac{\chi_{N,n}^{DE}}{1+\eta^{DE}}\left(\left(1-pop_r\right)\tilde{N}_{n,t}^{DE}\right)^{1+\eta}$$

Labor assemblers/ labor income distribution

Return

- Labor assembler combines labor of rich and non-rich households to produce a homogeneous labor input $N_t = z_{n,t} N_{n,t} + z_{r,t} N_{r,t}$. Sell it at real price w_t to intermediate goods firms. Hence real wages of non-rich and rich households are given by

$$w_{n,t} = w_t z_{n,t} \tag{1}$$

$$w_{r,t} = w_t z_{r,t} \tag{2}$$

w_t : cost of the homogeneous labor input. $z_{n,t}$/ $z_{r,t}$: productivity of non-rich/ rich labor, evolve according to

$$\omega_{n,t} = \omega_n + d_{n,t} \tag{3}$$

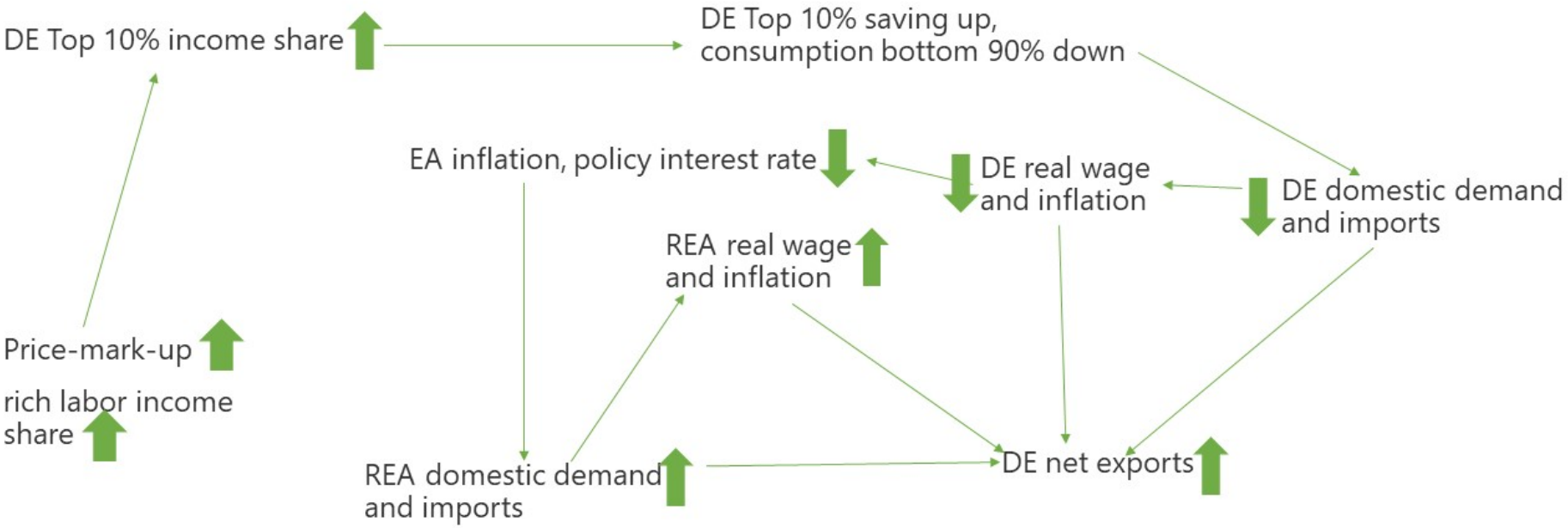
$$\omega_{n,t} = \frac{w_t z_{n,t} N_{n,t}}{w_t z_{r,t} N_{r,t} + w_t z_{n,t} N_{n,t}} \tag{4}$$

$$1 = \frac{z_{n,t} N_{n,t} + z_{r,t} N_{r,t}}{N_{r,t} + N_{n,t}} \tag{5}$$

- $\omega_{n,t}$: Non-rich share in total labor income.
- Use $d_{n,t}$ to match increases in the top 10% national income share not associated with a decline in the labor share.

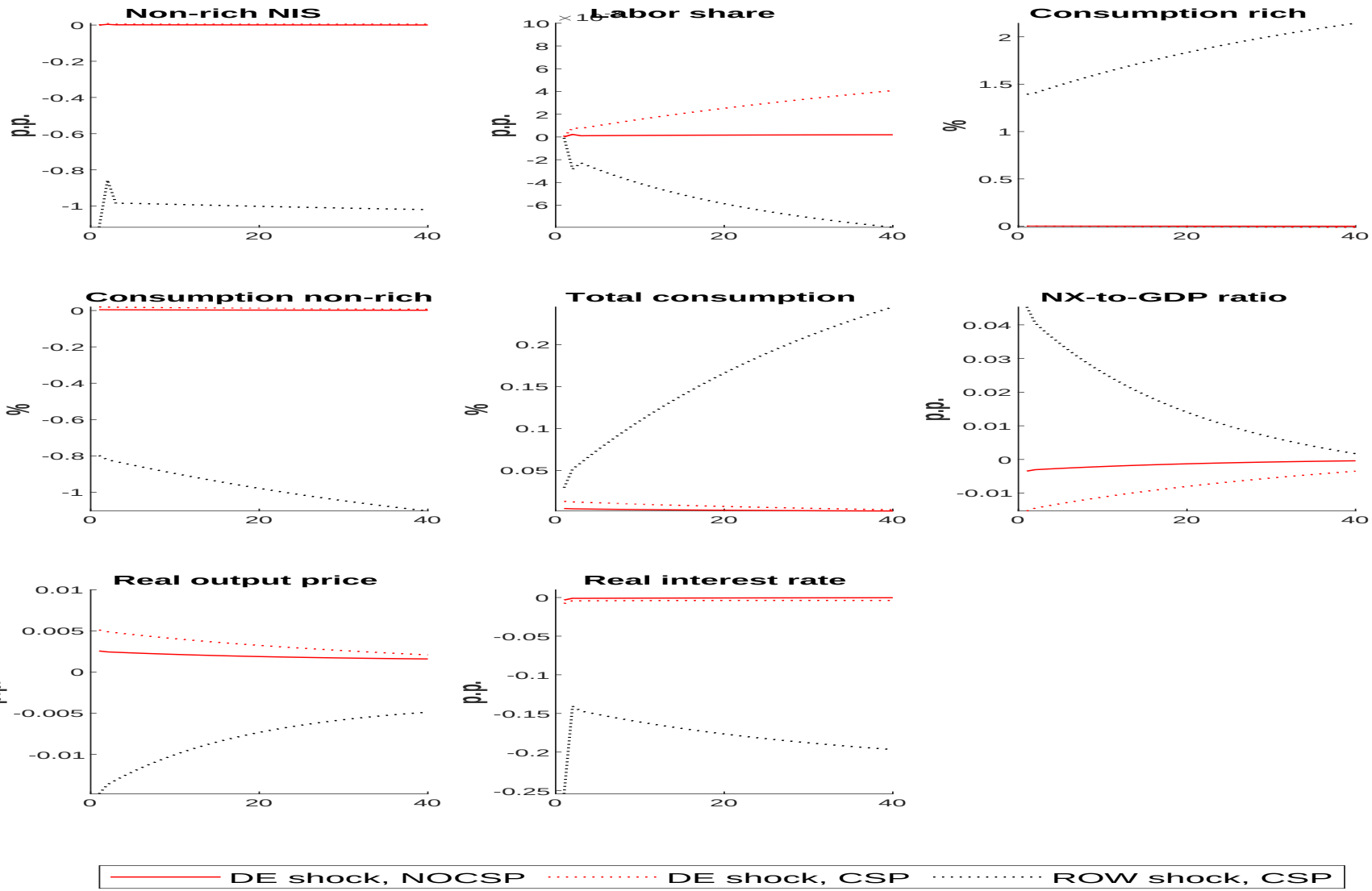
Transmission of an inequality increase with CSP

Return



ROW inequality increase Return

- Rich households saving $\Uparrow$, consumption and imports $\Downarrow$ and net exports $\Uparrow$. Central bank lowers real interest rate.
- Real interest rate decline >> than in DE for DE inequality increase, consumption decline only transitory, net export increase much smaller.
  - Reason: Import/ export share much smaller, economy size bigger than in DE$\Rightarrow$ less possibility for rich household saving leakage abroad: Would require huge percentage decline/ increase in imports/ exports. Would require bigger decrease in consumption, which would conflict with market clearing.
  - $\Rightarrow$Increase in rich HH savings absorbed/ eliminated mainly domestically via a lower real interest rate $\Longrightarrow$ Consumption and borrowing trajectory higher.
- ROW-EA interest rate interest rate differential >> than for DE inequality increase. Appreciation of EA exchange rate muted by decline in relative attractiveness of EA assets.


Non-rich NIS
p.p.
Labor share
p.p.
Consumption rich
%
Consumption non-rich
%
Total consumption
%
NX-to-GDP ratio
p.p.
Real output price
p.p.
Real interest rate
p.p.
DE shock, NOCSP
DE shock, CSP
ROW shock, CSP

Arrondel, L., Lamarche, P., and Savignac, F. (2019). Does inequality matter for the consumption-wealth channel? empirical evidence. *European Economic Review*, 111:139–165.

Behringer, J. and van Treeck, T. (2018). Income distribution and the current account. *Journal of International Economics*, 114(C):238–254.

Caballero, R. J., Farhi, E., and Gourinchas, P.-O. (2017). Rents, Technical Change, and Risk Premia Accounting for Secular Trends in Interest Rates, Returns on Capital, Earning Yields, and Factor Shares. *American Economic Review*, 107(5):614–620.

Dynan, K. E., Skinner, J., and Zeldes, S. P. (2004). Do the Rich Save More? *Journal of Political Economy*, 112(2):397–444.

Farhi, E. and Gourio, F. (2018). Accounting for Macro-Finance Trends: Market Power, Intangibles, and Risk Premia. *Brookings Papers on Economic Activity*, 49(2 (Fall)):147–250.

Gadatsch, N., Staehler, N., and Weigert, B. (2016). German labor market and fiscal reforms 1999-2008: Can they be blamed for intra-euro area imbalances? *Journal of Macroeconomics*, 50:307–324.

Garbinti, B., Lamarche, P., Savignac, F., and Lecanu, C. (2020). Wealth effect on consumption during the sovereign debt crisis: households heterogeneity in the euro area. Working Paper Series 2357, European Central Bank.

Gruening, P., Theobald, T., and van Treeck, T. (2015). Income inequality and Germanys current account surplus. IMK Working Paper 147-2015, IMK at the Hans Boeckler Foundation, Macroeconomic Policy Institute.

Harrison, G. W., Lau, M. I., and Williams, M. B. (2002). Estimating Individual Discount Rates in Denmark: A Field Experiment. *American Economic Review*, 92(5):1606–1617.

Hochmuth, B., Moyen, S., and Staehler, N. (2019). Labor market reforms, precautionary savings, and global imbalances. Discussion Papers 13/2019, Deutsche Bundesbank.

Hoffmann, M., Kliem, M., Krause, M., Moyen, S., and Å auer, R. (2021). Rebalancing the euro area: Is wage adjustment in germany the answer? *Journal of International Money and Finance*, 119:102497.

Kollmann, R., Ratto, M., Roeger, W., in't Veld, J., and Vogel, L. (2015). What drives the German current account? And how does it affect other EU Member States? *Economic Policy*, 30(81):47–93.

Kumhof, M., Ranciere, R., and Winant, E. O. P. (2022). Income inequality and the current account.

Kumhof, M., Ranciere, R., and Winant, P. (2015). Inequality, leverage, and crises. *American Economic Review*, 105(3):1217–45.

Mian, A., Straub, L., and Sufi, A. (2021). Indebted Demand*. *The Quarterly Journal of Economics*, 136(4):2243–2307.

Pleeter, S. and Warner, J. T. (2001). The Personal Discount Rate: Evidence from Military Downsizing Programs. *American Economic Review*, 91(1):33–53.

Rannenberg, A. (2019). Forward guidance with preferences over safe assets. Working Paper 364, National Bank of Belgium.

Rannenberg, A. (2023). The rise in inequality, the decline in the natural interest rate and the increase in household debt. *The International Journal of Central Banking*.

Ruppert, K. and Staehler, N. (2022). What drives the german current account? household savings, capital investments and public policies. *Economic Modelling*, 108:105769.

Schoen, M. and Staehler, N. (2020). When old meets young? germany's population ageing and the current account. *Economic Modelling*, 89:315–336.

Schroeder, C., Bartels, C., Goebler, K., Grabka, M. M., and Konig, J. (2020). MillionaerInnen unter dem Mikroskop: Datenluecke bei sehr hohen Vermoegen geschlossen - Konzentration hoeher als bisher ausgewiesen. *DIW Wochenbericht*, 87(29):511–521.

Straub, L. (2017). Consumption, Savings and the Distribution of Permanent Income. Technical report, Harvard University.

Wagner, G. G., Frick, J. R., Schupp, J., et al. (2007). The german socio-economic panel study (soep)–scope, evolution and enhancements. *Schmollers Jahrbuch: Journal of Applied Social Science Studies/Zeitschrift für Wirtschafts-und Sozialwissenschaften*, 127(1):139–169.