Income Inequality and Current Account Imbalances

Michael Kumhof, Bank of England Romain Ranciere, IMF and PSE

Alexander Richter, Auburn University Nate Throckmorton, College of William and Mary

Pablo Winant, Bank of England

The views expressed herein are those of the authors and should not be attributed to the Bank of England or the IMF.

1 Introduction

- Global external imbalances often mentioned as one of the reasons for the financial crisis.

- Competing explanations for U.S. current account deficits:
  - Low public and private saving rates in the United States.
  - High saving rates in the rest of the world.
  - Global underinvestment.
  - Demographics.
  - Productivity.
  - U.S. dollar's world reserve currency status.

- But persistently high CA deficits not limited to US: Many other cases, especially Anglo-Saxon.

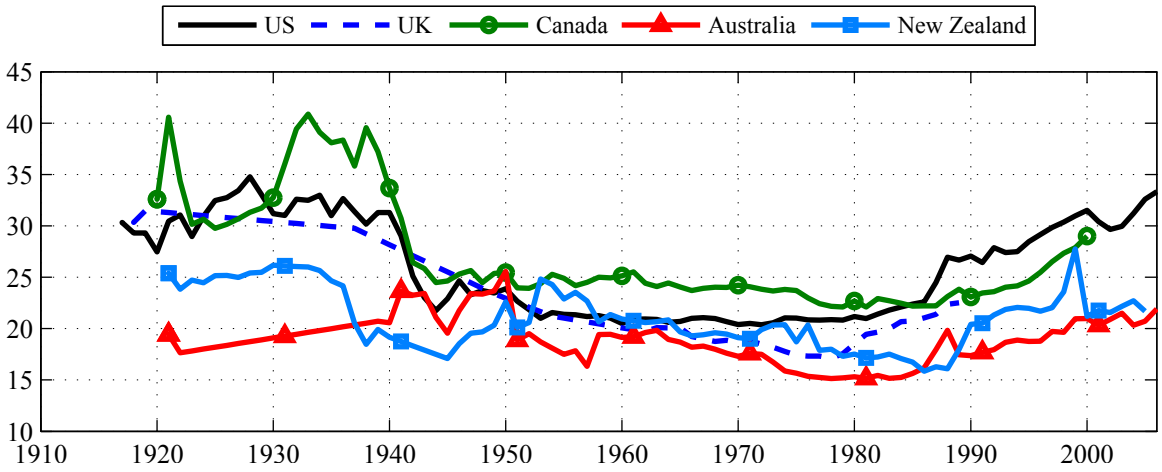
- Common factors for these countries:
  - Steep increase in income inequality over recent decades.
  - Finance-driven rather than export-driven growth models.

- Our empirical work and model simulations confirm this:
  - Income inequality can trigger large **CA deficits** under
    - redistributive shocks that drive up asset values, and
    - a large role of financial markets in the economy.
  - **CA surpluses** under opposite set of conditions,
    - redistributive shocks purely to labor incomes, and
    - small role of financial markets in the economy.

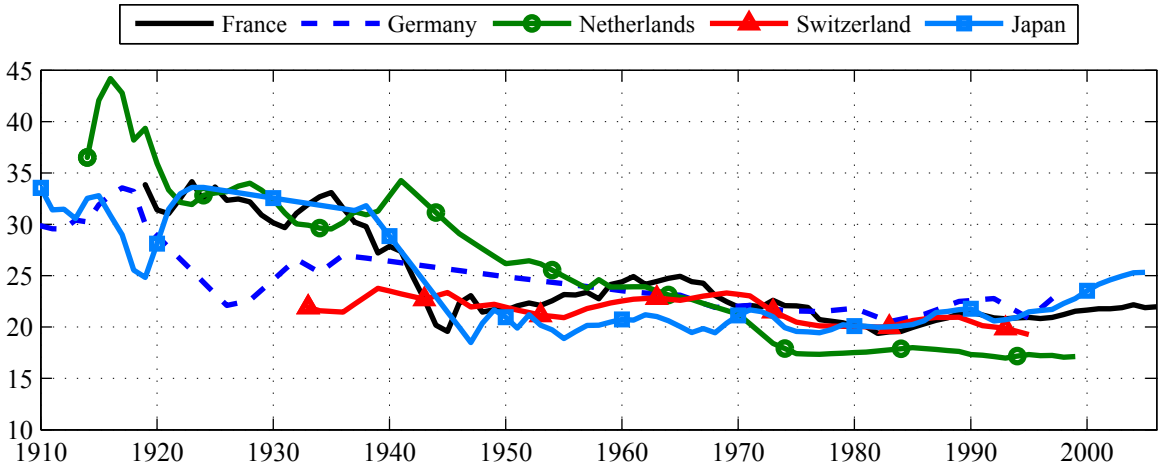
2 Data

2.1 Rise in Global Income Inequality

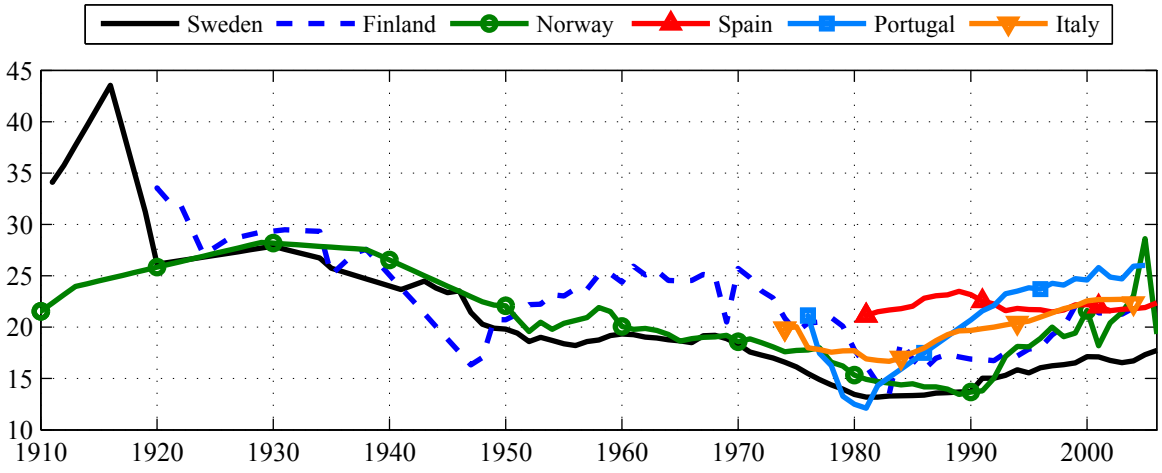
- Income inequality measured by top 5% income shares.
- Anglo-Saxon Countries: U-shaped pattern, rising inequality since late 1970s.
- Continental Europe and Japan: L-shaped pattern, no large increases in inequality.
- Southern European and Nordic Countries: L/U-shaped pattern, recent increases in inequality.



(a) Anglo-Saxon Countries (U-shaped)



(b) Continental Europe and Japan (L-shaped)

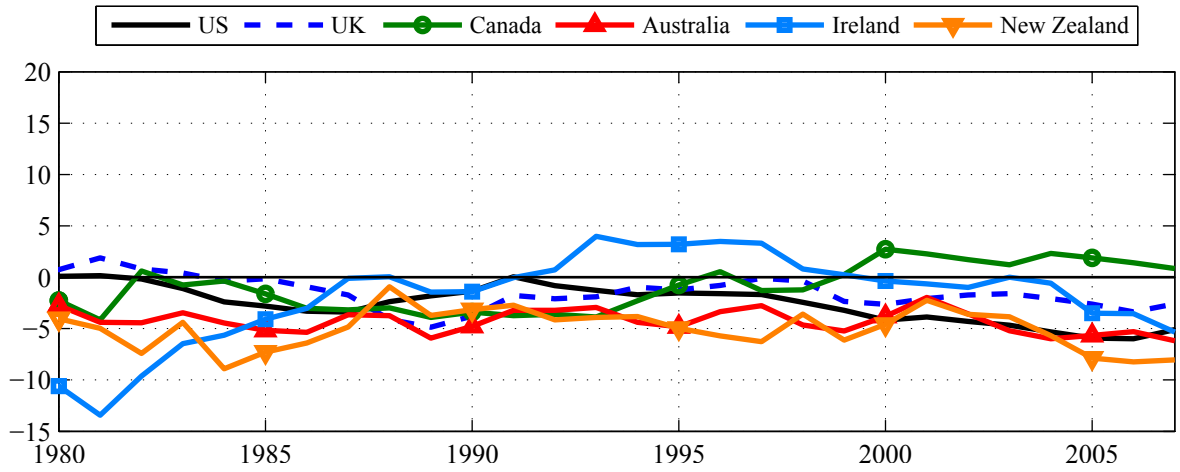


(c) Southern Europe and Nordic Countries (U/L-shaped)

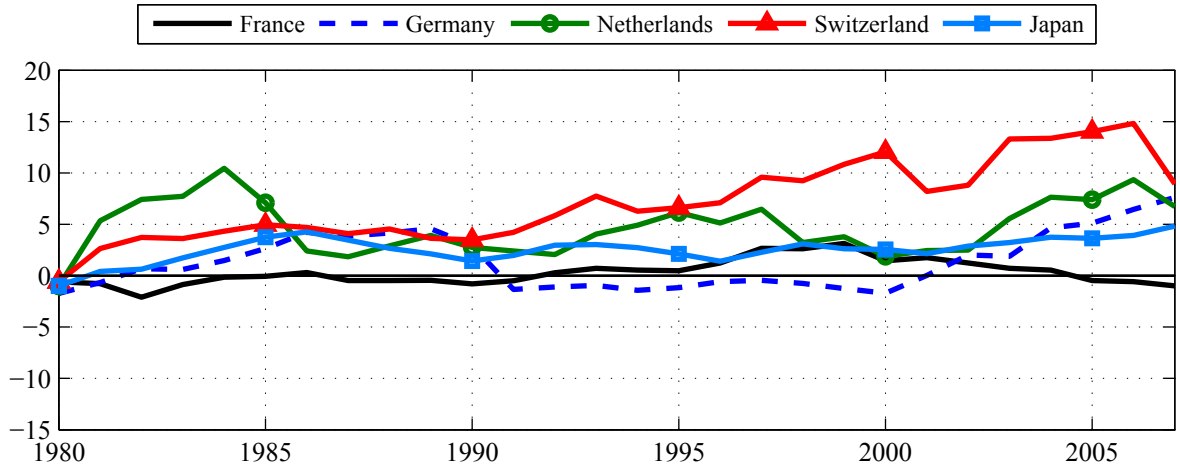
Figure 1: Income Share of Top 5 Percent by Country (in percent)

2.2 Rise in Global Current Account Imbalances

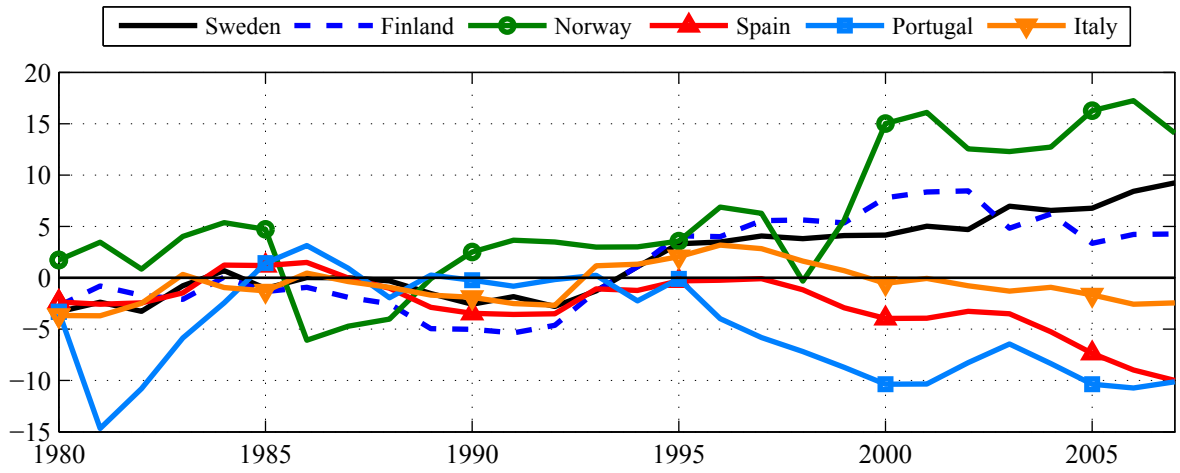
- CA Deficit Countries:
  - US, UK, Italy, Ireland and Portugal.
  - These countries also experienced rising top income shares.
- Balanced CA (or Surplus) Countries:
  - Germany, Japan, Switzerland and France.
  - These countries also exhibited stable top income shares.



(a) Anglo-Saxon Countries (U-shaped)



(b) Continental Europe and Japan (L-shaped)



(c) Southern Europe and Nordic Countries (U/L-shaped)

Figure 4: Global Current Account Imbalances (percent of GDP)

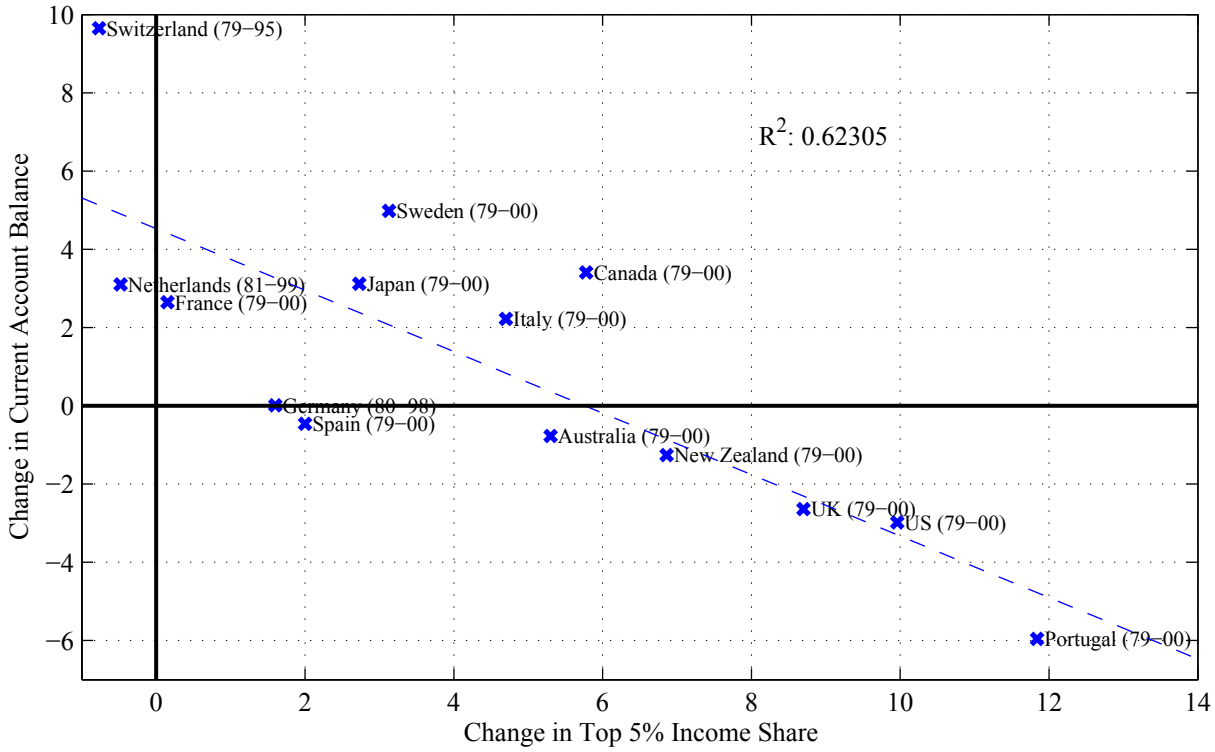


Figure 5: Changes in Current Accounts and Top Income Shares (in percent

2.3 Current Account Regressions

- Baseline = IMF's External Balance Assessment (EBA) methodology:
  - Comprehensive set of explanatory variables.
  - Pooled GLS with panel-wide AR(1) correction.
  - Annual data, 49 countries, 1986-2010.
  - We mostly use 19 OECD economies.

- Baseline regressors: Conventional results.

- Including top 5% income share (TIS):
  - TIS coefficients significant and robust:
    - 10 pp increase in TIS deteriorates CA/GDP by 1.25 pp.
    - US/UK top income shares increased by around 10 pp.
  - Other coefficients very similar to baseline.

- Including the size of domestic financial markets:
  - Used as interaction term with income inequality.
  - Inequality - CA deficit link stronger with larger financial markets.

- These results are consistent with model simulation results below.

Table 1. Current Account Regressions: EBA Specification augmented with Top Income Shares

Sample: OECD Countries
Dependant Variable: Current Account-to-GDP (OECD Countries)

Income Share Top 10%		-0.127***			
		(0.001)			
Income Share Top 5%			-0.125**		
			(0.034)		
Income Share Top 1%				-0.132	
				(0.119)	
Income Share Top 0.1%					-0.320**
					(0.048)
Net Foreign Assets/GDP (lagged one period)	0.002	0.004	0.018*	0.009	0.020**
	(0.793)	(0.600)	(0.056)	(0.287)	(0.045)
(NFA/GDP+0.6)*(dum=1 if NFA/GDP<-60%), (lagged one period)	-0.001	-0.003	-0.016	-0.006	0.024
	(0.948)	(0.850)	(0.424)	(0.751)	(0.528)
Dummy=1 if country is a financial center	0.044***	0.033***	0.025**	0.030**	0.024**
	(0.000)	(0.004)	(0.036)	(0.012)	(0.047)
Sample demeaned [own PPP GDP per working population(15-64)/average of US/Japan/Germany - 1], (lagged one period)	-0.109***	-0.107***	-0.150***	-0.135***	-0.138***
	(0.007)	(0.010)	(0.000)	(0.001)	(0.001)
Sample demeaned [own PPP GDP per working population(15-64)/average of US/Japan/Germany - 1]}*(1- Capital Control Index),(lagged one period)	0.157***	0.178***	0.191***	0.188***	0.186***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Oil & Gas trade balance (relative to World average, 5 yr MA)*(dum=1 if >0%), WITS	0.602***	0.463***	0.529***	0.515***	0.459***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Dependency Ratio (relative to World average)	0.050	0.111**	0.018	0.021	-0.017
	(0.338)	(0.044)	(0.745)	(0.693)	(0.749)
Population Growth (relative to World average)	-0.497	-0.329	-0.453	-0.431	-0.542
	(0.343)	(0.527)	(0.417)	(0.414)	(0.358)
Aging Speed (relative to World average)	0.232***	0.256***	0.226***	0.203***	0.174***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Expected GDP growth of medium-term(5 years out) relative to World average, WEO	-0.682***	-0.647***	-0.792***	-0.783***	-0.850***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Public Health Spending/GDP (relative to World average) (lagged one period)	0.099	0.094	0.117	0.062	0.405*
	(0.671)	(0.683)	(0.617)	(0.790)	(0.082)
Demeaned VOX*(1- Capital Control Index) (lagged one period)	0.033*	0.032	0.033	0.033*	0.003
	(0.089)	(0.102)	(0.110)	(0.099)	(0.885)
Demeaned VOX*(1- Capital Control Index)*(currency's share in world reserves stock) (lagged one period)	-0.030	-0.002	-0.046	-0.019	0.030
	(0.664)	(0.979)	(0.486)	(0.770)	(0.644)
Share of the country's currency held as FX reserve by central banks worldwide	-0.057***	-0.049***	-0.045***	-0.053***	-0.054***
	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)
Output Gap (relative to World average)	-0.208***	-0.207***	-0.158**	-0.190**	-0.188**
	(0.004)	(0.006)	(0.048)	(0.013)	(0.034)
Commodity Terms of Trade index deviation from trend, multiplied by openness	0.284***	0.353***	0.347***	0.350***	0.386***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Safer Institutional/Political Environment Index (rel to World average), ICRG	-0.155***	-0.109***	-0.120***	-0.122***	-0.100***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.003)
Private credit/GDP (rel to World average)	-0.035***	-0.040***	-0.033***	-0.033***	-0.022**
	(0.000)	(0.000)	(0.001)	(0.000)	(0.042)
Cyclically Adjusted Fiscal Balance (relative to World average)(instrumented)	0.604***	0.365**	0.490***	0.475***	0.496***
	(0.000)	(0.019)	(0.001)	(0.001)	(0.002)
Capital Control*(Changes in Reserves)/GDP, (relative to World average) instrumented	-0.129	0.309	0.620	0.503	1.268*
	(0.843)	(0.642)	(0.380)	(0.462)	(0.085)
Observation	463	417	396	416	336
Countries	19	19	18	19	16
R-Square	0.681	0.694	0.721	0.682	0.740
Root MSE	0.028	0.026	0.025	0.027	0.025

*** p<0.01, ** p<0.05, * p<0.1

3 Model

- Two countries:
  - Home and Foreign.
  - Home population share $= \omega$.

- Two household groups in each country:
  - Bottom earners (subscripts b).
  - Top earners (subscripts τ).
  - Top earner population share $= \chi = 0.05$.

- Single tradable world good.

- Endowment income in Home:
  - Total endowment $= a_t$.
  - Top earner dividend income from Lucas tree: $a_t y_t n_{t-1}$ $(n_t = \bar{n})$.
  - Top earner labor income: $\zeta_t a_t (1 - y_t n_{t-1})$.
  - Bottom earner labor income: $(1 - \zeta_t) a_t (1 - y_t n_{t-1})$.

3.1 Budget Constraints

- Two assets:
  1. Consol
     - Traded among all households worldwide.
     - Price p_t.
     - Coupon of r.
     - Holdings: $b_{\tau,t}$ and $b_{b,t}$.
  2. Share
     - Traded only domestically among top earners.
     - Price q_t.
     - Dividends $a_t y_t$.
     - Fixed supply at $n_t = \bar{n}$.

- Budget constraints:
  1. Bottom earners:

$$\begin{aligned} c_{b,t} &= \frac{a_t \left(1 - y_t n_{t-1}\right)\left(1 - \zeta_t\right)}{\left(1 - \chi\right)} \\ &\quad + r b_{b,t-1} - p_t \left(b_{b,t} - b_{b,t-1}\right) \end{aligned}$$

  2. Top earners:

$$\begin{aligned} c_{\tau,t} &= \frac{a_t \left(1 - y_t n_{t-1}\right)\zeta_t}{\chi} \\ &\quad + r b_{\tau,t-1} - p_t \left(b_{\tau,t} - b_{\tau,t-1}\right) \\ &\quad + \frac{a_t y_t n_{t-1}}{\chi} - q_t \left(n_t - n_{t-1}\right) \end{aligned}$$

3.2 Preferences

- Bottom earners:
  - Lifetime utility:

$$U\left(c_{b,t}\right) = \frac{\left(c_{b,t}\right)^{1-\sigma}}{1-\sigma}$$

  - Stochastic discount factor:

$$\psi_{b,t,t+1} = \beta_b \frac{U_c'\left(c_{b,t+1}\right)}{U_c'\left(c_{b,t}\right)}$$

  - Optimality condition for consols:

$$p_t = E_t\left[\rho_{b,t,t+1}\left(p_{t+1} + r\right)\right]$$

- Top earners:
  - Lifetime utility:
$$U\left(c_{\tau,t}, w_t\right) = \frac{\left(c_{\tau,t}\right)^{1-\sigma}}{1-\sigma} + \varphi\frac{(w_t)^{1-\eta}}{1-\eta}$$
  - Tradable wealth:
$$w_t = n_t q_t + b_{\tau,t} p_t$$
  - Stochastic discount factor:
$$\psi_{\tau,t,t+1} = \frac{\beta_\tau \frac{U_c'\left(c_{\tau,t+1}, w_{t+1}\right)}{U_c'\left(c_{\tau,t}, w_t\right)}}{1 - \varphi\frac{U_W'\left(c_{\tau,t}, w_t\right)}{U_c'\left(c_{\tau,t}, w_t\right)}}$$
  - Optimality condition for consols and shares:
$$p_t = E_t\left[\rho_{\tau,t,t+1}\left(p_{t+1} + r\right)\right]$$
$$q_t = E_t\left[\rho_{\tau,t,t+1}\left(q_{t+1} + \frac{a_{t+1} y_{t+1}}{\chi}\right)\right]$$

3.3 Market Clearing

- World goods market:

$$\omega a_t + (1-\omega)\, a_t^* = \omega\chi c_{\tau,t} + \omega\,(1-\chi)\, c_{b,t} + (1-\omega)\,\chi c_{\tau,t}^* + (1-\omega)\,(1-\chi)\, c_{b,t}^*$$

- World consols market:

$$\omega\chi b_{\tau,t} + \omega\,(1-\chi)\, b_{b,t} + (1-\omega)\,\chi b_{\tau,t}^\star + (1-\omega)\,(1-\chi)\, b_{b,t}^\star = 0$$

- Domestic share markets:

$$n_t = \bar{n}$$
$$n_t^* = \bar{n}^*$$

- Home NFA:

$$f_t = \omega\chi b_{\tau,t} + \omega\,(1-\chi)\, b_{b,t}$$

- Home CA:

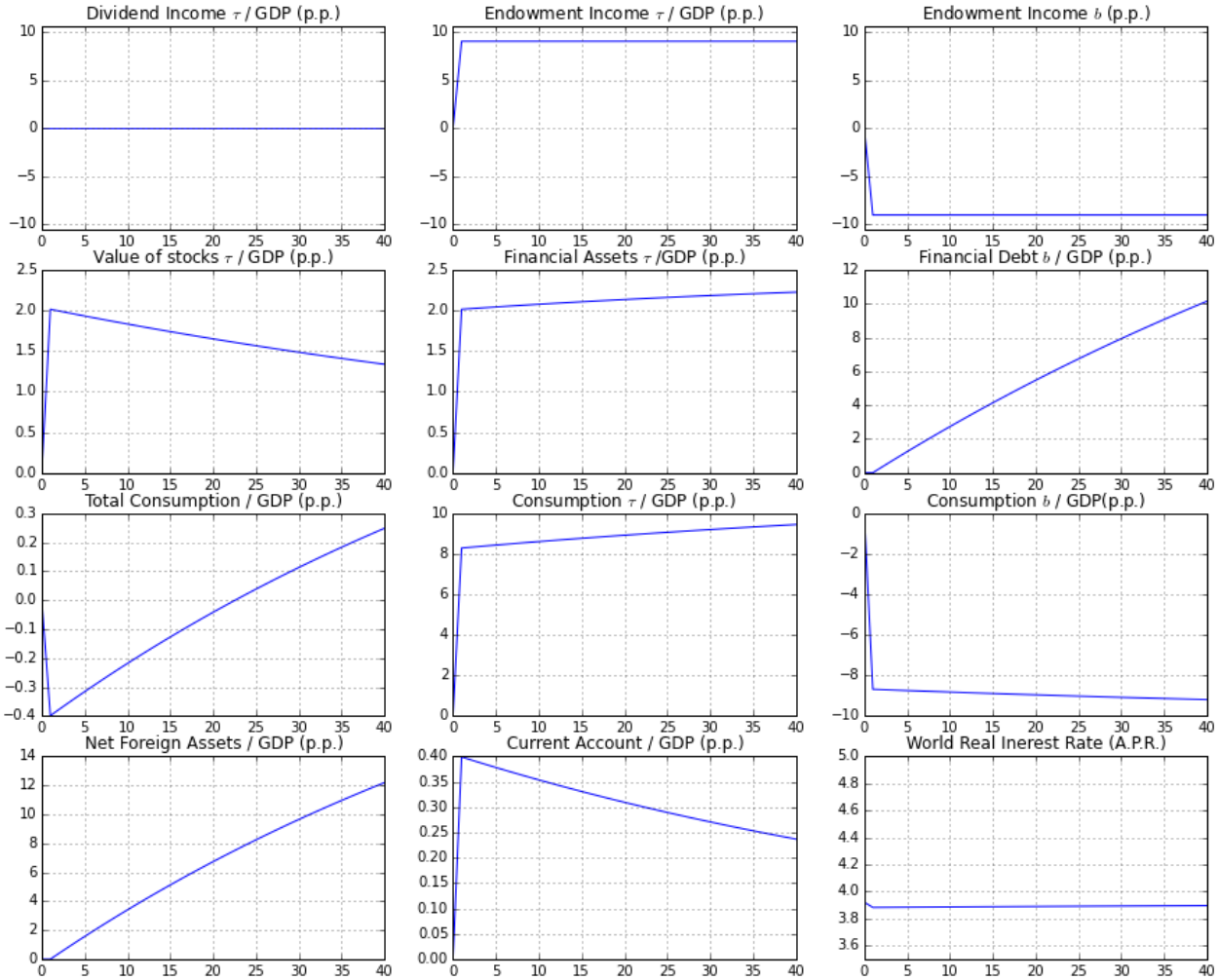
$$ca_t = f_t - f_{t-1}$$

3.4 Calibration

- All exogenous processes perfectly persistent: $\rho_a = \rho_y = \rho_\zeta = 1$.
- Technology normalized to one: $\bar{a} = \bar{a}^* = 1$.
- Share of stock market in income: $\bar{y}\bar{n} \in \{0.1, 0.2\}$.
- Income share of top-earners: 25%.
- World real interest rate: $r = 0.04$.
- Intertemporal elasticity of substitution: $\sigma = 2.0$.
- φ chosen to normalize initial debt to zero.
- η chosen to obtain marginal propensity to save of top earners close to 50%.

4 10pp Increase in Top 5% Labor Income

- Desired tradable wealth increases by more than actual tradable wealth.
- Saving (via consols) of Top 5% does two things:
  - Accumulates claims on domestic and foreign agents.
  - Lowers interest rates $\Rightarrow$ share values up $\Rightarrow$ less saving.
- Implication: CA surplus, 0.4% of GDP on impact.
- Weaker with large domestic financial markets:
  - Lower interest rates increase share values: Less need for saving.
  - Large share of top earner savings absorbed by domestic bottom earners.
- Stronger with smaller domestic financial markets: Germany, China.


Dividend Income τ / GDP (p.p.)
Endowment Income τ / GDP (p.p.)
Endowment Income b (p.p.)
Value of stocks τ / GDP (p.p.)
Financial Assets τ /GDP (p.p.)
Financial Debt b / GDP (p.p.)
Total Consumption / GDP (p.p.)
Consumption τ / GDP (p.p.)
Consumption b / GDP(p.p.)
Net Foreign Assets / GDP (p.p.)
Current Account / GDP (p.p.)
World Real Inerest Rate (A.P.R.)

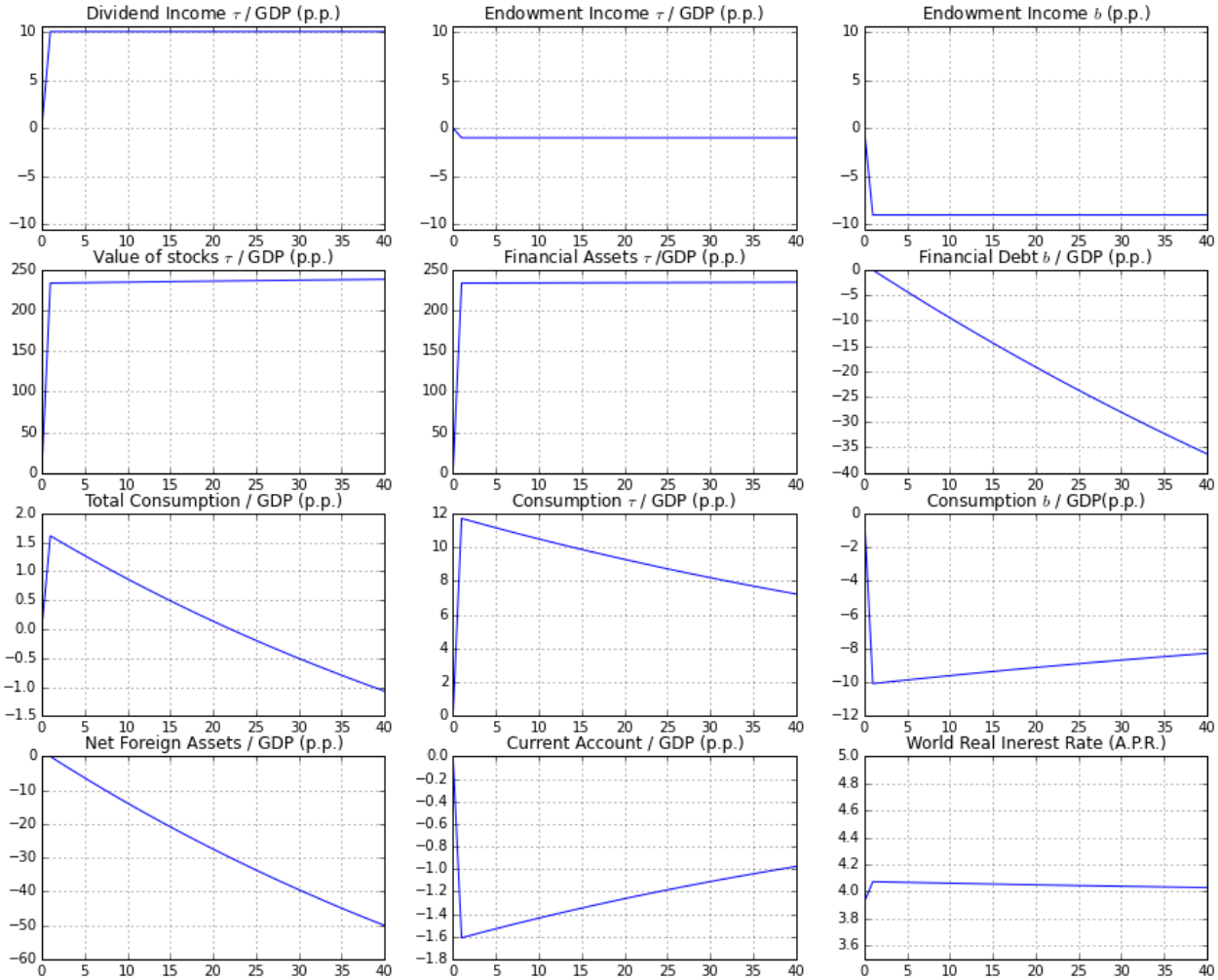
5 10pp Increase in Top 5% Dividend Income

- Actual tradable wealth, namely share prices, increases by much more than long-run desired tradable wealth.

- Dissaving by Top 5% does two things:
  - Accumulates debts to domestic and foreign agents.
  - Raises interest rates $\Rightarrow$ share values slightly up $\Rightarrow$ slightly less dissaving.

- Implication: CA deficit, 1.6% of GDP on impact.

- Stronger with larger domestic financial markets: Anglo-Saxon economies.


Dividend Income τ / GDP (p.p.)
Endowment Income τ / GDP (p.p.)
Endowment Income b (p.p.)
Value of stocks τ / GDP (p.p.)
Financial Assets τ /GDP (p.p.)
Financial Debt b / GDP (p.p.)
Total Consumption / GDP (p.p.)
Consumption τ / GDP (p.p.)
Consumption b / GDP(p.p.)
Net Foreign Assets / GDP (p.p.)
Current Account / GDP (p.p.)
World Real Inerest Rate (A.P.R.)

6 Summary

Empirical Evidence

- In a broad cross section:
  - Top income shares $\uparrow \Rightarrow$ CA deficits $\uparrow$.
  - For most countries, especially with "finance-led" growth models and large financial markets.
  - Magnitude of the effect is large.

- Outliers:
  - Top income shares $\uparrow \Rightarrow$ CA surpluses $\uparrow$.
  - For fewer but important countries with "export-led" growth models and smaller financial markets.

Theoretical Model

- Key Features:
  - Two household groups, top earners and bottom earners.
  - Permanent shock that redistributes income to top earners.
  - Top earners have much higher marginal propensity to save, as in data.
  - They therefore want to increase not only consumption but also wealth.

- Critical Question: Does top earners' actual wealth increase by more or less than desired wealth?

- Case 1: Shock Benefits Top 5% Dividend Incomes
  - Actual wealth increases by far more than desired wealth.
  - Top earners borrow both domestically and abroad.
  - Country runs a current account deficit.
  - Deficits larger when domestic financial markets are large.

- Case 1: Shock Benefits Top 5% Labor Incomes
  - Actual wealth increases by less than desired wealth.
  - Top earners lend both domestically and abroad.
  - Country runs a current account surplus.
  - Surpluses larger when domestic financial markets are small.