IMK
Institut für Makroökonomie
und Konjunkturforschung
Macroeconomic Policy Institute

Hans Böckler Stiftung
Fakten für eine faire Arbeitswelt.

Einkommensungleichheit als Krisenursache

Makroökonomische Ungleichgewichte, DSGE Kritik, (Empirie)

Thomas Theobald

Outline - Block I:

Einkommensungleichheit als Krisenursache (Credit)

1. Theoretische Wirkungsweisen möglicher Krisenursachen
2. Stylized Facts - USA pre-crisis time
3. Das Kumhof et al. (2012) DSGE zur Erklärung der US Dynamik
4. Simulation und Politikempfehlung
5. Ein alternativer Erklärungsansatz über die Relative Einkommenshypothese

Outline - Block II:

Einkommensungleichheit als Krisenursache (Current Account)

1. Was ist der Unternehmensschleier (Corporate Veil) ?
2. Stylized Facts - GER pre-crisis time
3. Das Grüning et al. (2012) DSGE zur Berücksichtigung der deutschen Dynamik
4. Simulation und Politikempfehlung
5. Stilisierte Zusammenfassung unterschiedlicher Schocks auf die Einkommensverteilung

Outline - Block III:

DSGE Kritik und Robustifizierung

1. Pros and Cons of (2nd generation) DSGE models used
2. Should you never use rational expectations ?
   Ricardian equivalence and its consequences for expansionary fiscal policy
3. Should you never use rational expectations ?
   A Dynamic Stochastic Labor-Market Disequilibrium and effective demand
4. Macroeconomic factors behind financial instability -
   Evidence from Granger causality tests including both panel and time series econometrics

Measuring financial fragility by debt-to-income ratios

A substantial amount of empirical research provides evidence that there is a strong positive relationship between excessive credit expansion (measured by a private sector debt-to-income ratio) and the origination of financial crises, among others

Mendoza, E.G. and Terrones, M.E. (2012)
An Anatomy of Credit Booms and their Demise,
NBER Working Papers **18379**

Schularick, M. and Taylor, A.M. (2012)
Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Crises,,
American Economic Review **102** , 1029-61

- but income inequality delivers a strong household credit demand side argument (percentile-specific debt-to-income ratio, percentile from income distribution), e.g.

Fazzari, S. and Cynamon, B.Z. (2013)
Inequality and household finance during the consumer age,
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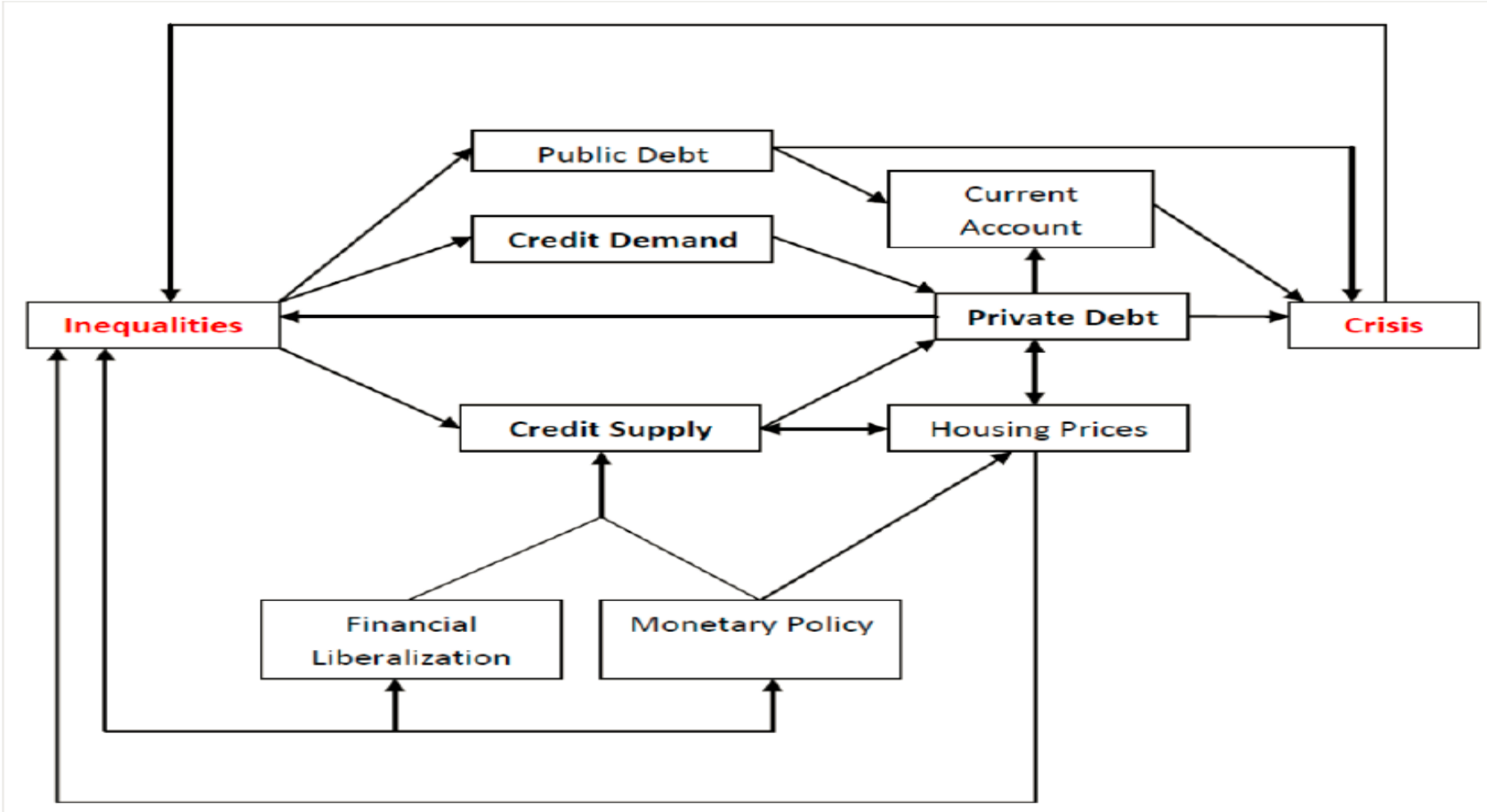
- that is why, from a sectoral perspective, we primarily look at a household credit-to-disposable-income ratio, but for comparison also at the aggregated one for the whole private sector

What are potential causes of the last crisis ? No simple solution.

Source: Evans (2014): Factors generating and transmitting the US financial crisis, WP45 of the EU granted project 'Financialisation, Economy, Society and Sustainable Development (FESSUD)'

What are potential causes of the last crisis ? No simple solution.

Figure 1: a complex tangle of mechanisms



Source: Bazillier and Héricourt (2014): The circular relationship between inequality, leverage, and financial crisis

Potential causes of the crisis - Transmission mechanism

Think about a state where credit demand and supply clear

There is a bunch of explanations starting from the credit supply side

- asset prices $\uparrow$ $=>$ collateral value $\uparrow$ $=>$ (bank) lending $\uparrow$ (Kiyotaki and Moore, 1997)
- financial deregulation (e.g. allowing for securitization) $\uparrow$ $=>$ off-balance sheet transactions $\uparrow$ $=>$ (bank) lending $\uparrow$ (Hein, 2009)
- expansionary monetary policy $\uparrow$ $=>$ cheap refinancing $\uparrow$ $=>$ lending $\uparrow$ (Taylor, 2010)
- excess saving (from abroad) $\uparrow$ $=>$ deposits $\uparrow$ $=>$ (bank) lending $\uparrow$ (Bernanke, 2005)

But there is not much on the credit demand side

- income inequality $\uparrow$ $=>$ people trying to compensate permanent income loss by debt (while the rich search for return) $\uparrow$ $=>$ lending $\uparrow$ (Post Keynesians; Rajan, 2010)
- asst prices $\uparrow$ $=>$ herding and irrational expectations make people to demand for the extra house to benefit from future prices (Campbell, 1998)

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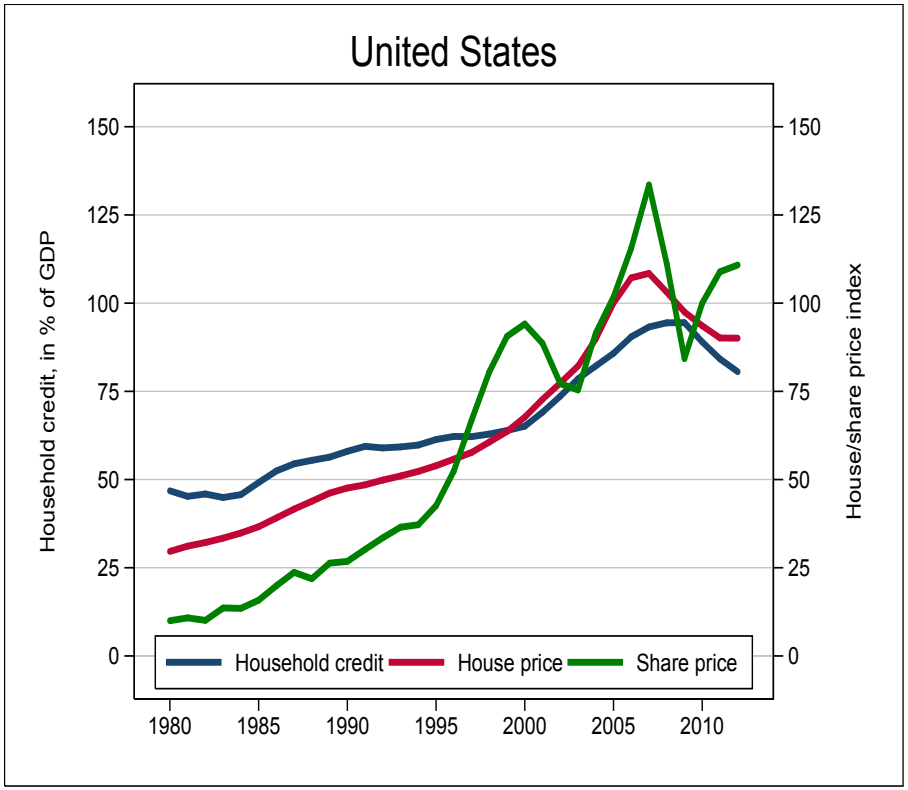
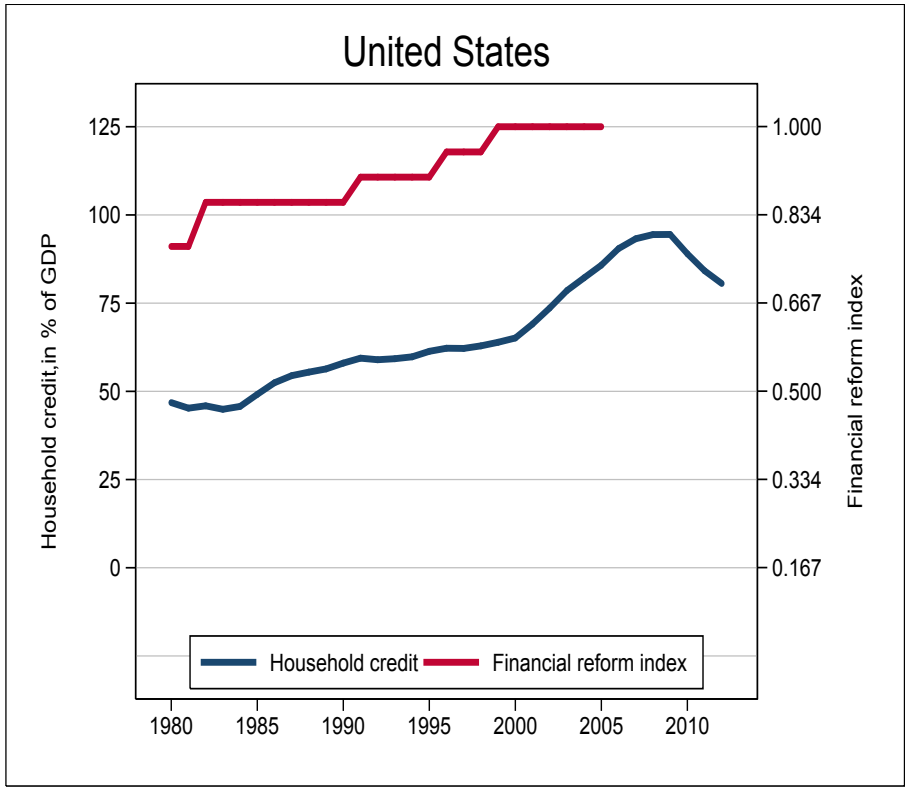
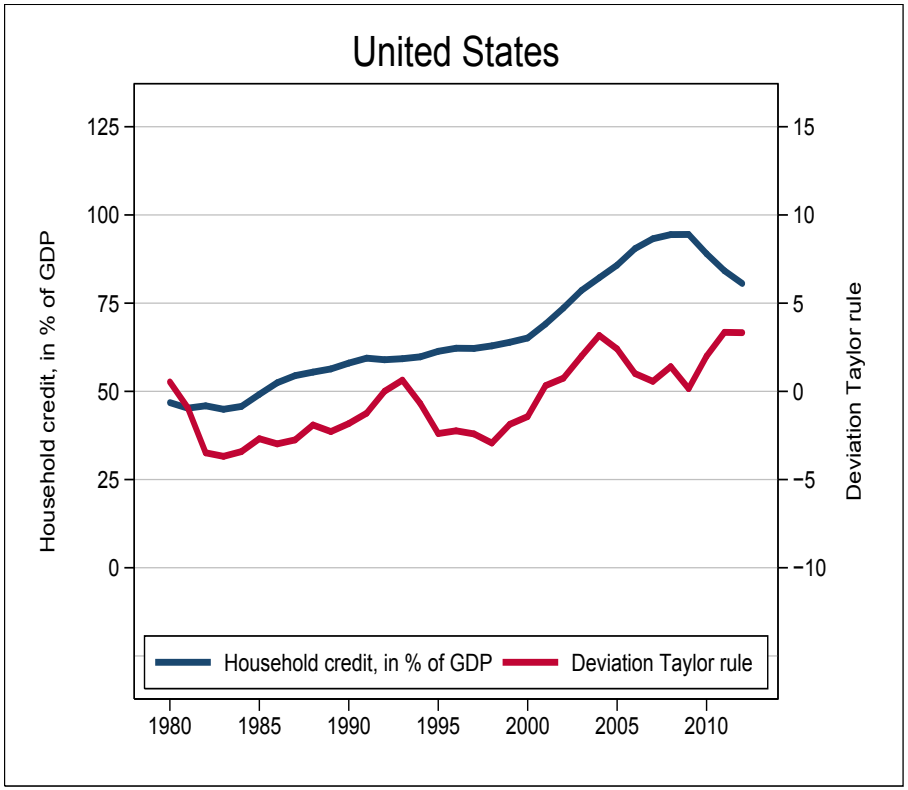
Potential causes of the crisis - US - Asset prices and Deregulation

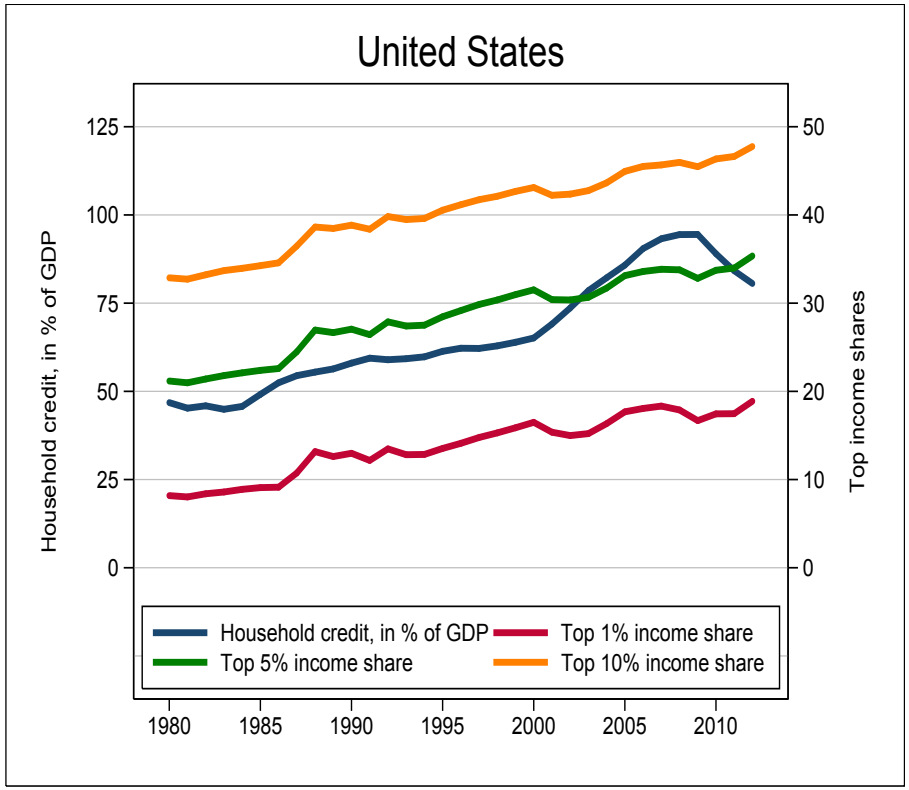




Data source: Bank for International Settlement, OECD Stock Price Index, Dallas Fed, IMF Financial Reform Index
Reference: Behringer / Stephan / Theobald (2015): What causes financial crises - the role of inequality revisited

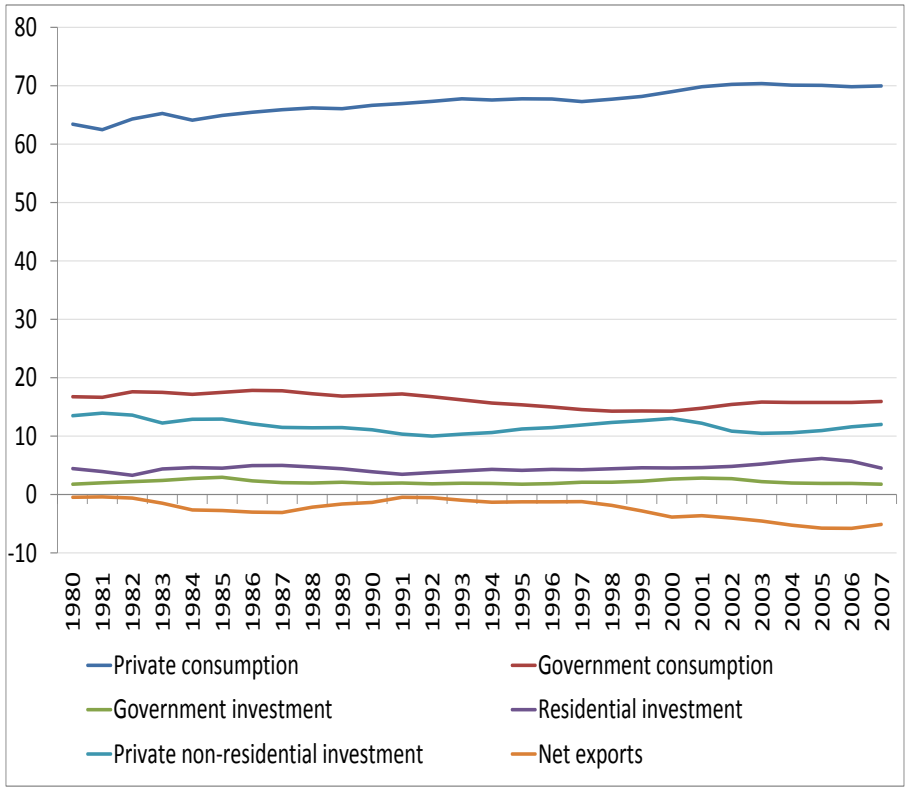
Potential causes of the crisis - US - Monetary policy and Inequality





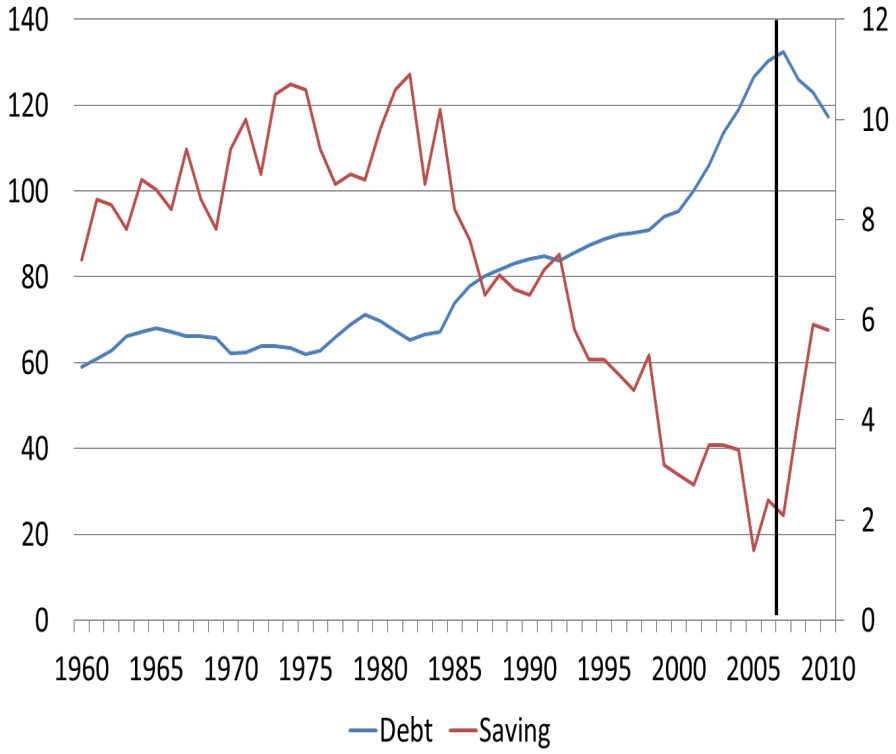
Data source: Bank for International Settlement, AMECO Data for standard Taylor rule, World Top Incomes Database
Reference: Behringer / Stephan / Theobald (2015): What causes financial crises - the role of inequality revisited

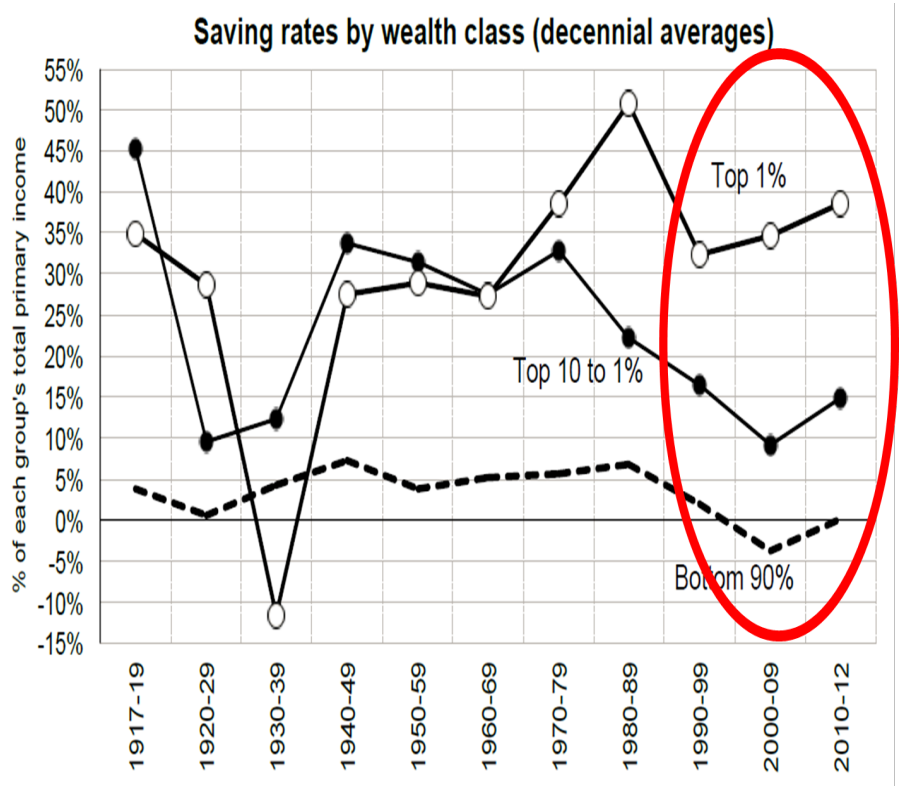
US: Top income shares and GDP by expenditure approach



left graph: in % of total GDP, right graph: in % of total pre-tax income
Source: World Top Incomes Database, National Income and Product Accounts

US: decline in saving and debt-financed consumption





left graph: debt(in % of household disposable income, left axis); savings rate(in % of household disposable income, right axis), right graph: savings rates by wealth decile from Saez and Zucman (2014) Wealth inequality in the United States since 1913
Source: BIS, National Income and Product Accounts, NBER Working Paper 20625.

A side note to the interaction between income and wealth on the basis of Piketty's (2014): Capital in the 21st century

Period	alpha (=P/Y)	Share of L T	M	U	r	g	Savings rates Total	T	M	U	s/g	beta (=W/Y) Total	T	M	U	Share of W T	M	U	Share of Y T	M	U
0	0.27	0.13	0.45	0.43	0.08	0.03	0.11	0.26	0.09	0.02	3.6	3.6	8.53	2.98	0.56	0.6	0.35	0.05	0.25	0.42	0.32
1	0.32	0.23	0.45	0.32	0.09	0.01	0.13	0.3	0.05	0.02	13	3.6	6.17	3.02	0.77	0.6	0.35	0.05	0.35	0.42	0.23
2	0.33	0.23	0.45	0.32	0.09	0.01	0.13	0.3	0.05	0.02	13.1	3.69	6.31	3.06	0.79	0.61	0.34	0.05	0.36	0.41	0.23
3	0.34	0.23	0.45	0.32	0.09	0.01	0.13	0.3	0.05	0.02	13.3	3.79	6.44	3.1	0.81	0.61	0.34	0.05	0.36	0.41	0.23
4	0.35	0.23	0.45	0.32	0.09	0.01	0.13	0.3	0.05	0.02	13.4	3.88	6.57	3.14	0.83	0.62	0.33	0.05	0.37	0.41	0.22
5	0.36	0.23	0.45	0.32	0.09	0.01	0.14	0.3	0.05	0.02	13.6	3.97	6.7	3.19	0.84	0.63	0.32	0.05	0.37	0.41	0.22
10	0.4	0.23	0.45	0.32	0.09	0.01	0.14	0.3	0.05	0.02	14.4	4.46	7.3	3.41	0.94	0.66	0.3	0.04	0.4	0.39	0.21
15	0.45	0.23	0.45	0.32	0.09	0.01	0.15	0.3	0.05	0.02	15.2	4.95	7.84	3.65	1.04	0.69	0.27	0.04	0.43	0.37	0.2
30	0.59	0.23	0.45	0.32	0.09	0.01	0.18	0.3	0.05	0.02	18	6.55	9.16	4.51	1.43	0.75	0.21	0.03	0.54	0.31	0.15
50	0.81	0.23	0.45	0.32	0.09	0.01	0.22	0.3	0.05	0.02	22.5	8.99	10.4	6.58	2.64	0.82	0.15	0.02	0.71	0.21	0.08
80	1.22	0.23	0.45	0.32	0.09	0.01	0.31	0.3	0.05	0.02	31.4	13.58	11.7	195.40	-2.9	0.9	0.09	0.01	1.05	0.01	-0.1
100	1.57	0.23	0.45	0.32	0.09	0.01	0.39	0.3	0.05	0.02	39.4	17.48	12.2	-5.02	-0.6	0.94	0.05	0.01	1.35	-0.2	-0.2
1000	45748	0.23	0.45	0.32	0.09	0.01	10962	0.3	0.05	0.02	####	508316	13.9	2.32	0.77	1.14	-0.1	-0	####	####	####

[1] N.B.: L=Wage income, P=Profits, Y=National income, W=Wealth, T=Top income households, M=Middle income households, U=Lower income households, r=Return on capital, g=Growth rate of national income, s=Savings rate.

Source: IMK calculations.

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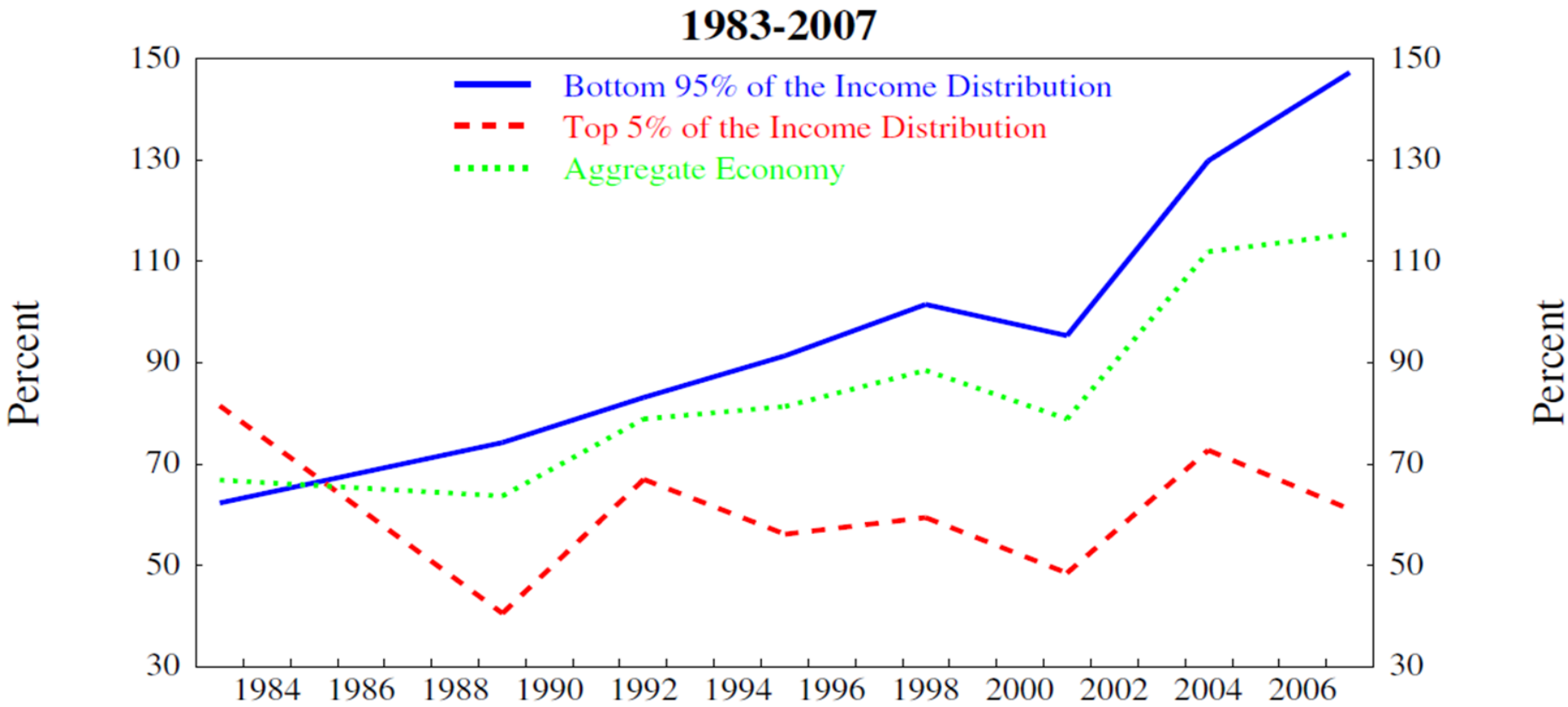
The baseline values are calibrated to guarante constant α, β ratios as well as income and wealth distributions.
Source: van Treeck / Behringer / Theobald (2014): Income and Wealth Distribution in Germany. IMK Report 99.

Decomposing US pre-crisis household leverage by income group

Figure 2. Debt-to-Income Ratios by Income Group



Source: Kumhof et al.(2012) Income inequality and current account imbalances

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(Mutilated) balance sheet matrix

		'Country of Interest (UK, GER)'			'Rest of the World'	
Assets and Liabilities	Currency	Households A 5% (+ firms)	Households A 95%	Banks A	Households B representing all	Σ
Deposits	A	$+m^A$		$-m^A$		0
Consumer loans	A		$-l^A$	$+l^A$		0
Foreign bonds	A,B	$+/-f^A$			$+/-f^B \times \chi_{AB}$	0
Capital stock	A	$+k^A$				k^A
	B				$+k^B$	k^B
Σ	A	$= w^{A5\%}$	$= -w^{A95}$	$= 0$		$= k^A + nfa^A$
	B				$= w^B$	$= k^B + nfa^B$

Investors maximize their expected lifetime utility function

$$E_0 \left(\sum_{t=0}^{\infty} \beta_t^i \left(\left(\frac{\left(c_t^i\right)^{\left(1-\frac{1}{\sigma^i}\right)}}{1-\frac{1}{\sigma^i}} \right) + \xi^d \log \left(d_t + \frac{\xi^f}{\xi^d} e_t f_t \right) + \xi^k \log \left(\kappa + k_t \right) \right) \right) \tag{1}$$

with respect to the following vector of variables

$$\left(c_t^i, d_t, f_t, k_t \right), \qquad t = 0 \ldots \infty \tag{2}$$

under the budget constraint

$$e_t f_t q_t^f + d_t q_t^d = e_t f_{t-1} + d_{t-1} + r_t^k k_{t-1} - p_t^{cons} c_t^i - p_t^{inv} I_t + \Pi_t^{bank}. \tag{3}$$

$$\beta^i_{t+1} E_t \left(\frac{\lambda_{t+1}}{\lambda_t q^d_t} \right) + \frac{\xi^d}{\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t \right) \lambda_t q^d_t} = 1$$

$$\beta^i_{t+1} E_t \left(\frac{\lambda_{t+1}}{\lambda_t} \frac{\frac{e_{t+1}}{e_t}}{q^f_t} \right) + \frac{\xi^f}{\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t \right) \lambda_t q^f_t} = 1$$

$$\beta^i_{t+1} E_t \left(\frac{\lambda_{t+1} \left(r^k_{t+1} + p^{inv}_{t+1} (1 - \delta) \right)}{\lambda_t p^{inv}_t} \right) + \frac{\xi^k}{(\kappa + k_t) \lambda_t p^{inv}_t} = 1 \tag{4}$$

$$\lambda^i_t = \frac{1}{p^{cons}_t c_t^{i\left(\frac{1}{\sigma^i}\right)}}$$

Workers maximize their expected lifetime utility function

$$E_0 \left(\sum_{t=0}^{\infty} \beta_t^w \left(\frac{(c_t^w)^{\left(1-\frac{1}{\sigma^w}\right)}}{1-\frac{1}{\sigma^w}} \right) \right) \tag{5}$$

with respect to the following vector of variables

$$(c_t^w, l_t) \tag{6}$$

under the budget constraint

$$l_t q_t = l_{t-1} + p_t^{cw} c_t^w - w_t. \tag{7}$$

leading to the following first order conditions

$$\begin{aligned} \beta_{t+1}^w E_t \left(\frac{\lambda_{t+1}}{\lambda_t q_t} \right) &= 1 \\ \lambda_t^w &= \frac{1}{{c_t^w}^{\left(\frac{1}{\sigma^w}\right)} p_t^{cw}}. \end{aligned} \tag{8}$$

Production follows a Cobb-Douglas function

$$y_t = A\left(\chi k_{t-1}\right)^{\alpha}\left(h_t\right)^{1-\alpha}. \tag{9}$$

Wages can, but do not have to be equal to the marginal product of labor derived as follows under normalization of labor supply and the population shares of workers being equal to $(1-\chi)$

$$\begin{aligned}\frac{\partial y_t}{\partial h_t} =: f_t^h &= A\left(\chi k_{t-1}\right)^{\alpha}(1-\alpha)\left(h_t\right)^{-\alpha}\frac{h_t}{h_t} \\ &= A\left(\chi k_{t-1}\right)^{\alpha}(1-\alpha)(1-\chi)^{-\alpha}\frac{1-\chi}{1-\chi} \\ &= \frac{(1-\alpha)y_t}{(1-\chi)}.\end{aligned} \tag{10}$$

Labor market can mostly be identified by some canonical (over-) simplified search and matching model. Workers' bargaining power is denoted by η. Under certain conditions the Nash bargaining solution that emerges will select an outcome that maximizes the product of the individual gains over the discordant wage.

$$\underset{\{w_t\}}{MAX} \qquad (\lambda_t^w w_t)^{\eta_t} \left(f_t^h - w_t\right)^{1-\eta_t} =: G, \tag{11}$$

whereby $\left(f_t^h - w_t\right)$ denotes investors' surplus which is identified by the difference between the marginal product of labor and the wage. Hence, the first order condition will be $\eta_t f_t^h = w_t$.

r_t^k, the profit rate, is obtained residually, i.e.

$$r_t^k = \frac{y_t - w_t\left(1-\chi\right)}{\chi k_{t-1}} \tag{12}$$

In the following the bargaining power η is assumed to follow some autogressiv stochastic process that is given by

$$\eta_t = \left(1-\rho\right)\tilde{\eta} + \rho\eta_{t-1} + \epsilon_t, \quad \text{with} \quad \epsilon_t^{\eta} \overset{i.i.d.}{} N\left(0, \sigma^{\eta}\right). \tag{13}$$

Investment and consumption goods are produced out of domestic and foreign intermediate goods which altogether makes the trading technology looks like

$$I_t = \left(I_t^h\right)^{\gamma} \left(I_t^f\right)^{1-\gamma}, \tag{14}$$

so that prices in the model are only dependent on the exchange rate given a certain degree of preferred home production (home bias), i.e.

$$p_t = \gamma^{-\gamma} \left(1-\gamma\right)^{-(1-\gamma)} e_t^{1-\gamma}. \tag{15}$$

A similar production procedure applies to the goods consumed by investors or consumers.

Foreign agents are representative and maximize their expected lifetime function

$$E_0 \left(\sum_{t=0}^{\infty} \beta_t^* \left(\left(\frac{(c_t^*)^{\left(1-\frac{1}{\sigma^*}\right)}}{1-\frac{1}{\sigma^*}} \right) + \xi_f^* \log\left(\kappa_f^* + f_t^*\right) + \xi_k^* \left(\kappa_k^* + k_t^*\right) \right) \right) \tag{16}$$

with respect to the following vector

$$(c_t^*, f_t^*, k_t^*), \qquad t = 0, \ldots, \infty \tag{17}$$

under the budget constraint

$$f_t^* = f_{t-1}^* + r_t^{k^*} k_{t-1}^* + w_t^* - p_t^{cons^*} c_t^* - p_t^{inv^*} I_t^*. \tag{18}$$

Banks are monopolistically competitive in the loans market, where each bank makes loans in the amount of $l_t(z)$ at (theoretically different) gross interest rates $1/q_t(z)$. The aggregate credit bundle, demanded by borrowers, follows a Dixit-Stiglitz form:

$$l_t = \left(\int_0^1 l_t(z)^{\frac{1}{\theta+1}} dz \right)^{\theta+1}, \tag{19}$$

Rewritting leads to the following constraint

$$l_t(z) = \left(\frac{q_t(z)}{q_t} \right)^{\theta+1} l_t \tag{20}$$

under which banks maximize their profit

$$\Pi = \frac{1}{q_t(z)} l_t(z) - \frac{1}{q_t^d} l_t(z) \tag{21}$$

with respect to $q_t(z)$ which in turn delivers for profits

$$\Pi = q_t(z)^{\theta} q_t^{(-\theta-1)} l_t - q_t(z)^{(\theta+1)} q_t^{(-\theta-1)} l_t \frac{1}{q_t^d}. \tag{22}$$

Optimization of profits delivers

$$\frac{\partial \Pi^{single}}{\partial q_t(z)} = \frac{q_t(z)^{\theta}\,\theta q_t^{(-\theta-1)} l_t}{q_t(z)} - \frac{q_t(z)^{(\theta+1)}\,(\theta+1)\,q_t^{(-\theta-1)} l_t}{q_t^d q_t(z)} \stackrel{!}{=} 0$$
$$\Leftrightarrow \frac{1}{q_t} = \frac{\theta+1}{\theta}\frac{1}{q_t^d} = \frac{1}{q_t^d} s. \tag{23}$$

Also the spread s is assumed to follow some autogressiv stochastic process that is given by

$$s_t = (1-\rho)\,\tilde{s} + \rho s_{t-1} + \epsilon_t, \quad \text{with} \quad \epsilon_t \overset{i.i.d.}{\sim} N(0,\sigma). \tag{24}$$

Bank profits (here as a fraction of deposits) are given by

$$\Pi_t^{bank} = d_t\left(q_t^d - q_t\right). \tag{25}$$

With respect to financial markets clearing condition, credit amounts lent by domestic investors to domestic workers must be equal to the bank deposits (national bank balances check)

$$\chi d_t = (1-\chi)\,l_t. \tag{26}$$

International credit amounts must find their offsetting item, while all credit transactions are intermediated by domestic investors

$$w\chi f_t = -(1-w) f_t^*. \tag{27}$$

A, A^* set national output to a certain level, e.g. equal to 1. Hence, to reproduce the world's output (or income) shares, one multiplies domestic variables by the factor w and foreign variables by $1-w$ for a rest of the world perspective. The following identities decompose home and foreign output into consumption, investment and gross exports:

$$wy_t = w\chi\left(c_t^{ih} + I_t^h\right) + w\left(1-\chi\right)c_t^{wh} + \left(1-w\right)\left(c_t^{h^*} + I_t^{h^*}\right) \tag{28}$$

$$\left(1-w\right)y_t^* = \left(1-w\right)\left(c_t^{f^*} + I_t^{f^*}\right) + w\chi\left(c_t^{if} + I_t^{if}\right) + w\left(1-\chi\right)c_t^{wf} \tag{29}$$

Net exports from home perspective are equal to domestic export minus foreign exports

$$\left(1-w\right)\left(c_t^{h^*} + I_t^{h^*}\right) - w\left(\chi\left(c_t^{if} + I_t^f\right) + \left(1-\chi\right)c_t^{wf}\right)e_t \tag{30}$$

Considering gross interest payments on foreign bonds one obtaines for the identity between international financial and trading flows

$$\begin{aligned} w\chi\left(e_t f_t q_t^f - e_t f_{t-1}\right) &= \left(1-w\right)\left(c_t^{h^*} + I_t^{h^*}\right) - w\left(\chi\left(c_t^{if} + I_t^f\right) + \left(1-\chi\right)c_t^{wf}\right)e_t \\ \Leftrightarrow \chi e_t f_t q_t^f &= \chi e_t f_{t-1} + \frac{\left(1-w\right)}{w}\left(c_t^{h^*} + I_t^{h^*}\right) - e_t w\left(\chi\left(c_t^{if} + I_t^f\right) + \left(1-\chi\right)c_t^{wf}\right) \end{aligned} \tag{31}$$

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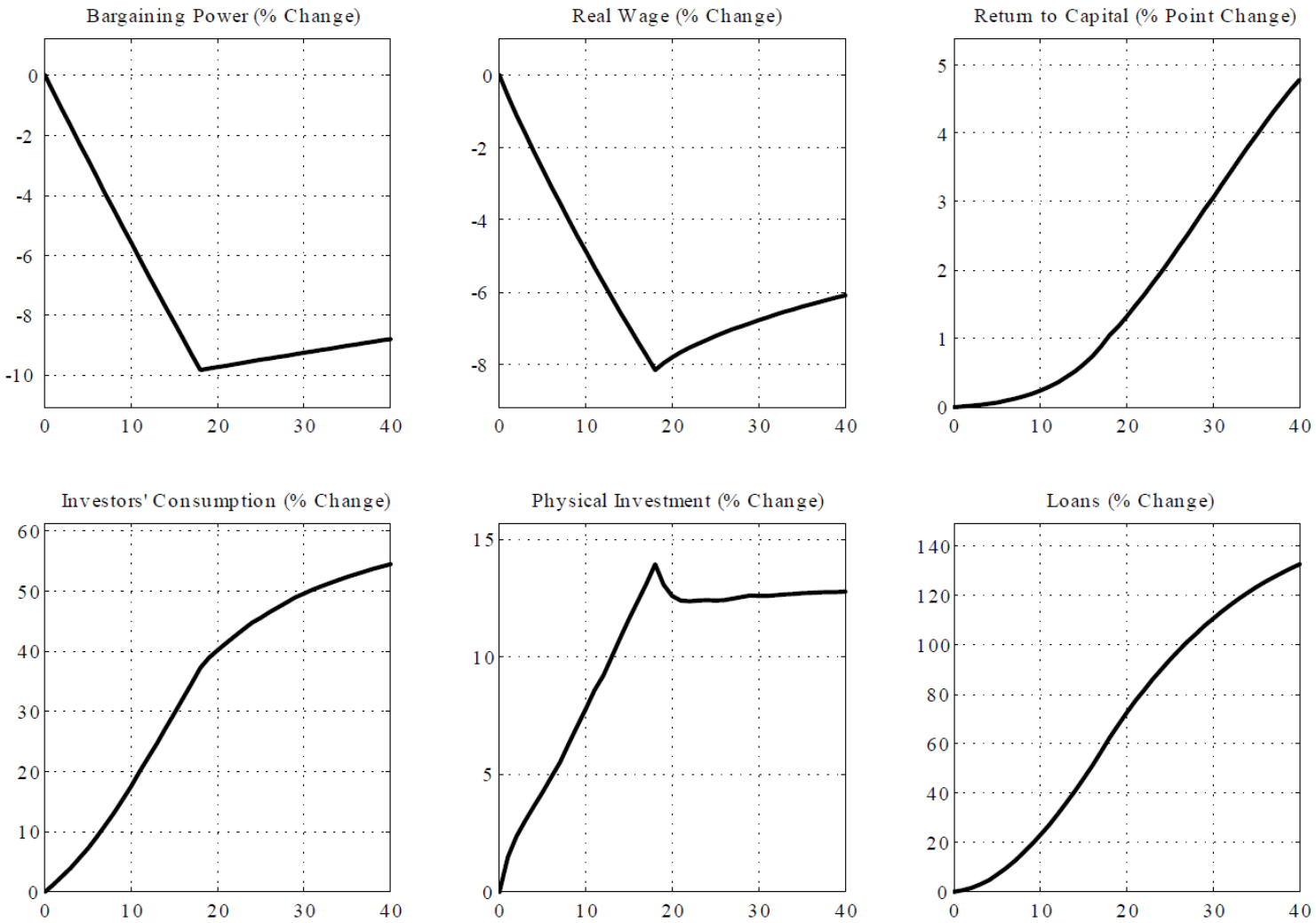
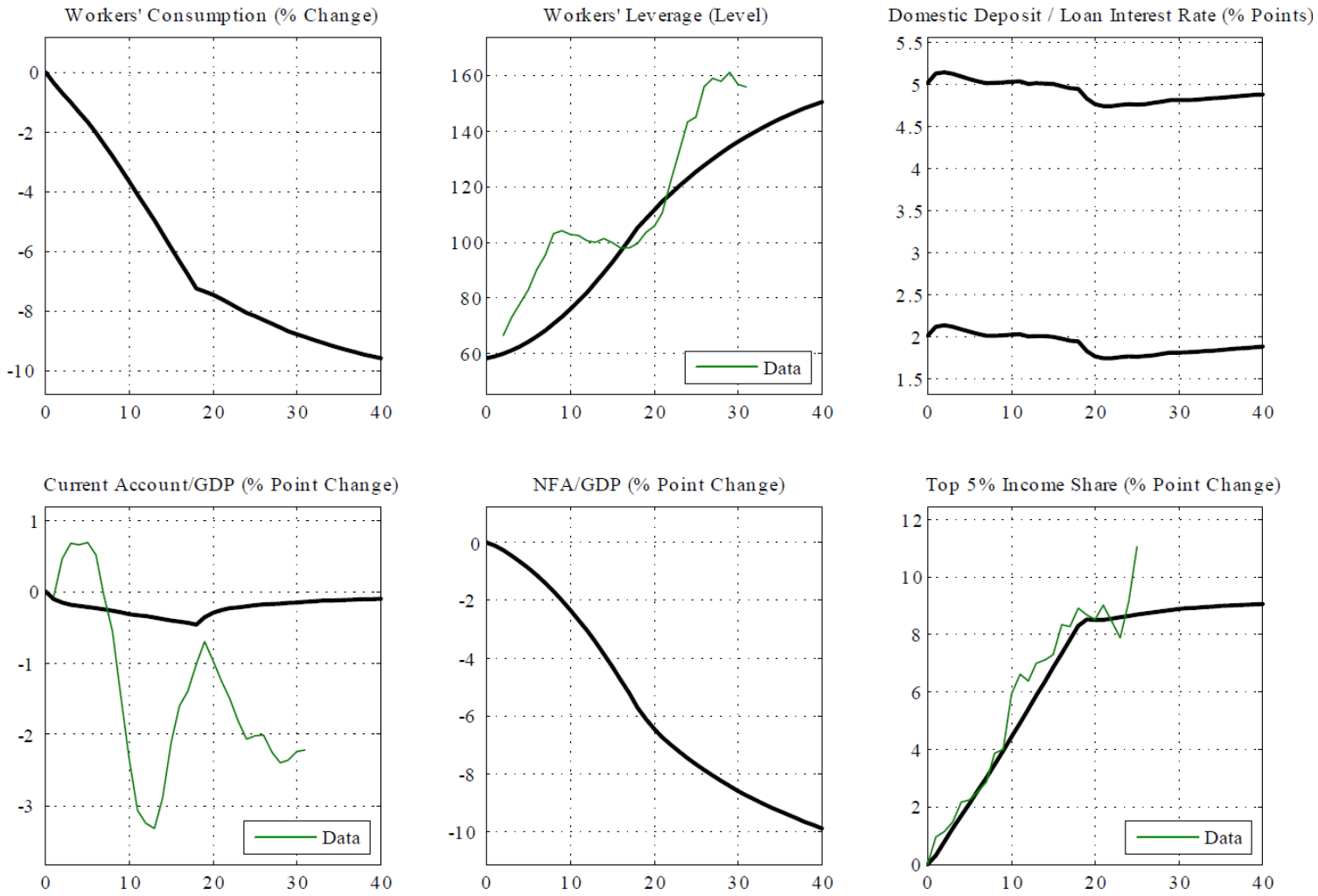
UK inequality scenario (bargaining power -8 % over 20 years)

Figure 6. Increased Inequality



Source: Kumhof et al.(2012) Income inequality and current account imbalances, IMF Working Paper 12/08

UK inequality scenario (bargaining power -8 % over 20 years)



Source: Kumhof et al.(2012) Income inequality and current account imbalances, IMF Working Paper 12/08

Policy Implications

- 'There is no way around addressing the income inequality directly' (Kumhof et al., 2012)
- not only from a social fairness and fairness of opportunities perspective, but also from a macroeconomic stability perspective. Possible instruments are
- strengthening workers bargaining power over wages via labour unions
- taxing income more progressively
- (re-)introducing progressive wealth taxes (Piketty, 2014)

Outline - Block I:

Einkommensungleichheit als Krisenursache (Credit)

1. Theoretische Wirkungsweisen möglicher Krisenursachen
2. Stylized Facts - USA pre-crisis time
3. Das Kumhof et al. (2012) DSGE zur Erklärung der US Dynamik
4. Simulation und Politikempfehlung
5. **Ein alternativer Erklärungsansatz über die Relative Einkommenshypothese**

An alternative explanation by expenditure cascades

- Milton Friedman's permanent income hypothesis can only explain the fact that US consumption of low and middle income class households did not decline before crisis, if those income changes were purely transitory
- Keynesians would traditionally expect the aggregate household saving rate to rise, as inequality increases
- However, models with upward-looking status comparisons (as a specific type of the relative income hypothesis by James Duesenberry) predict a negative link between inequality and the aggregate saving rate
- This is not about eccentric luxury consumption, but basic middle class needs (private financing of important positional goods such as education, housing, health care, etc. in the U.S.)

Source: Sturn / van Treeck (2012) Income inequality as a cause of the Great Recession

An alternative explanation by expenditure cascades

- The impact of expenditure cascades depends on country-specific institutions. For instance, in countries with relatively strong public infrastructure such effects will be limited
- The alternative is modelled in the tradition of the stock-flow consistent (SFC) approach by W. Godley / M. Lavoi (2007), which 'studies how flows of income, expenditure and production are intertwined with stocks of assets and liabilities determining how whole economies evolve through time'
- Unfortunately sofar, no explicit consideration of forward-looking behaviour (expectations), but fully calibrated / partly estimated to US, German, and Chinese data

Source: Belabed / Theobald / van Treeck (2013) Income distribution and current account imbalances

Modeling the relative income hypothesis in a SFC

Consumption and the Relative income hypothesis

Consumption of top 10 percent households:

$$c^{1,j} = o^{1,j} \cdot v_h^{1,j} + \kappa \cdot \left(1 + g^j\right) \cdot yd_{t-1}^{1,j}; \qquad j \quad = A, B, C \tag{32}$$

Consumption of bottom 90 percent households under upward looking status comparisons:

$$c_{de}^{i,j} = o^{i,j} \cdot v_h^{i,j} + \kappa \cdot \left[1 - \left(\alpha_0 - \alpha_1^j\right)\right] \cdot (1 + g^j) \cdot yd_{t-1}^{i,j} + \left(\alpha_0 - \alpha_1^j\right) \cdot \left(1 + g^j\right) \cdot c_{t-1}^{i-1,j} \tag{33}$$
$$i = 2, \ldots, 10 \qquad j = A, B, C$$

- Calibration of α_1^j: Influenced by institutional environment, e.g. provision of public infrastructure (schools, health care, social transfers) and labor market specifications (firm-specific skills, labor market mobility)
- Variables: c_{de} Desired level of consumption; $v_h^{i,j}$ Decile-specific wealth; $yd_{t-1}^{i,j}$ Decile-specific disposable income; $c_{t-1}^{i-1,j}$ Consumption of reference group
- Parameters: o Marginal propensity to consume out of wealth; κ Propensity to consume out of income; α_0 natural rate of imitation; α_1^j household-specific penalty term; g^j Growth rate

Modeling the relative income hypothesis in a SFC

Current account and household financial balance

$$ca^j = nx^j + \left[\left(r^j_{lh} \cdot l^{jn}_{h,d,t-1} \cdot xr^{jn}\right) + \left(r^j_{lh} \cdot l^{jk}_{h,d,t-1} \cdot \frac{1}{xr^{jk}}\right) - \left(r^n_{lh} \cdot l^{nj}_{h,d,t-1}\right) - \left(r^k_{lh} \cdot l^{kj}_{h,d,t-1}\right)\right] \quad (34)$$

$$j,k,n = A, \ldots, C \qquad with \qquad j \neq n \qquad and \qquad j \neq k$$

- Variables: ca^j Current account; nx^j Net exports; r^j_{lh}, r^k_{lh}, r^n_{lh} interest rate on household loans; $l^j_{h,d}$ Household loans; xr^{jn}, xr^{jk} Exchange rates

Effects on the current account

- Consider an increase in personal income inequality triggering expenditure cascades
- Consumption and imports rise and net exports will fall
- Given sufficient access to credit, part of consumption will be debt-financed
- Interest payments for consumer loans from foreign banks will increase
- All effects will have a negative impact on current account

Source: Belabed / Theobald / van Treeck (2013) Income distribution and current account imbalances

Outline - Block II:

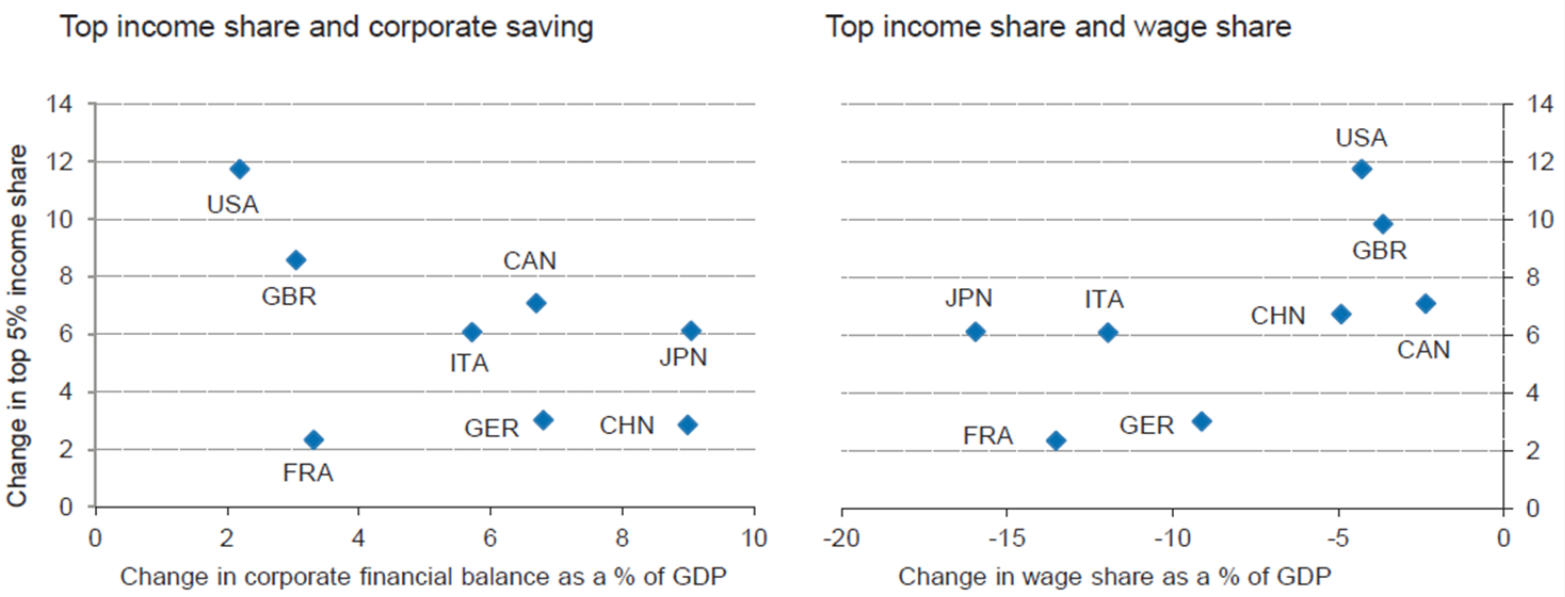
Einkommensungleichheit als Krisenursache (Current Account)

1. **Was ist der Unternehmensschleier (Corporate Veil) ?**
2. Stylized Facts - GER pre-crisis time
3. Das Grüning et al. (2012) DSGE zur Berücksichtigung der deutschen Dynamik
4. Simulation und Politikempfehlung
5. Stilisierte Zusammenfassung unterschiedlicher Schocks auf die Einkommensverteilung

The link between functional and personal income measures

FIGURE BOX 1.2

Correlation between personal and functional income distribution



The illustrations show the correlation between measures of personal and functional income distribution for the G7 and China. All figures relate to the period 1980/3 – 2004/7 (four-year averages) except for the UK (1984/7 – 2004/7) and China (1992/5 – 2000/3).

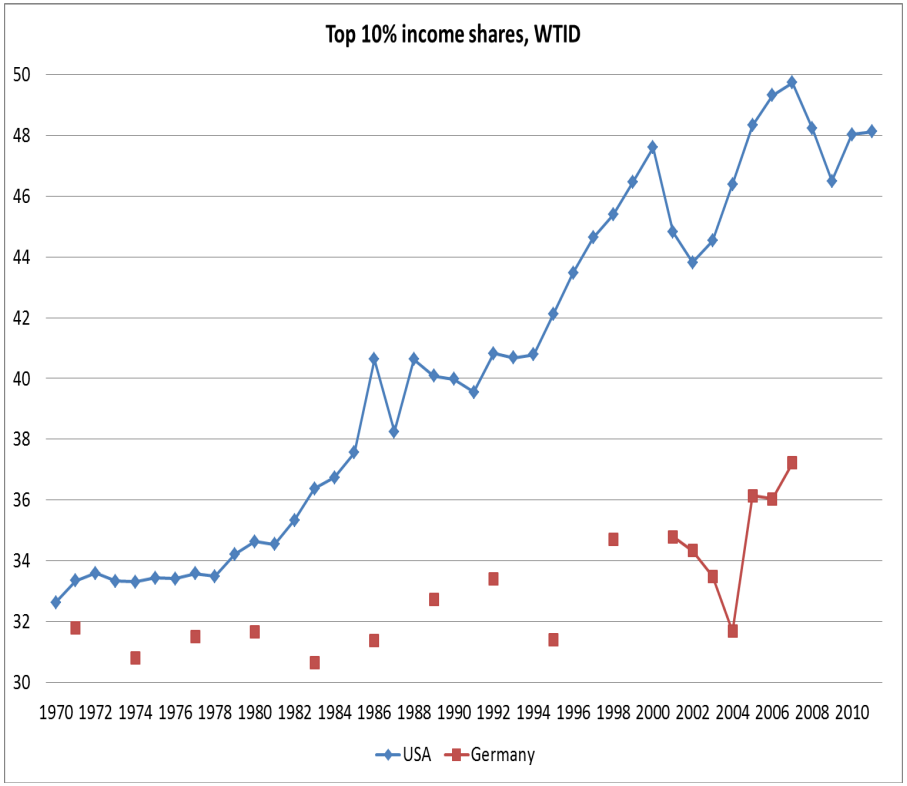
CAN = Canada; CHN = China; GER = Germany ; FRA = France; GBR = Great Britain; ITA = Italy; ; JPN = Japan; USA = USA

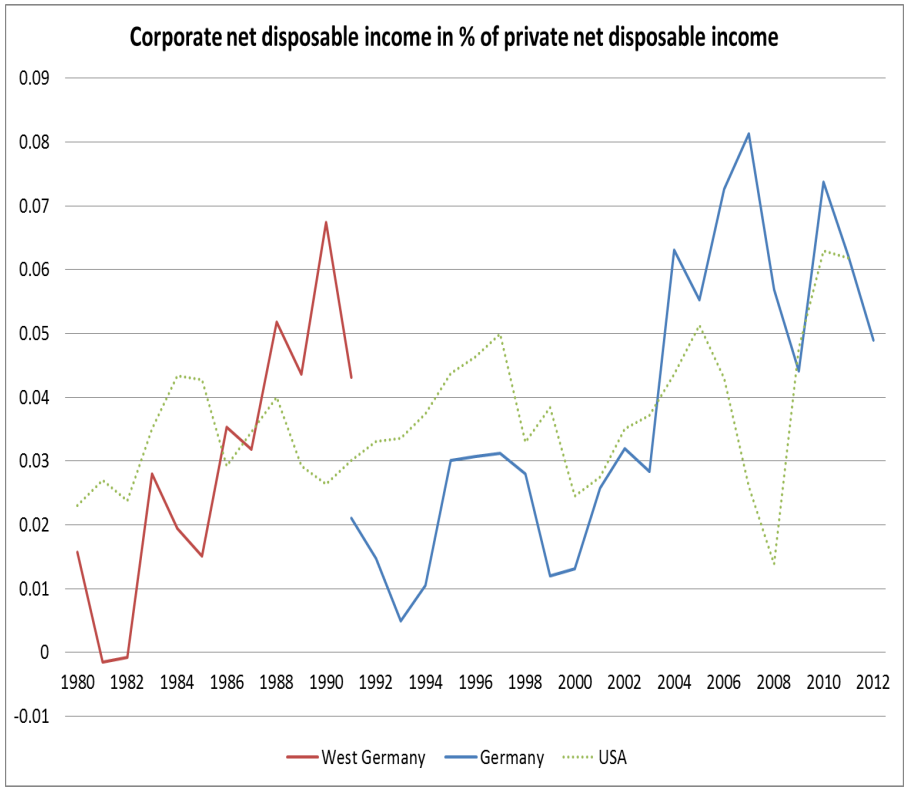
Source: IMK calculations.

IMK

Source: Behringer / van Treeck (2013) Income distribution and current account: A sectoral perspective

The German case - distinguishing between personal/functional income





Source: Grüning / Theobald / van Treeck (2015) Inequality and Germany's current account surplus

The macroeconomic implications of the corporate veil

The 'corporate veil'

- hides the rise in inequality between households
- restraints domestic demand (rising retained profits are not spent)
- limits the pressure put on the middle class to engage in debt-financed consumption
- enlarges the current account surplus
- increases global financial fragility
  (World Current Account Balance = 0 !!!)

Source: Sturn / van Treeck (2012) Income inequality as a cause of the Great Recession

Outline - Block II:

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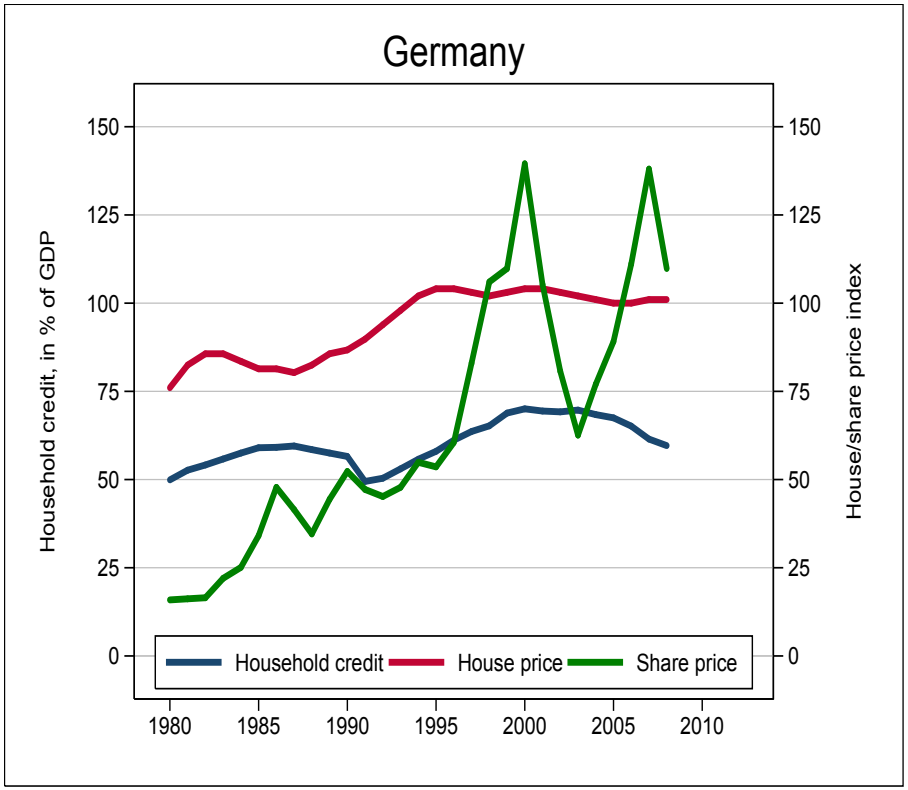
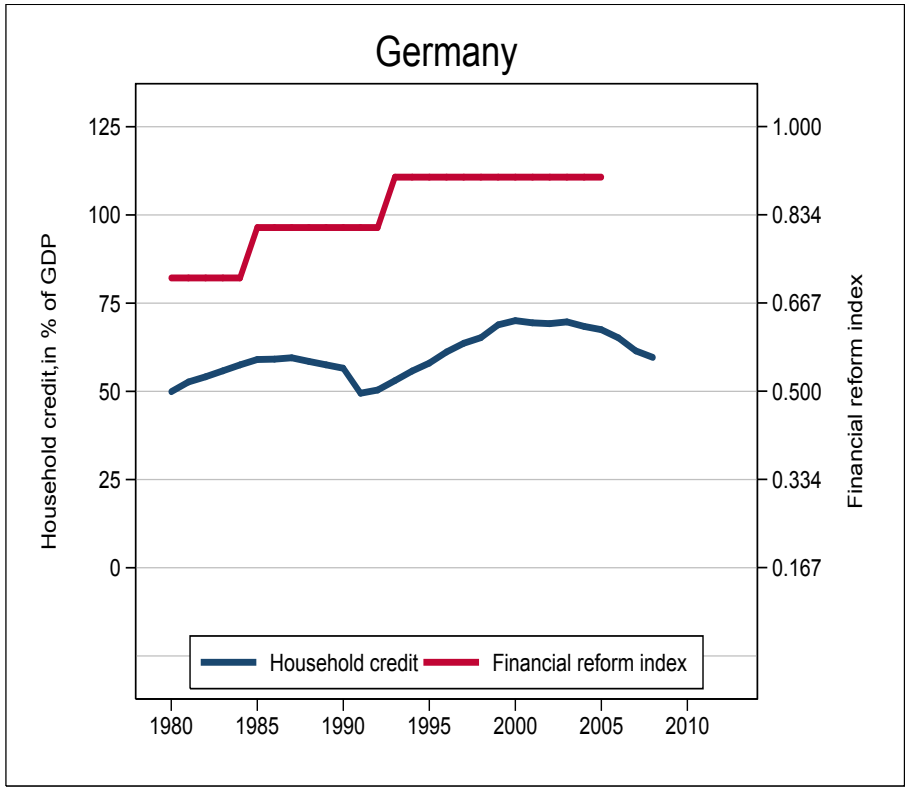
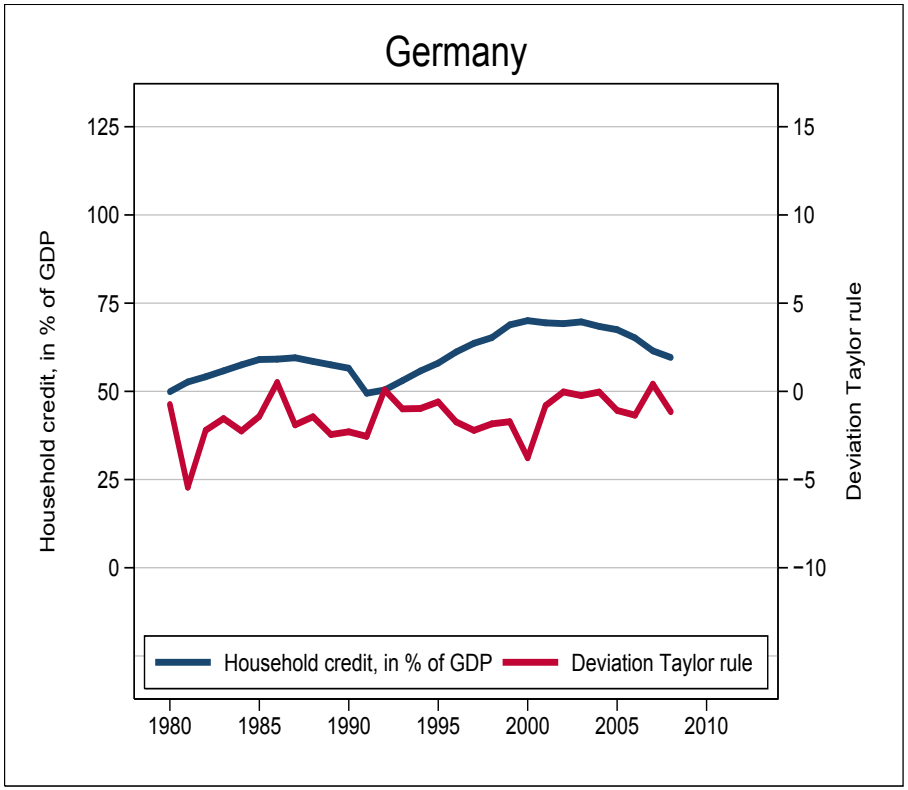
Potential causes of the crisis - GER - Asset prices and Deregulation

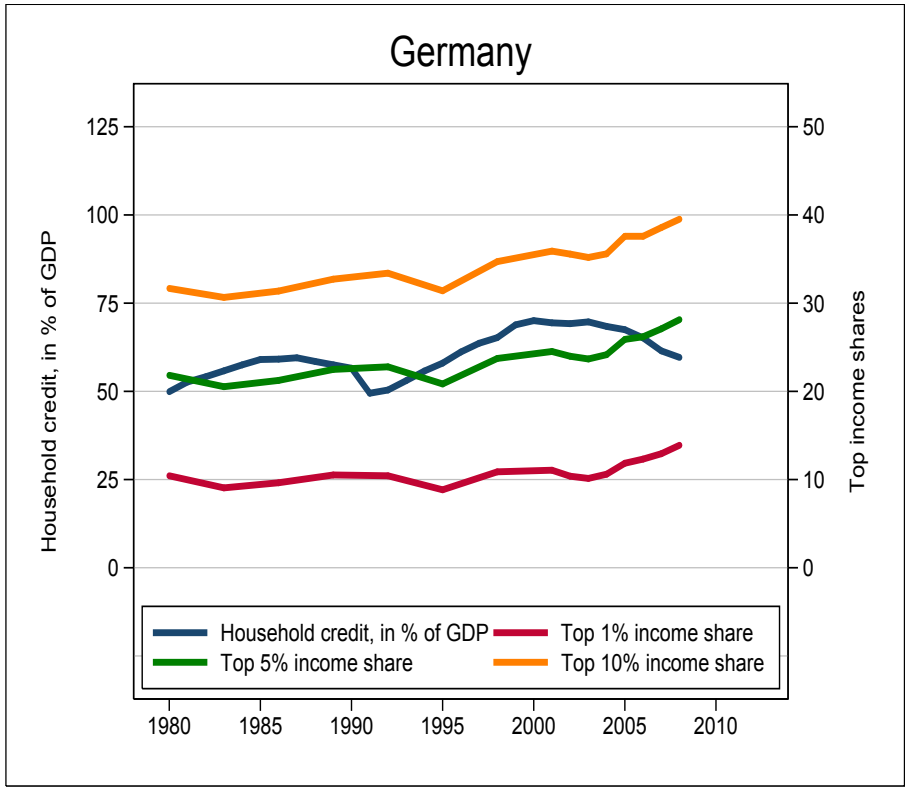




Data source: Bank for International Settlement, OECD Stock Price Index, Dallas Fed, IMF Financial Reform Index
Reference: Behringer / Stephan / Theobald (2015): What causes financial crises - the role of inequality revisited

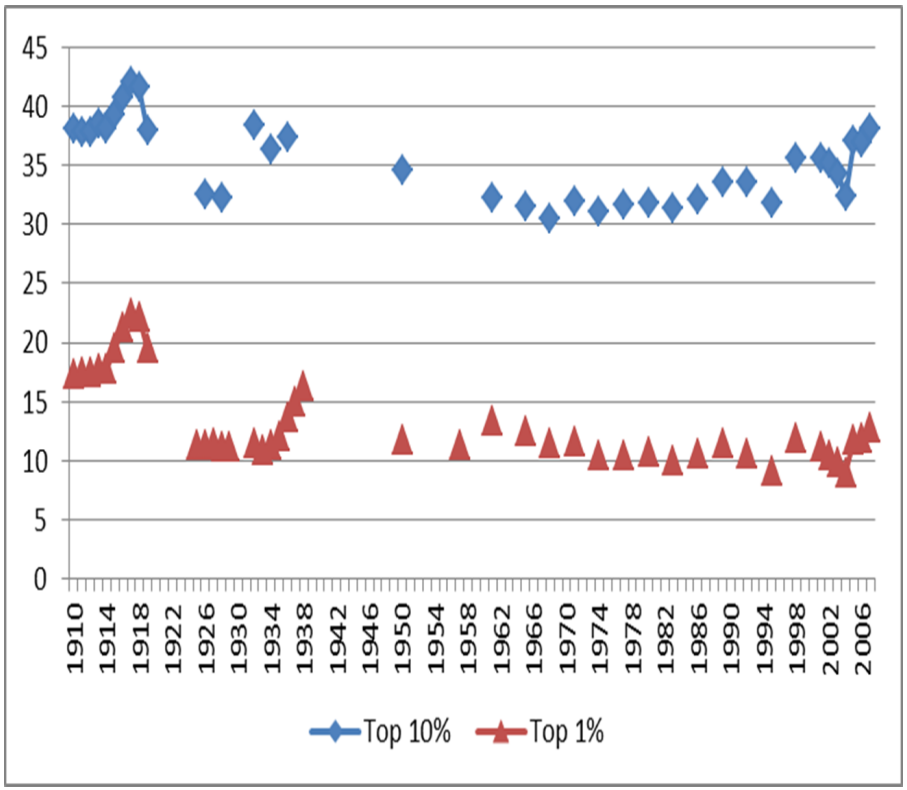
Potential causes of the crisis - GER - Monetary policy and Inequality

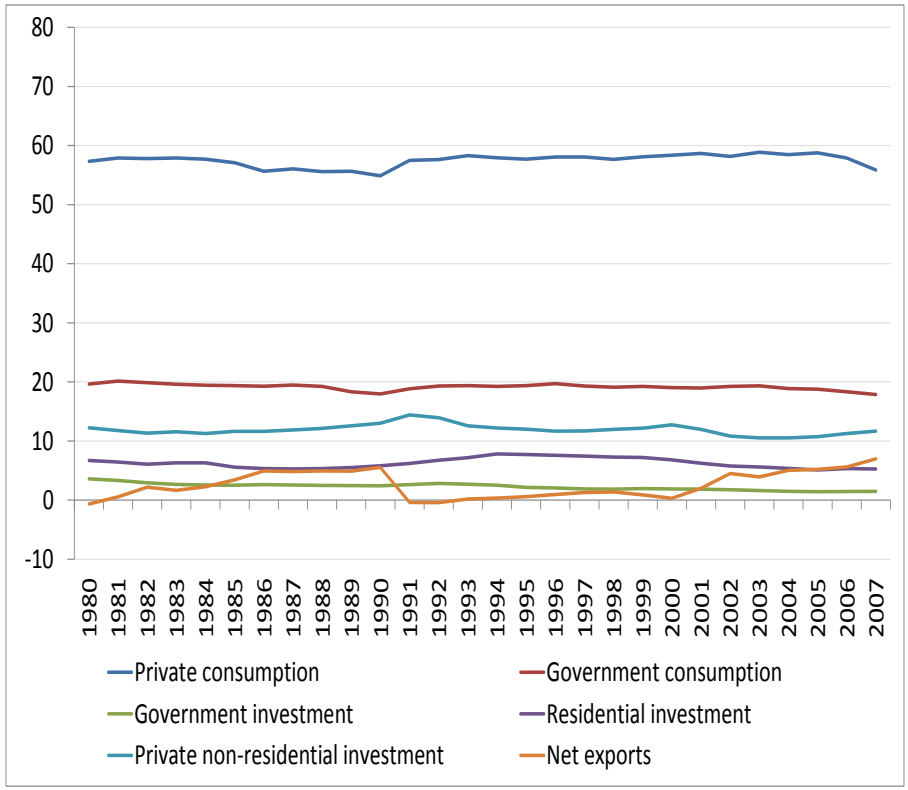




Data source: Bank for International Settlement, AMECO Data for standard Taylor rule, World Top Incomes Database
Reference: Behringer / Stephan / Theobald (2015): What causes financial crises - the role of inequality revisited

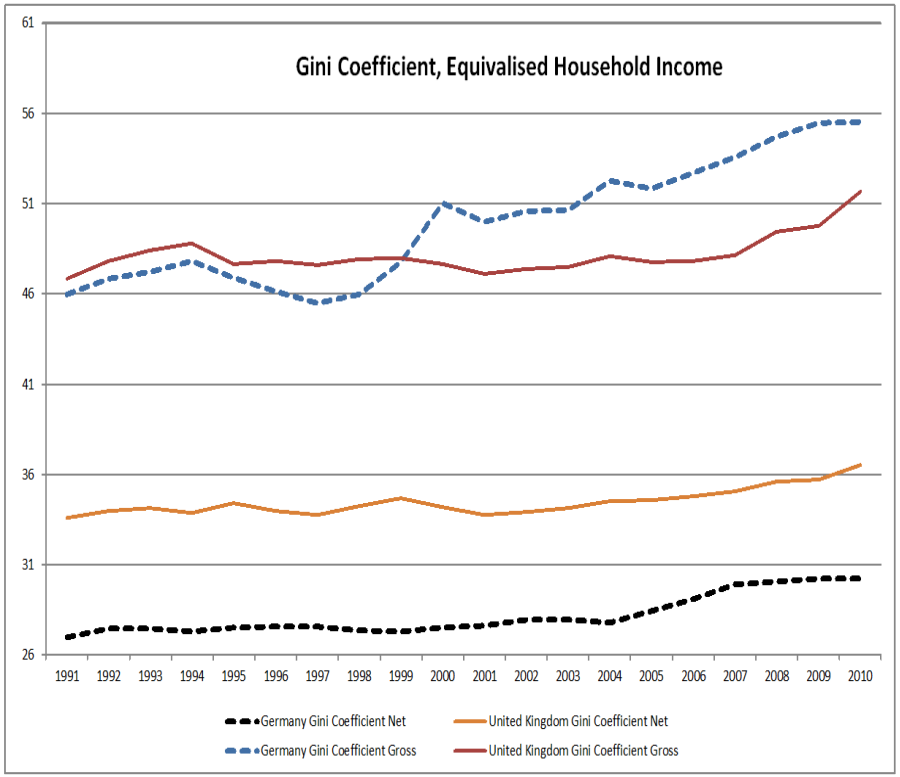
GER: Top income shares and GDP by expenditure approach

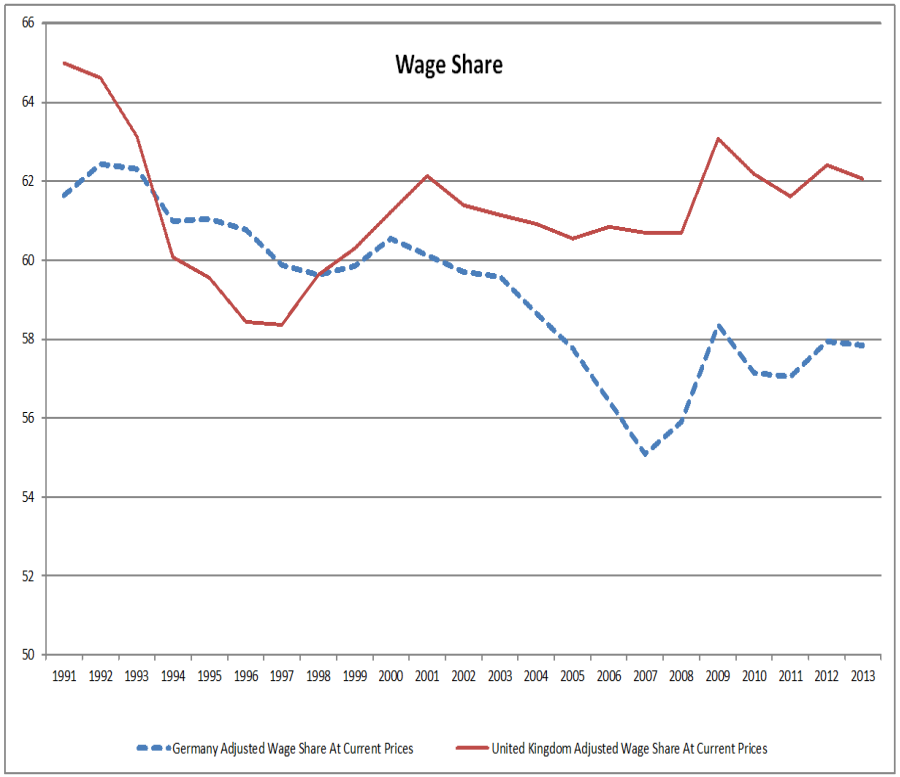




left graph: in % of total GDP, right graph: in % of total pre-tax income
Source: World Top Incomes Database, Volkswirtschaftliche Gesamtrechnung

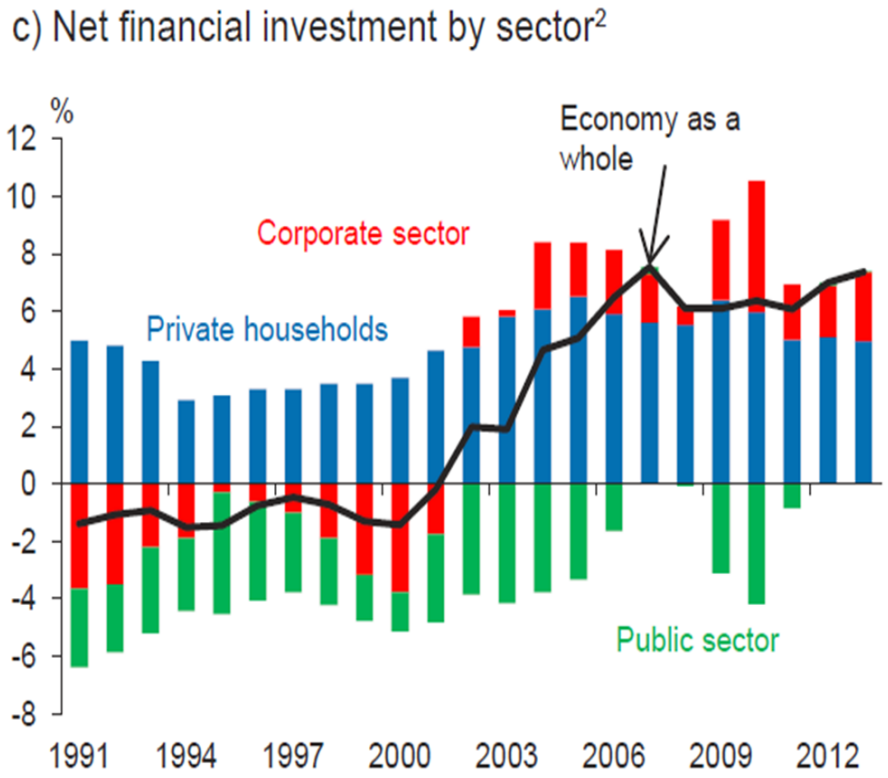
GER / UK comparison: GINI coefficient and wage share

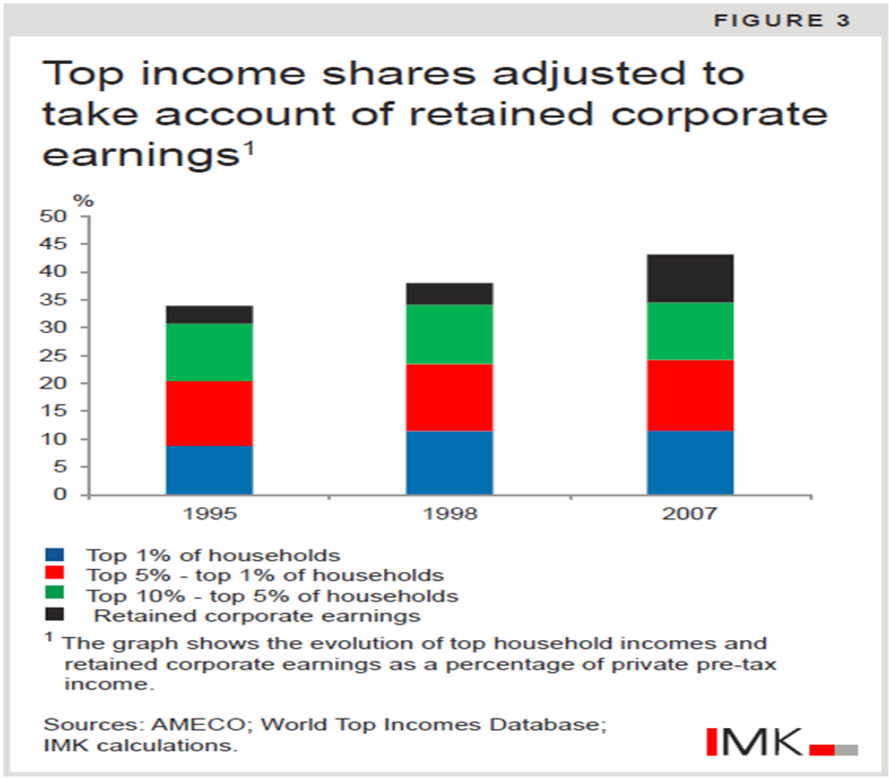




Source: Grüning / Theobald / van Treeck (2015) Inequality and Germany's current account surplus

Why do entrepreneur households save so much via their company ?





left graph: Decomposing Germany's current account by sector based on flow of funds data.
right graph: Hypothetical top income shares based on the rough assumptions that all retained earnings belong to the 10 % income households.
Source: Behringer / Theobald / van Treeck (2014) Income and Wealth Distribution in Germany - A macroeconomic perspective

Outline - Block II:

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1. Was ist der Unternehmensschleier (Corporate Veil) ?
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Investors maximize lifetime utility

$$E_0\left(\sum_{t=0}^{\infty}\beta_t^i\left(\xi_c^{\left(1-\frac{1}{\sigma^i}\right)}\left(\frac{\left(c_t^i\right)^{\left(1-\frac{1}{\sigma^i}\right)}}{1-\frac{1}{\sigma^i}}\right)+\log\left(d_t+\frac{\xi^f}{\xi^d}e_t f_t\right)\right)\right) \tag{35}$$

with respect to the vector $\left(c_t^i, d_t, f_t\right)$ subject to their budget constraint given by

$$e_t f_t q_t^* - e_t f_{t-1} + d_t q_t^d - d_{t-1} = r_t^k k_{t-1} + \Pi_t^{bank} - p_t^{cons_i} c_t^i - p_t^{inv}\left(k_t - (1-\delta)\, k_{t-1}\right) \tag{36}$$

In contrast to Kumhof et al.(2012) we do not presume a constant consumption utility weight. A higher ξ_c stands for lower investors consumption:

$$\xi^c := \xi_c^1 + \xi_c^2 winc_t \tag{37}$$

with worker income $winc_t = w_t - (1-q_t)\, l_t$ and w standing for the wages, q for the credit rate and l for the credit amount. Hence because of less change in the wage share (but more change in top income share), ξ_c^2 will be higher in the British scenario.

Straightforward Lagrangian optimization delivers first order conditions for domestic deposits, foreign bonds, and investor consumption:

$$\left(\beta^i\right)^{t+1} E_t\left(\frac{\lambda_{t+1}}{\lambda_t q_t^d}\right) + \frac{\xi^d}{\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t\right)\lambda_t q_t^d} = 1$$

$$\left(\beta^i\right)^{t+1} E_t\left(\frac{\lambda_{t+1}}{\lambda_t}\frac{\frac{e_{t+1}}{e_t}}{q_t^f}\right) + \frac{\xi^f}{\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t\right)\lambda_t q_t^f} = 1 \tag{38}$$

$$c_t^i = \left(\frac{1}{\lambda_t^i p_t^{cons}}\right)^{\sigma^i} (\xi_t^c)^{\sigma^i - 1}, \qquad \sigma^i < 1.$$

Workers maximize lifetime utility

$$E_0\left(\sum_{t=0}^{\infty} (\beta^w)^t \left(\frac{(c_t^w)^{\left(1-\frac{1}{\sigma^w}\right)}}{1-\frac{1}{\sigma^w}}\right)\right) \tag{39}$$

with respect to the vector (c_t^w, l_t) subject to their budget constraint

$$l_t q_t = l_{t-1} + p_t^{cw} c_t^w - w_t. \tag{40}$$

l denotes the amount of credit supplied by banks.

Investors own both banks and firms and do not receive any income from wages. q is the credit rate and q_t^d denotes the deposit interest rate so that bank profits are given by

$$\Pi_t^{bank} = d_t \left(q_t^d - q_t \right). \tag{41}$$

Physical capital accumulation is defined by the usual accumulation $k_t = I_t + (1-\delta) k_{t-1}$, and the amount of period t's investment are exogenized by applying the following autoregressive stochastic processes for both domestic and foreign investments:

$$\begin{aligned} I_t &= (1-\rho)\tilde{I} + \rho I_{t-1} + \epsilon_t, \quad \text{with} \quad \epsilon_t \overset{i.i.d.}{} N(0,\sigma), \\ I_t^* &= (1-\rho)\tilde{I^*} + \rho I_{t-1}^* + \epsilon_t, \quad \text{with} \quad \epsilon_t \overset{i.i.d.}{} N(0,\sigma). \end{aligned} \tag{42}$$

Production follows a Cobb-Douglas function

$$y_t = A (\chi k_{t-1})^{\alpha} ((1-\chi) h_t)^{1-\alpha}, \tag{43}$$

where χ stands for the fraction of investors and $(1-\chi)$ for the fraction of workers. Labor supply is set inelastically equal to $h_t = 1$. Following the rationale of the model, one derives the marginal product of labor as given by

$$\frac{\partial y_t}{\partial h_t} =: f_t^h = \frac{(1-\alpha) y_t}{(1-\chi)}, \qquad \frac{\partial G}{\partial w} \overset{!}{=} 0 \Leftrightarrow \eta_t f_t^h = w_t. \tag{44}$$

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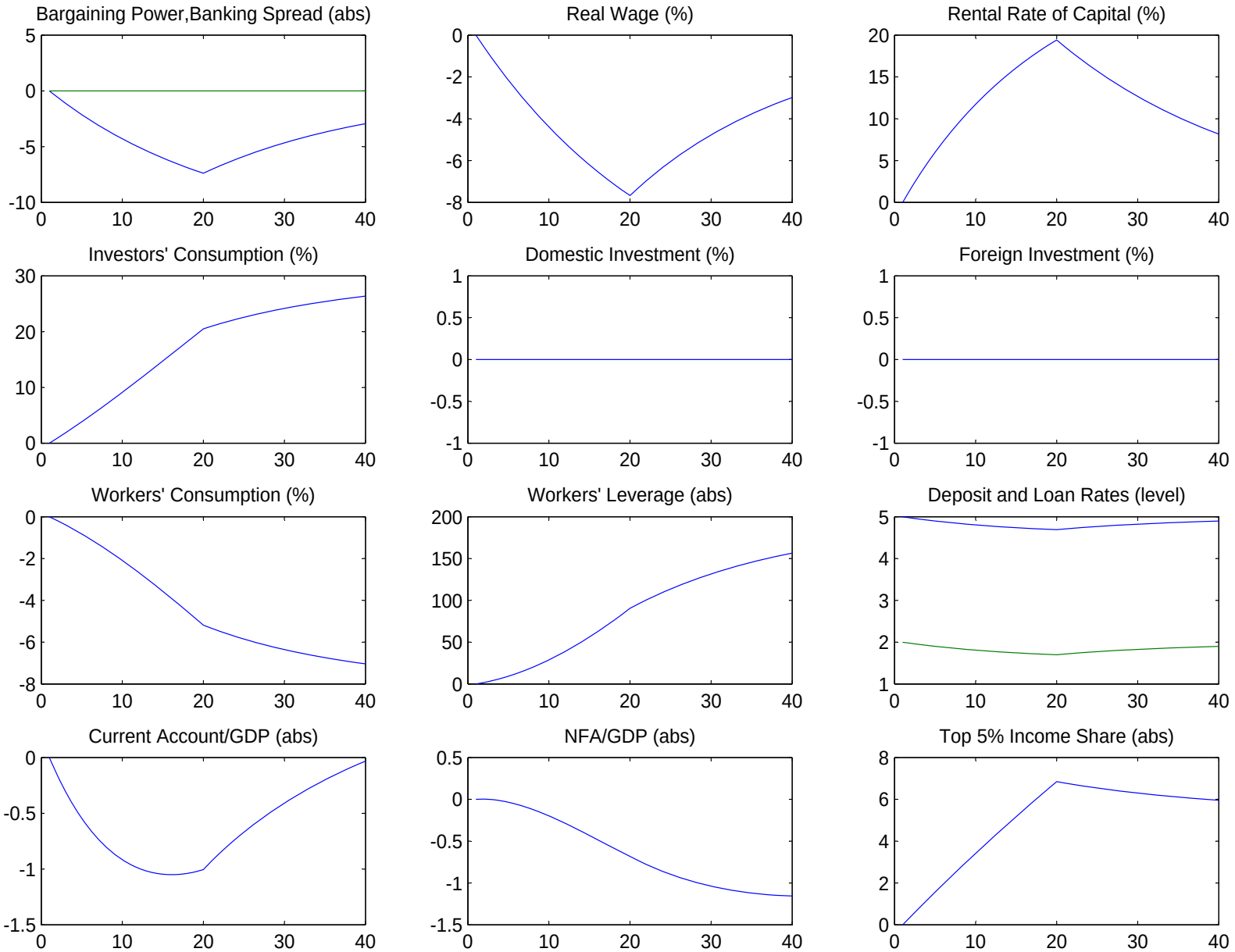
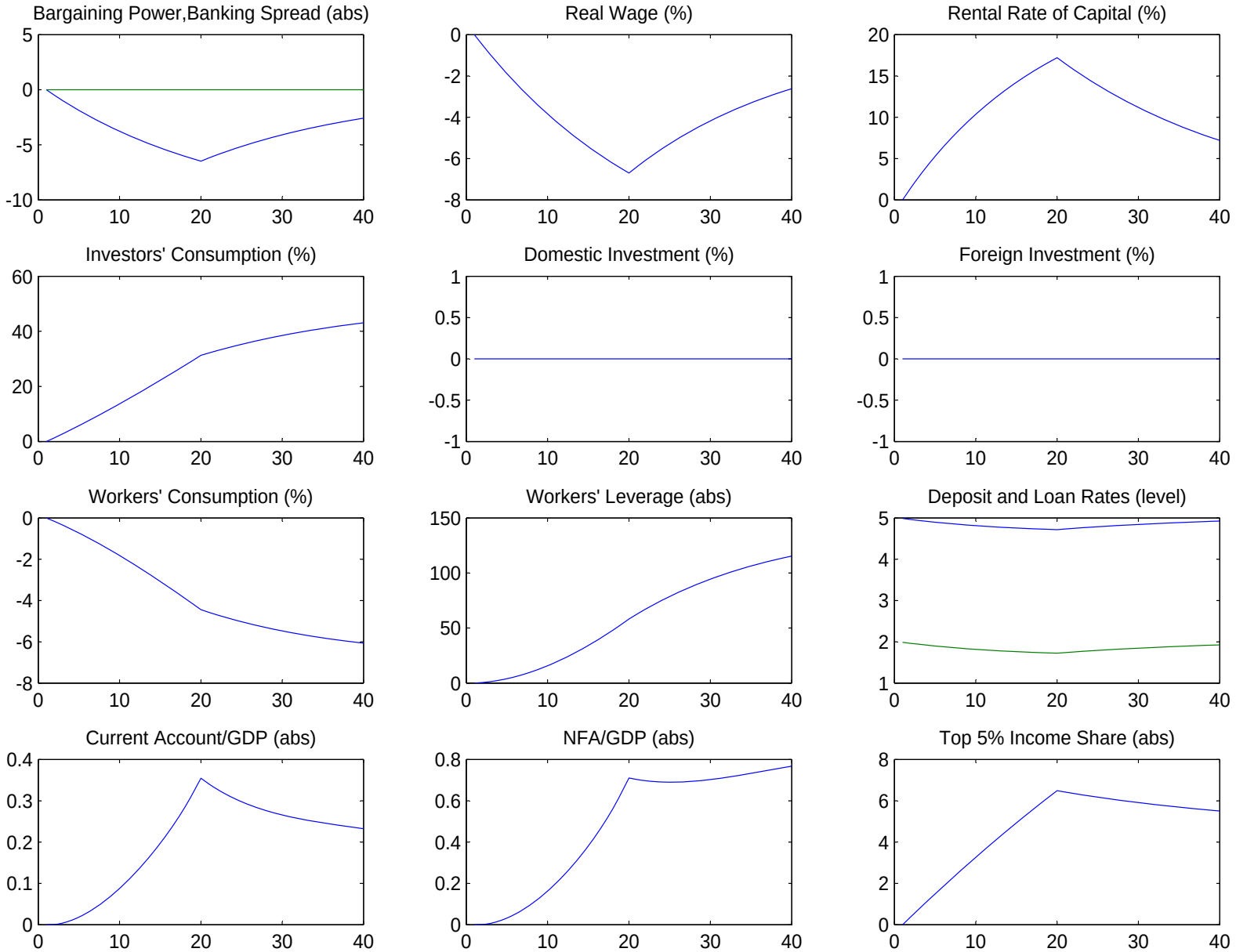
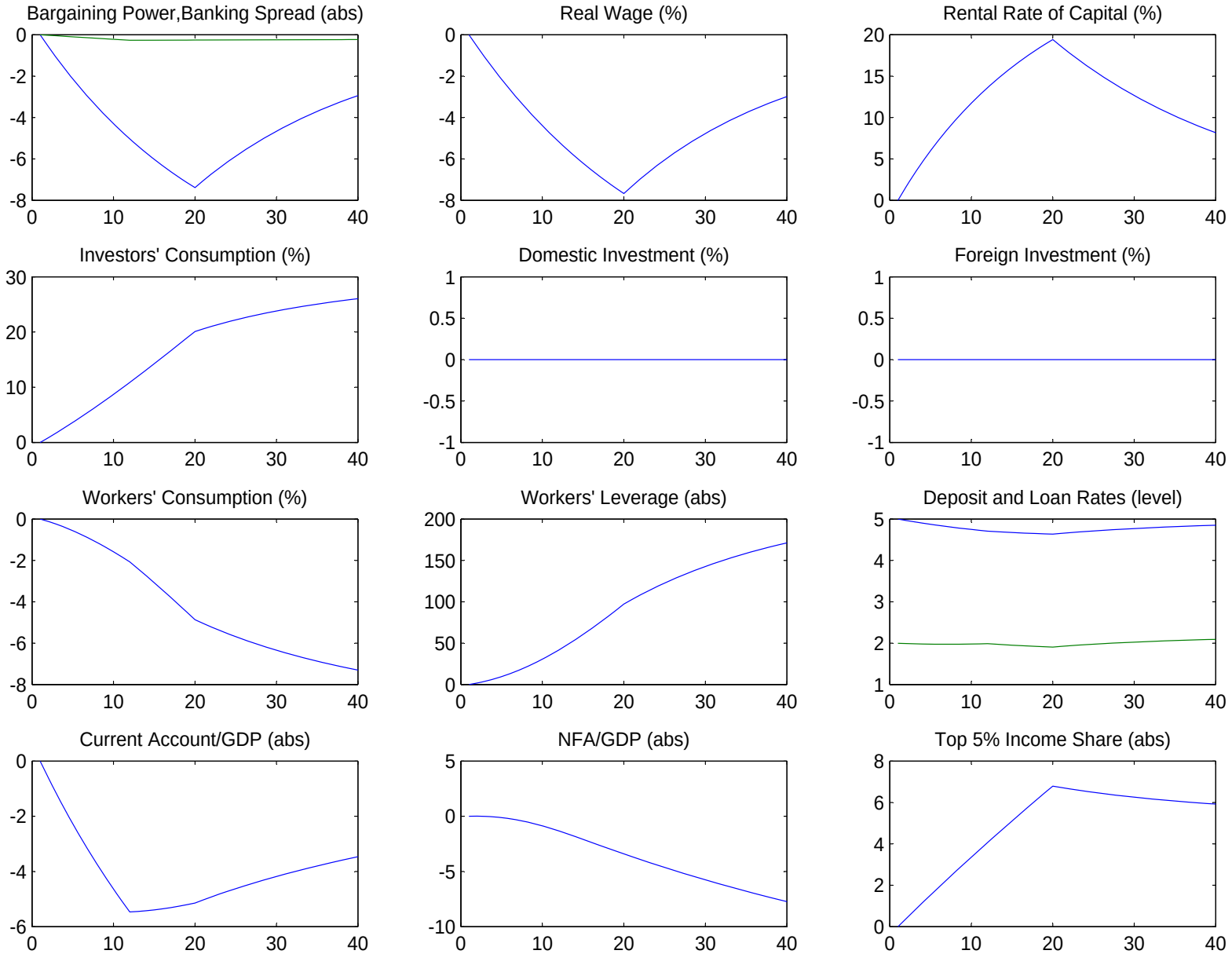
UK inequality scenario (bargaining power -8 % over 20 years)



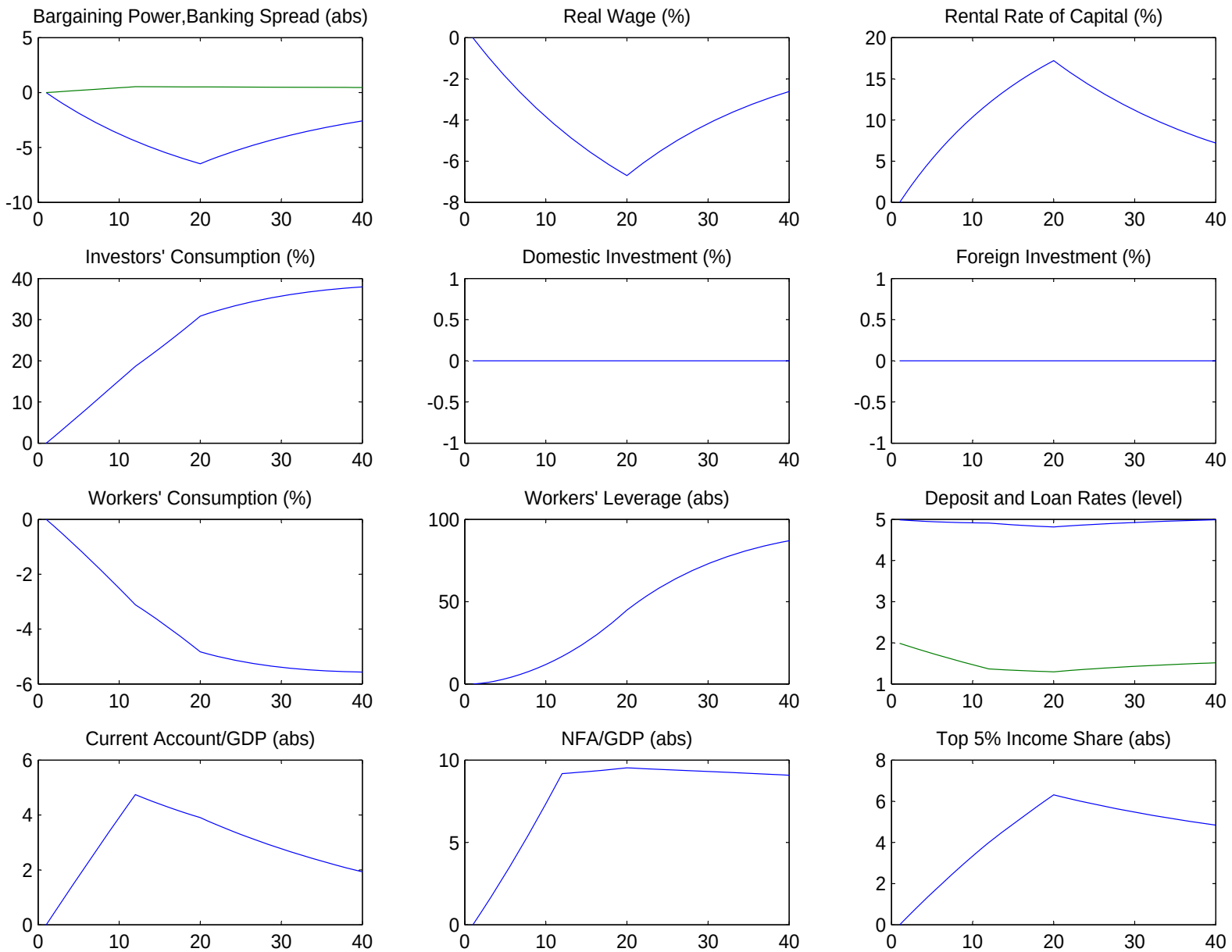
GER inequality scenario (bargaining power -7 % over 20 years)



UK inequality & financial liberalization (. . ., banking spread -1 %, 10y)



GER inequality & EMU joining (. . ., banking spread +0.5 %, 10y)



Policy Implications

- 'There is no way around addressing the income inequality directly' (Kumhof et al., 2012)
- not only from a social fairness or fairness of opportunities perspective, but also from a macroeconomic stability perspective. Possible instruments are
- strengthening workers bargaining power over wages via labour unions,
- taxing income more progressively,
- (re-)introducing progressive wealth taxes (Piketty, 2014).

- There is also no way around addressing current account imbalance directly
- from a macroeconomic stability perspective as the global current account is balanced per definition. Possible instruments are
- strengthening domestic demand in surplus countries by higher wages and expansionary fiscal policy (which itself can be balanced by progressive income and wealth taxes),
- creating a symmetric macroeconomic imbalance procedure in the EU. What sense does it make that the scoreboards penalty procedure is activated by more than 4 % deficit, but not until more than 6 % surplus ?

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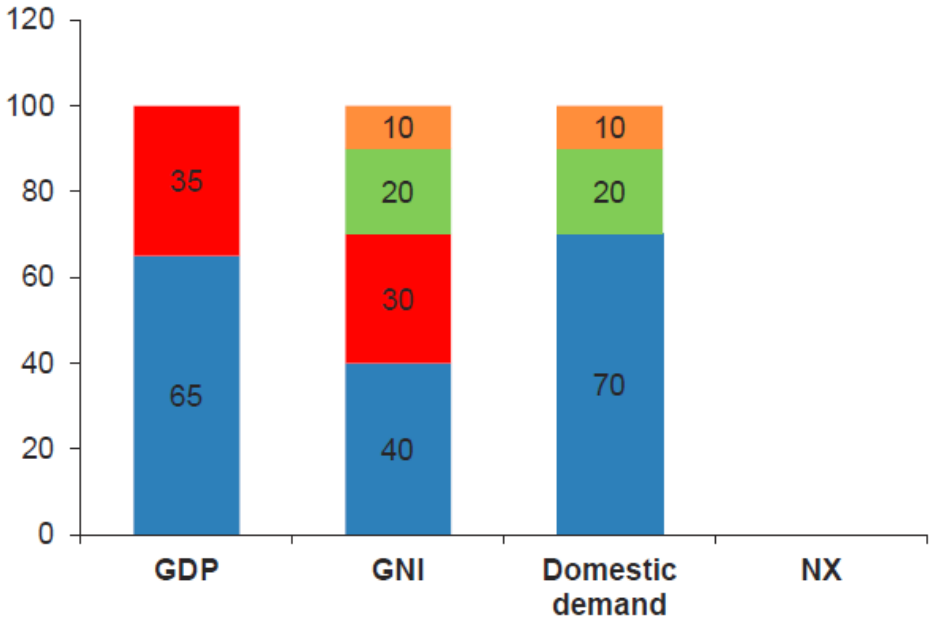
Macroeconomic Summary: The baseline

Macroeconomic effects of distributional changes

a) Simplified baseline scenario



1. pillar: GDP
profits [P]
+ wages [W]
= gross domestic product [GDP]

2. pillar: GNI
taxes [T]
+ corporate income [Y_F]
+ top household income [Y_H_T]
+ middle and bottom household income [Y_H_MU]
= gross national income [GNI]

3. pillar: DD
government spending [G]
+ corporate investment [I]
+ private consumption [C]
= domestic demand [DD]

4. pillar: NX
government financial balance [T-G]
+ coporate financial balance [Y_F-I]
+ household financial balance [Y _H_MU + Y_H_T - C]
= net exports [NX]

Graphs do not include primary income and depreciation.
Values chosen for illustrative purposes.

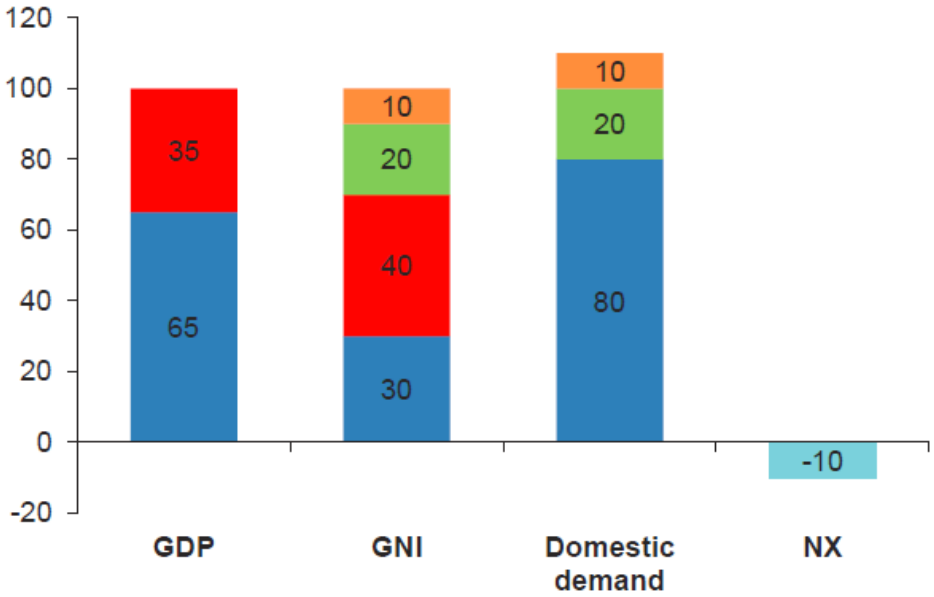
Source: IMK calculations.

IMK

Source: Behringer / Theobald / van Treeck (2014) Income and Wealth Distribution in Germany - A macroeconomic perspective

Macroeconomic Summary: A personal income shock

b) Simplified impact of a personal income shock



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Graphs do not include primary income and depreciation.
Values chosen for illustrative purposes.

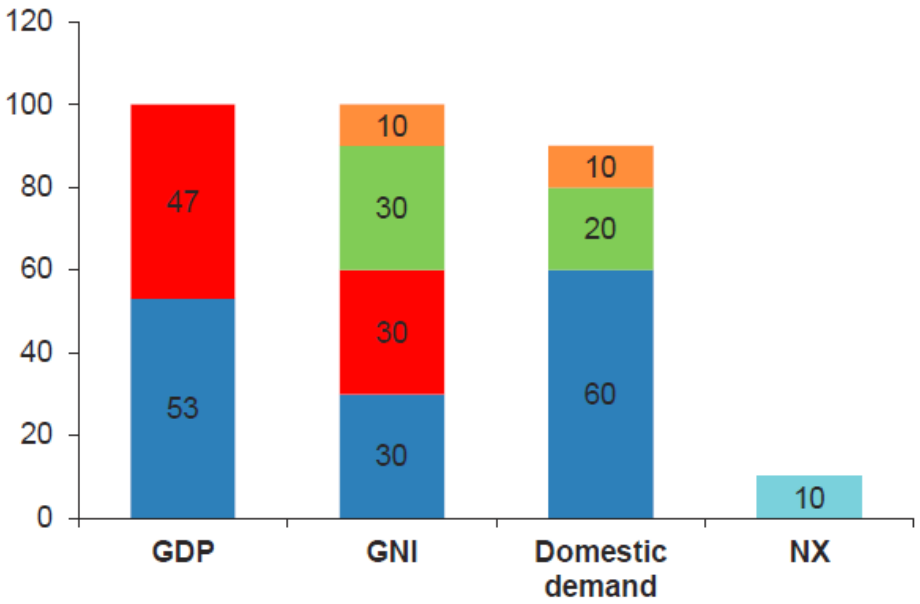
Source: IMK calculations.

IMK

Source: Behringer / Theobald / van Treeck (2014) Income and Wealth Distribution in Germany - A macroeconomic perspective

Macroeconomic Summary: A functional income shock

c) Simplified impact of a functional income shock



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+ middle and bottom household income [Y_H_MU]
= gross national income [GNI]

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government spending [G]
+ corporate investment [I]
+ private consumption [C]
= domestic demand [DD]

4. pillar: NX
government financial balance [T-G]
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+ household financial balance [Y _H_MU + Y_H_T - C]
= net exports [NX]

Graphs do not include primary income and depreciation.
Values chosen for illustrative purposes.

Source: IMK calculations.

IMK

Source: Behringer / Theobald / van Treeck (2014) Income and Wealth Distribution in Germany - A macroeconomic perspective

Outline

Block III - DSGE Kritik und Robustifizierung

1. **Pros and Cons of the DSGE models used**
2. Should you never use rational expectations ?
   Ricardian equivalence and its consequences for expansionary fiscal policy
3. Should you never use rational expectations ?
   A Dynamic Stochastic Labor-Market Disequilibrium and effective demand
4. Macroeconomic factors behind financial instability -
   Evidence from Granger causality tests including both panel and time series econometrics

What is the pro of the model presented ?

- **heterogeneity among forward looking agents:** i. capitalists (top 5%) own firms and banks and obtain only capital income from physical and financial capital. ii. workers (bottom 95%) obtain only labor income, in contrast to a standard DSGE the model allows to analyze distributional shocks via a deline in bargaining power so that wages are no longer equal to the marginal product of labor (derived from a CD production)
- The investor class strongly drives the results. Those agents maximizing

$$E_0 \left(\sum_{t=0}^{\infty} \beta_t^i \left(\xi_c^{\left(1-\frac{1}{\sigma^i}\right)} \left(\frac{\left(c_t^i\right)^{\left(1-\frac{1}{\sigma^i}\right)}}{1-\frac{1}{\sigma^i}} \right) + \log\left(d_t + \frac{\xi^f}{\xi^d} e_t f_t \right) \right) \right) \tag{45}$$

with respect to the vector $\left(c_t^i, d_t, f_t\right)$ subject to their budget constraint given by

$$e_t f_t q_t^* - e_t f_{t-1} + d_t q_t^d - d_{t-1} = r_t^k k_{t-1} + \Pi_t^{bank} - p_t^{cons_i} c_t^i - p_t^{inv} \left(k_t - (1-\delta) k_{t-1}\right) \tag{46}$$

set credit supply which is always cleared through workers' budget constraint.

2nd generation DSGE models: Kritische Würdigung

What are the (old) cons of the model ?

- **no direkt demand side effects** (no effective demand): for instance in the initial Kumhof(2012) model investment is not direcly driven by aggregate demand, but instead purely by income gains of the top income class households (that is why we exogenize)
- **no money creation by private banks** (loans do not create deposits): instead, bank balances directly depend on deposit preferences of the top income class households
- **rational expectations**: (in particular for the bottom and middle income class households) this is oversimplifying unrealistic (who behaves like this ?)
- **representative agent**: only for the foreign agent, but still ...

The experiment was to change all this successively in order to go farer beyond standard DSGE results (similar to the zero lower bound changing those), but we ran into numerical constraints

What is the (new) con of the model ?

- **computational effort**: it is not the fact that we need sophisticated numerical methods (we finally use a dynare++ solution with Taylor approximation of order 3). it is the fact that the model becomes fragile in terms of solvability and sensitivity of parameter changes (think about parameter uncertainty) - probably also with global solution methods

Source: Grüning / Theobald / van Treeck (2015) Inequality and Germany's current account surplus

Outline

Block III - DSGE Kritik und Robustifizierung

1. Pros and Cons of the DSGE models used
2. **Should you never use rational expectations ?**
   Ricardian equivalence and its consequences for expansionary fiscal policy
3. Should you never use rational expectations ?
   A Dynamic Stochastic Labor-Market Disequilibrium and effective demand
4. Macroeconomic factors behind financial instability -
   Evidence from Granger causality tests including both panel and time series econometrics

Rational expectations and Ricardian equivalence

Overlapping Generation model where each individual lives two periods following Barro (1974) 'Are government bonds net wealth ?', Journal of Political Economy

- preference of households: $U(C_1, C_2) = lnC_1 + \beta lnC_2$
- government policy: $\{G_1, G_2, T_1, T_2, B\}$
- household budget constraint in period 1: $C_1 + B \leq w_1 - T_1/N$
- household budget constraint in period 2: $C_2 \leq B(1+r) + w_2 - T_2/N$
- budget constraint of the Government in period 1: $G_1 \leq T_1 + B$
- budget constraint of the Government in period 2: $G_2 + B(1+r) \leq T_2$

Reference: K. Bahttarai, Economic Modelling - Ricardian Equivalence, Business School University of Hull.

Rational expectations and Ricardian equivalence

Inter temporal budget constraints for government and households:

$$G_1 + \frac{G_2}{1+r} = T_1 + \frac{T_2}{1+r}$$

$$C_1 + \frac{C_2}{1+r} = (w_1 - T_1) + \left(\frac{w_2}{1+r} - \frac{T_2}{1+r} \right)$$

Market clearing conditions in this economy without money are

$$NC_1 + G_1 = Nw_1 \qquad NC_2 + G_2 = Nw_2$$

Optimization delivers $C_2 = \beta (1+r) C_1$ so that we obtain for two different government policies

- $T_1 \neq 0, T_2 \neq 0, B = 0$
- $T_1 = 0, T_2 \neq 0, B \neq 0$

the following optimal consumption

- $C_1 = \frac{1}{\beta}\left((w_1 - T_1) + \left(\frac{w_2}{1+r} - \frac{T_2}{1+r}\right)\right)$
- $C_1 = \frac{1}{\beta}\left((w_1) + \left(\frac{w_2}{1+r} - \frac{T_2+B(1+r)}{1+r}\right)\right)$

If B in the second case amounts to T_1 from the first, both results are the same.

- Barro concluded from this identity that it does not matter whether government finances its deficits by borrowing (bonds) or taxes.
- And from C_1 in the second case being less than $\tilde{C_1} = \frac{1}{\beta}\left((w_1) + \left(\frac{w_2}{1+r} - \frac{T_2}{1+r}\right)\right)$ he took the intuition that people will anticipate that government raises tax in the future for repayment of its debt. Hence they save in period 1 for the future taxation.

Rational expectations and Ricardian equivalence

- The problem is not that there is anything wrong with the computation, but
- that there is everything wrong with the economy modelled.
- It is just too simplistic. What if people make (ex-ante) systematic mistakes when they form their expectations ?
- Or do you think about next year's government budget before making your supermarket choice between Spanish Rioja and red wine from the Mosel ?

Rational expectations and Ricardian equivalence

Further drawbacks

- No private wealth accumulation, no bequest motive, no heterogeneity, no distributional change, no money ...
- This result is against all the modern empirical findings about the regime-dependence of the fiscal multiplier (it matters if you consolidate via revenues or expenditures ! as it matters if you consolidate in a recession or in an expansion !)
- Already in 1976, James Buchanan wrote a comment in the same journal:
  '... From this Barro infers that the substitution of debt for tax finance will exert no expansionary effect on total spending. There are two questions here. Are the future tax liabilities fully capitalized ? And, even if they are, does this necessarily imply that the fiscal policy shift exerts no effect on total spending ? To establish the second result, it is necessary to examine the differential impacts of taxation and debt issue, quite apart from the question of capitalization of future taxes. Barro wholly neglects this necessary part of any comparative analysis of the two fiscal instruments, and, because of this neglect, his conclusion is not nearly so relevant for policy as it seems to be ...'
- Unfortunately, it was and is still very relevant for the role of fiscal policy in many DSGEs (apart from those including the Zero Lower Bound problem)

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DSLMD: Typical micro-foundations but effective demand

Schoder (2015) proposes a 'Dynamic Stochastic Labor Market Disequilibrium model' which uses rational expectations but

- unemployment arises from job rationing due to insufficient aggregate spending rather than search and matching frictions
- the state of the labor market affects the relative bargaining power in a collective Nash bargaining process
- a consumption function is implied by a precautionary saving motive arising from an uninsurable risk of permanent income loss

=> The variation of unemployment (and the one of the business cycle) is mainly driven by demand shocks in the DSLMD model and by (labor) supply shocks in the DSGE
=> The persistence of standard shocks seems to deliver a better fit with observable data.

Conclusion about DSGE

- each model has its strengths and weaknesses
- DSGE models get better over the years
- still, the whole framework usually allows only to make one feature more realistic
- I personally prefer something else for the future of macroeconomic modelling

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Hans Böckler Stiftung
Fakten für eine faire Arbeitswelt.

Thank you very much !

An overview of current research

Thomas Theobald