Global Real Rates: A Secular Approach

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Ten Years after the Great Financial Crisis: what has changed?

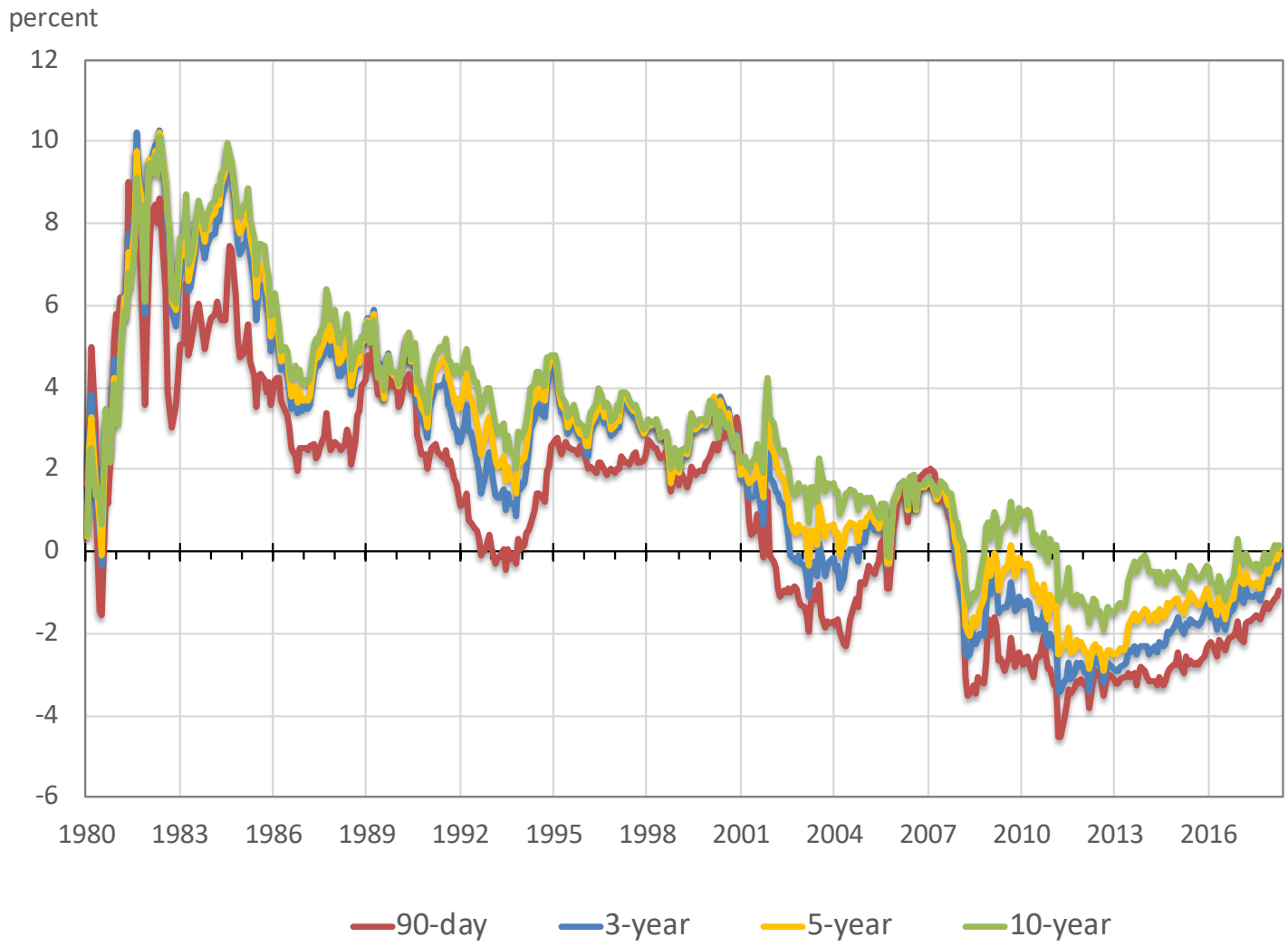
Main Question:

- Why have global real interest rates declined so much, and for how much longer?

- Propose a simple empirical approach using the world budget constraint and a century of historical data.
  1. Gives us insights regarding the forces behind low frequency movements in real rates.
  2. Allows us to forecast future global real rates.

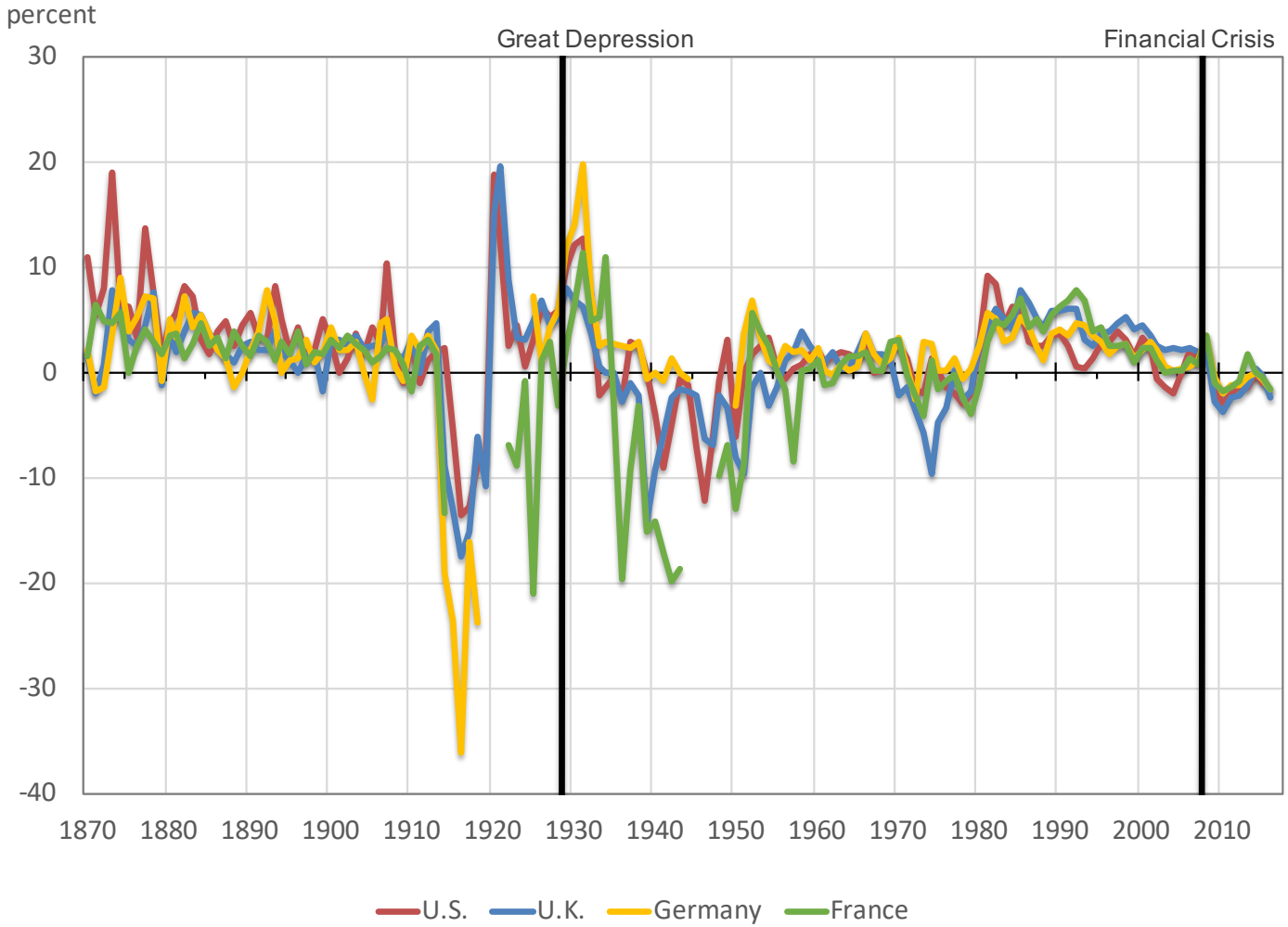
- Implications for the future, and international policy coordination

U.S. Ex-Ante Real Rates



Ex-ante real yields on U.S. Treasury Securities constructed using median expected price changes from the University of Michigan's Survey of Consumers. Source: FRED.

'Historical' Real Rates, 1870-2015



Ex-post real rates are constructed as the nominal interest rate on 3-months Treasuries minus realized CPI inflation. Source: Jordà et al (2016).

Facts and Possible Interpretations

- Decline in natural rate: Holston et al (2017), Laubach and Williams (2016)

- 'Secular Stagnation':
  1. Demography: Hansen (1939), Carvalho et al (2016)
  2. Productivity growth: Summers (2013), Gordon (2012)
  3. Demand for safe assets: Caballero et al (2016), del Negro et al (2017)

- Savings Glut: Bernanke (2005), Caballero et al (2008)

- Deleveraging after the crisis: Eggertson Krugman (2012); Guerrieri and Lorenzoni (2011); Lo and Rogoff (2015)

Consumption-to-Wealth Ratio

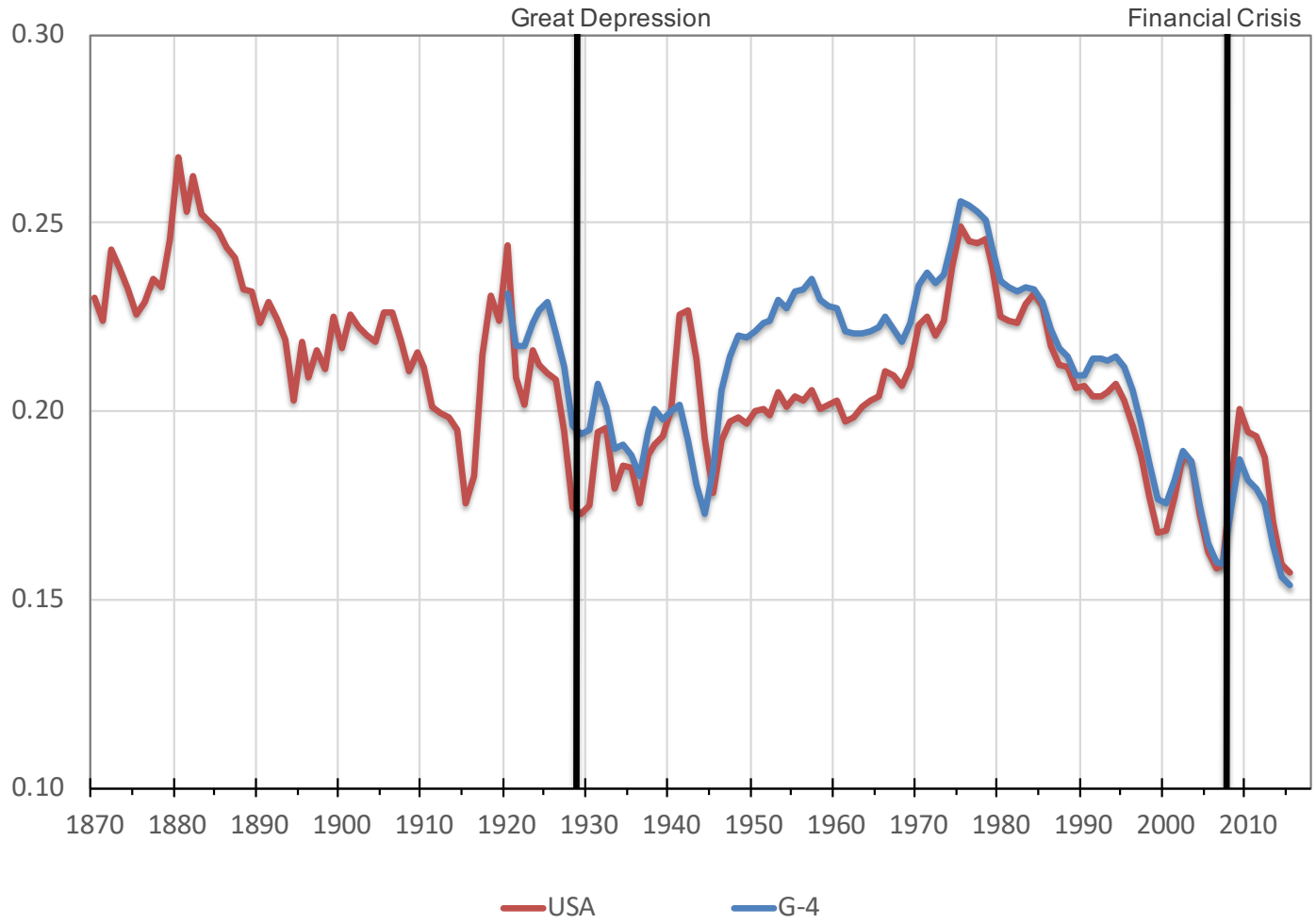


Figure: Consumption-to-Private Wealth Ratio, 1870-2015, United States and G-4 (U.S., U.K., Germany and France). Sources: Jordá et al (2016), Piketty et al (2017) and WID.

Theoretical framework

- Wealth accumulation for the world (financial integration):

$$\bar{W}_{t+1} = \bar{R}_{t+1}(\bar{W}_t - C_t)$$

- $\bar{W}_t$: Total Private wealth: financial wealth (incl. gov. debt) as well as housing, non incorporated businesses, land, + human wealth; $\bar{R}_{t+1}$ gross return on total private wealth; C_t world private consumption. No Ricardian equivalence.

- Accounting identity.

Theoretical Framework

- Most models deliver a stationary $C/\bar{W}$. Details unimportant.

- Log-linearize around the steady-state consumption-wealth ratio (Campbell (1986), Lettau and Ludvigson (2001)):

$$\ln C_t/\bar{W}_t \backsimeq \mathbb{E}_t \sum_{s=1}^{\infty} \rho_w^s \left(\bar{r}_{t+s}^w - \Delta \ln C_{t+s}\right)$$

- Today's aggregate consumption to wealth ratio is low if:
  - Expected future rates of return on wealth $\bar{r}^w$ are low
  - Expected future aggregate consumption growth $\Delta \ln C$ is high

Theoretical Framework: Two Adjustments

- Private wealth vs. human wealth. $\bar{W} = W + H$. H unobserved.

$$\ln C_t/W_t \backsimeq \mathbb{E}_t \sum_{s=1}^{\infty} \rho_w^s \left(r_{t+s}^w - \Delta \ln C_{t+s}\right) + \varepsilon_t$$

with $\varepsilon_t \propto \mathbb{E}_t \sum_{s=1}^{\infty} \rho_w^s \left(r_{t+s}^h - r_{t+s}^w\right) - (\ln W_t - \ln H_t)$. Interpretation.

- safe and risky returns. write $r^w \equiv r^f + er^w$.
  - proxy $er^w = \nu' \mathbf{er}$ where er is a vector of observed excess returns (equity, bonds, housing)
  - estimate ν from the data.

- Present value relation:

$$\begin{aligned} \ln C_t/W_t \quad &\backsimeq \quad \mathbb{E}_t \textstyle\sum_s \rho_w^s r_{t+s-1}^f \quad + \nu' \mathbb{E}_t \textstyle\sum_s \rho_w^s \mathbf{er_{t+s}} \quad - \mathbb{E}_t \textstyle\sum_s \rho_w^s \boldsymbol{\Delta} \ln \mathbf{C_{t+s}} \quad + \varepsilon_t \\ &\equiv \quad cw_t^f \quad + cw_t^{rp} \quad + \mathbf{cw_t^c} \quad + \varepsilon_t \end{aligned}$$

Identification

Look at co-movements of ln C/W and components:

- Productivity slowdown: $c \downarrow, r^f \downarrow$
- Aging/demography: saving $\uparrow$, $r^f \downarrow$
- Deleveraging: $c?$, $r^f \downarrow$
- Risk Appetite $\downarrow$: $rp \uparrow$, $r^f \downarrow$

Data

- World is an aggregate of the United States, the United Kingdom, Germany and France.

- Historical data on private wealth, population and private consumption for the period 1870-2015 for the United States, and 1920-2015 for the United Kingdom, Germany and France from Piketty et al. (2014) and Jordà et al. (2016).
  - Risk-free return: ex-post real return on three-months Treasuries minus CPI inflation.
  - Real return on risky assets: total equity return for each country minus CPI inflation.

‘Global’ Consumption & Wealth per capita, 1920-2015

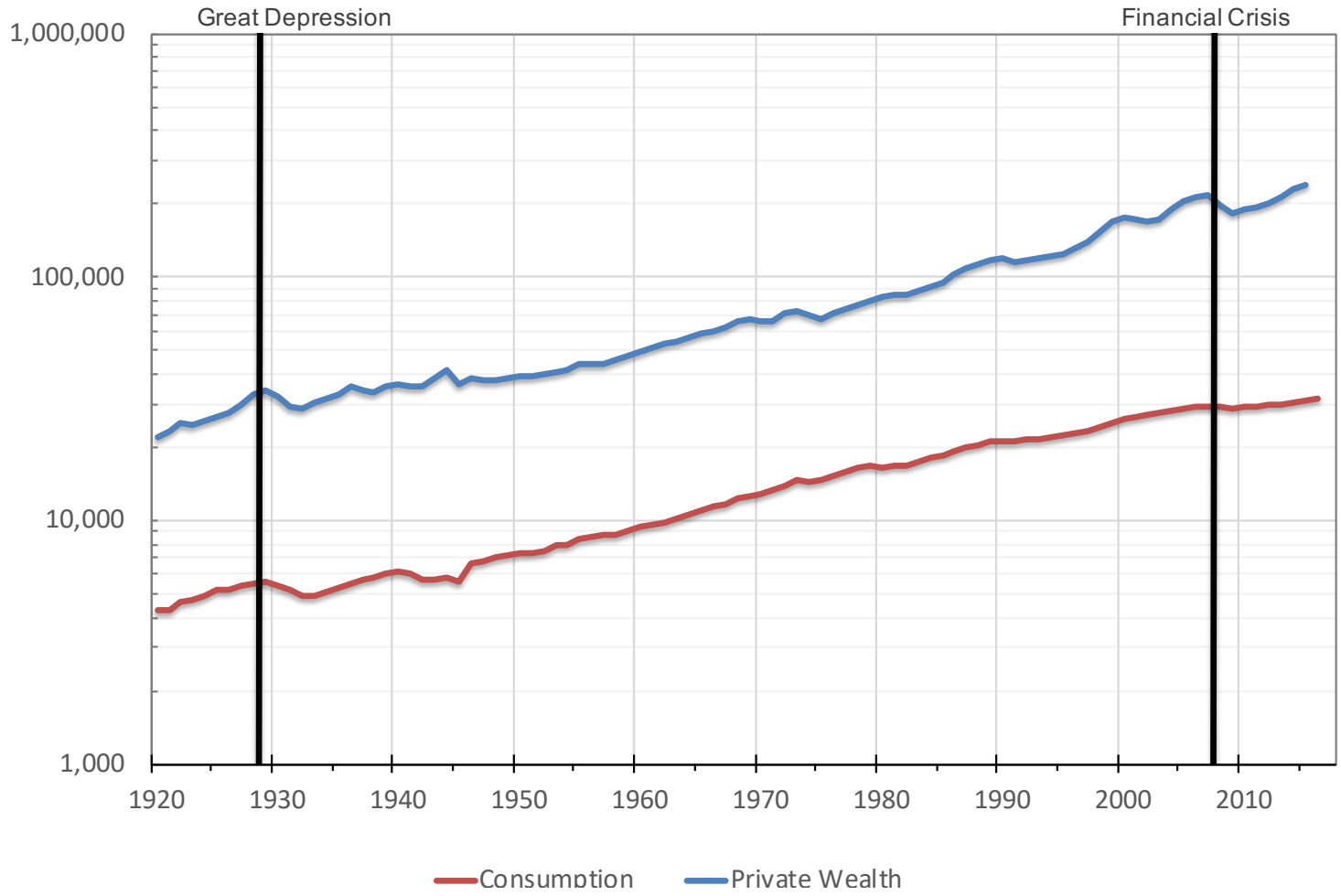


Figure: The figure reports real annual private consumption expenditures and real private wealth (land, housing, financial assets) for the U.S., U.K., Germany and France in 2010 US dollars. Source: Jordà et al (2016), Piketty et al (2017) and WID.

Financial and Housing Wealth

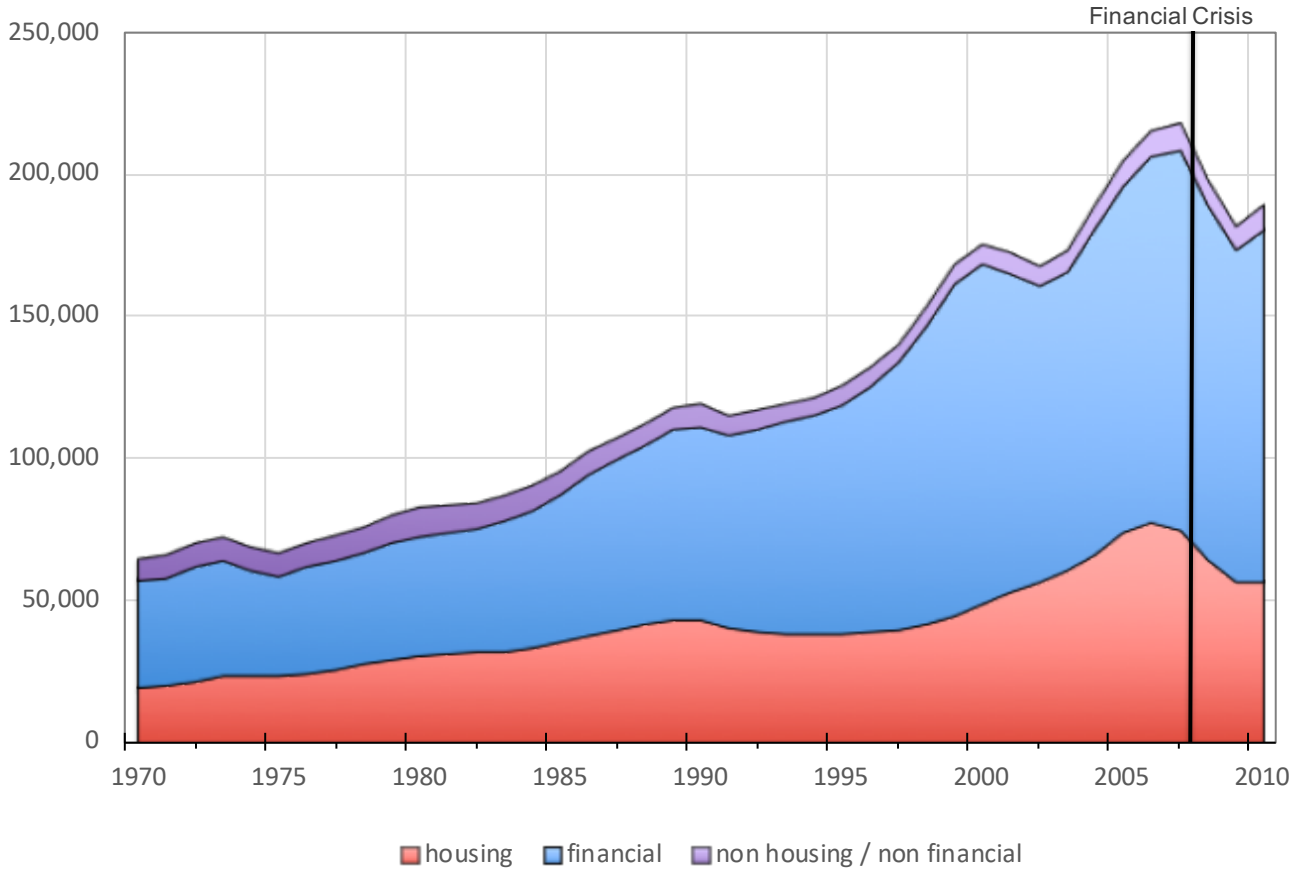
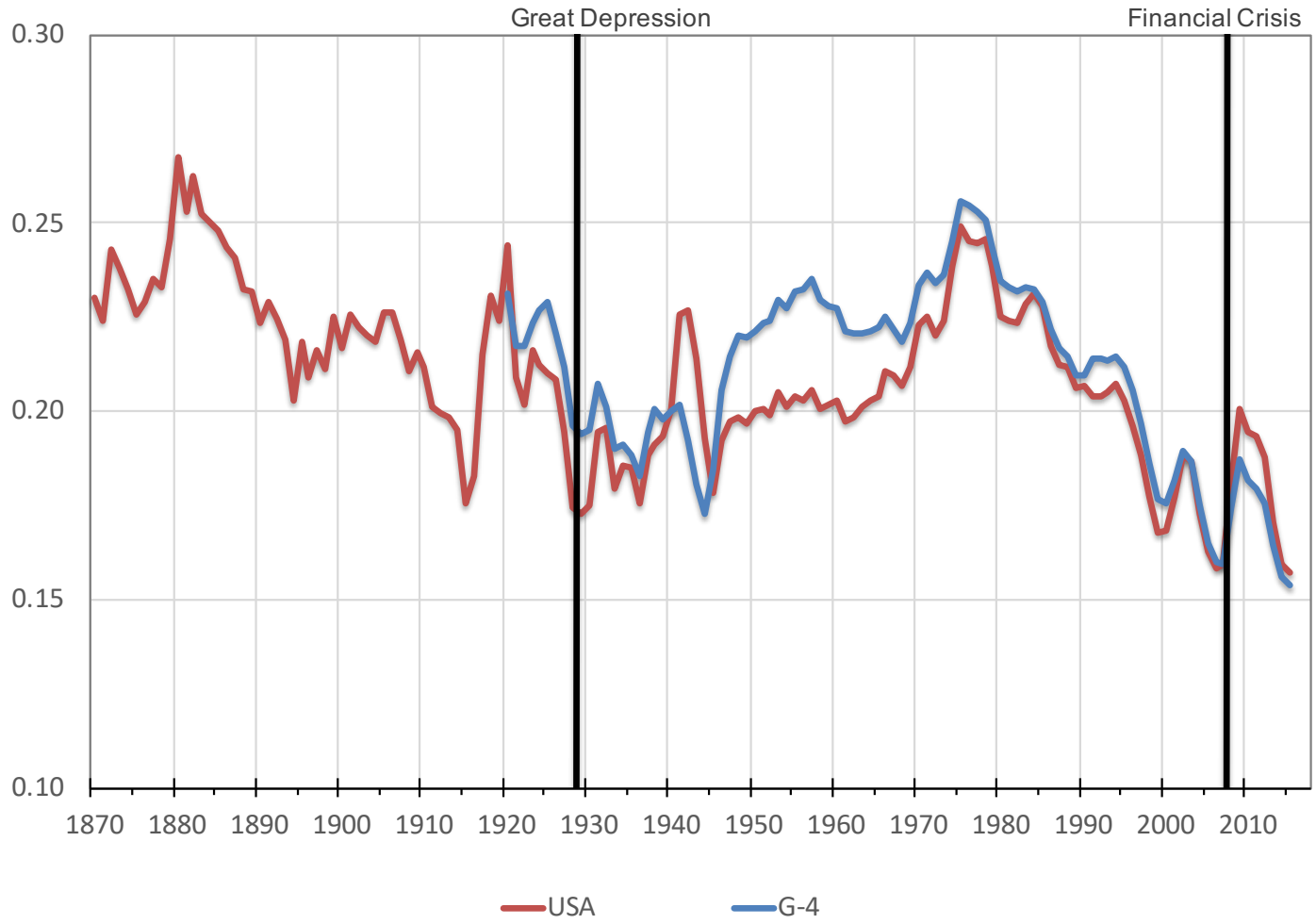


Figure: Housing, Financial and Private Wealth per capita, 2010 USD, United States, United Kingdom, Germany and France, 1970-2010. Source: Piketty & Zucman (2014).

Consumption-to-Wealth Ratio



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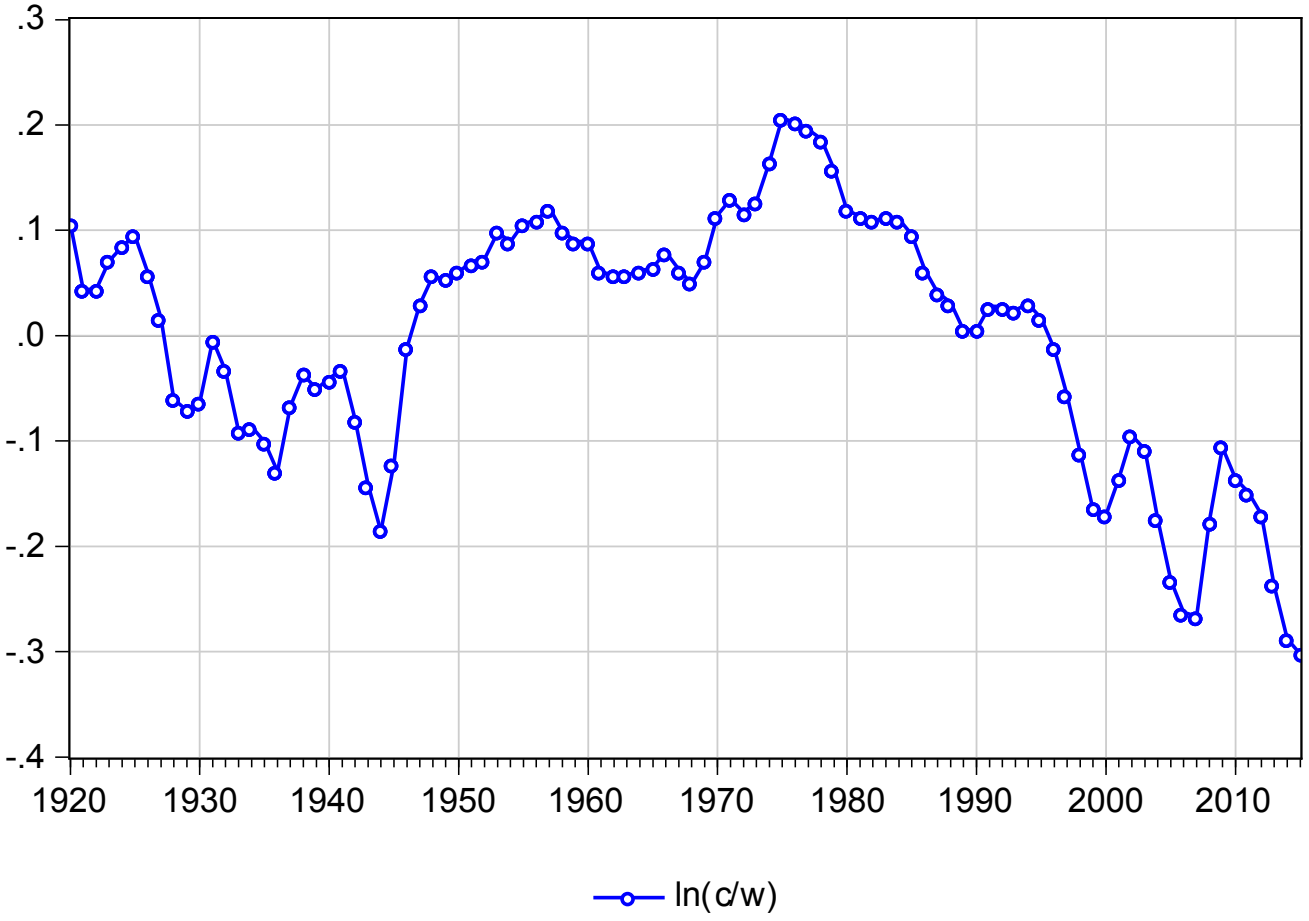
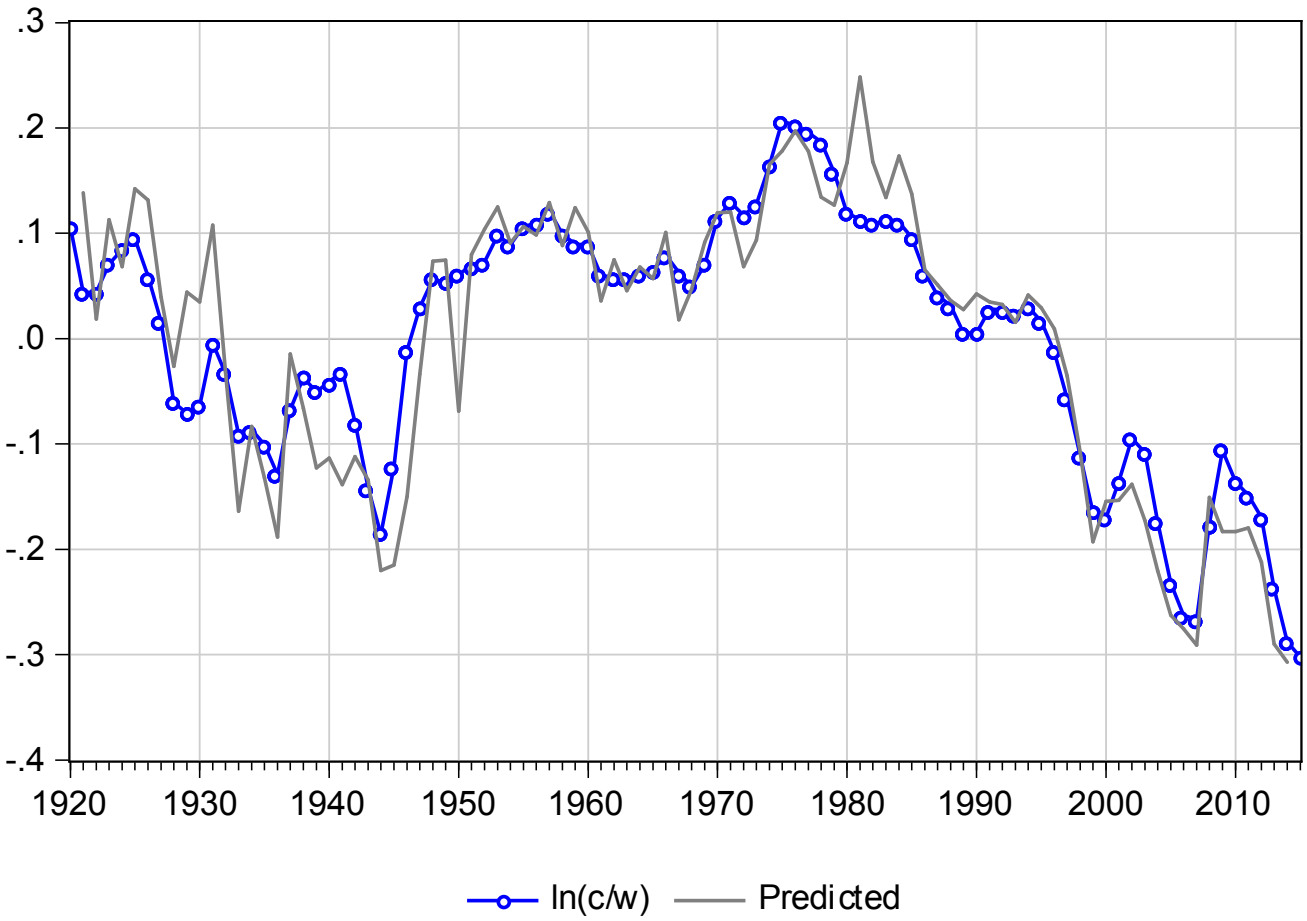
Decomposing the Global Consumption/Wealth Ratio



The figure decomposes $\ln(C/W)$ into a risk-free component (cw^f), an excess return component (cw^{rp}) and a consumption growth component ($\mathbf{cw^c}$).

Decomposing the Global Consumption/Wealth Ratio



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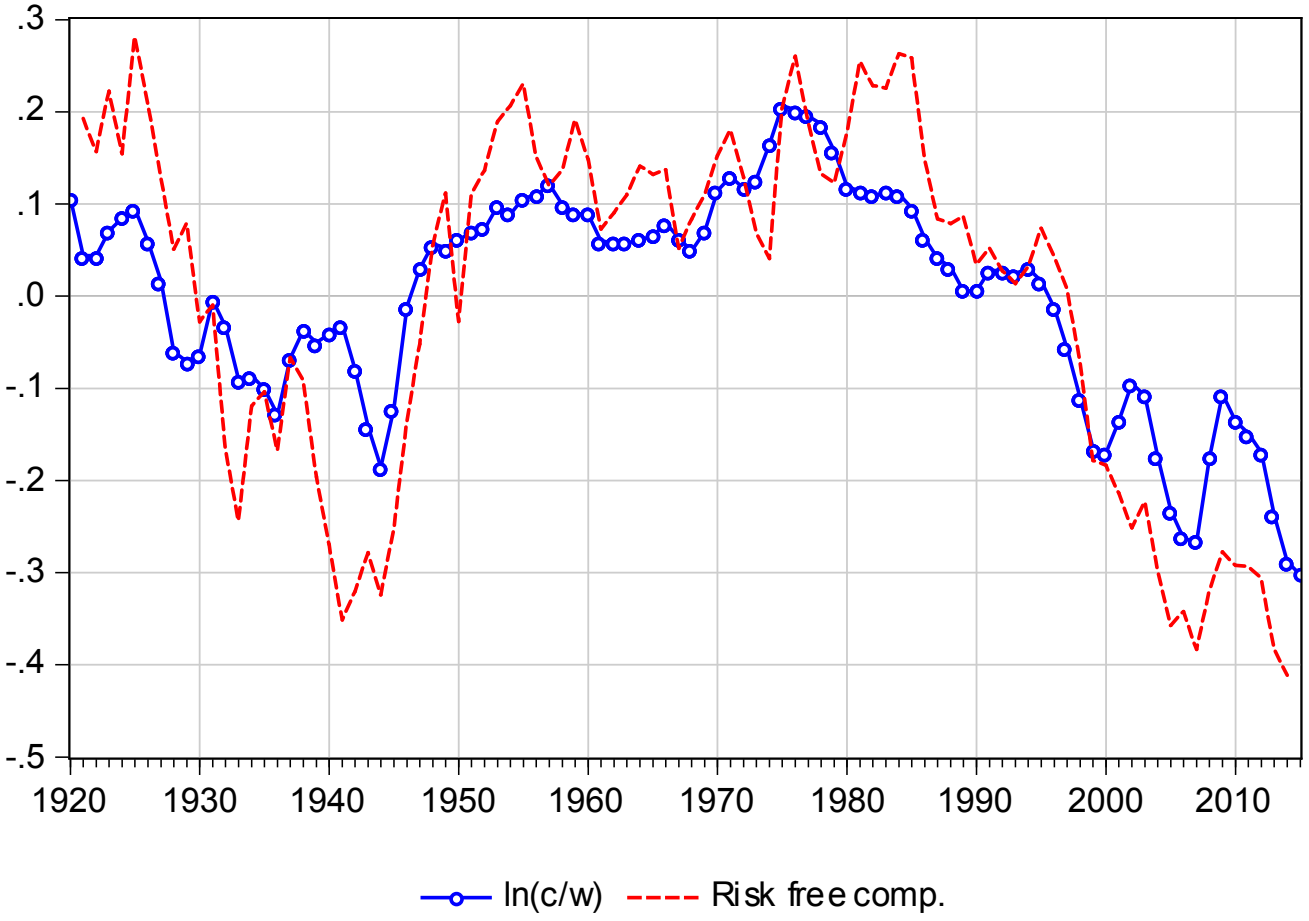

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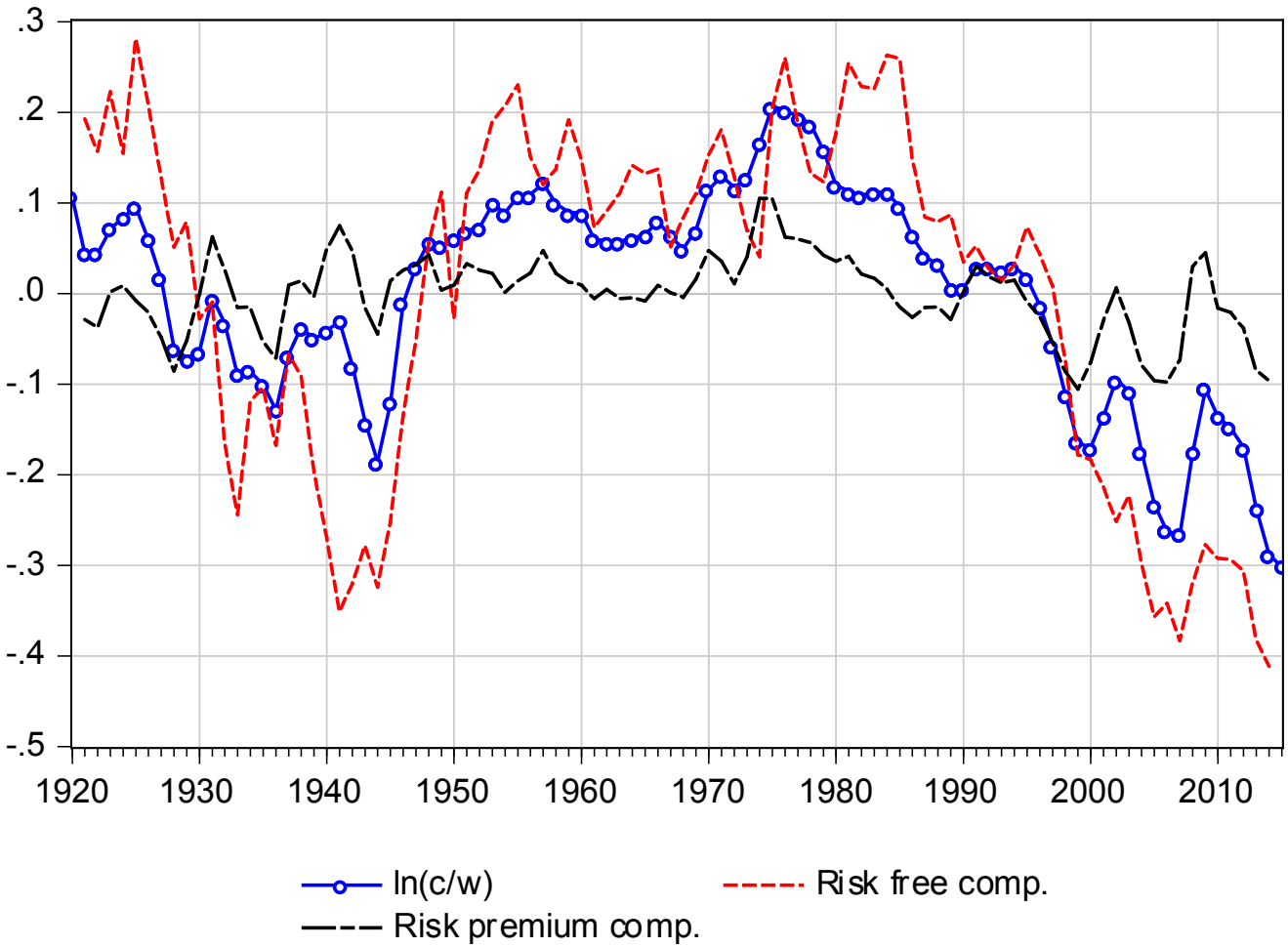

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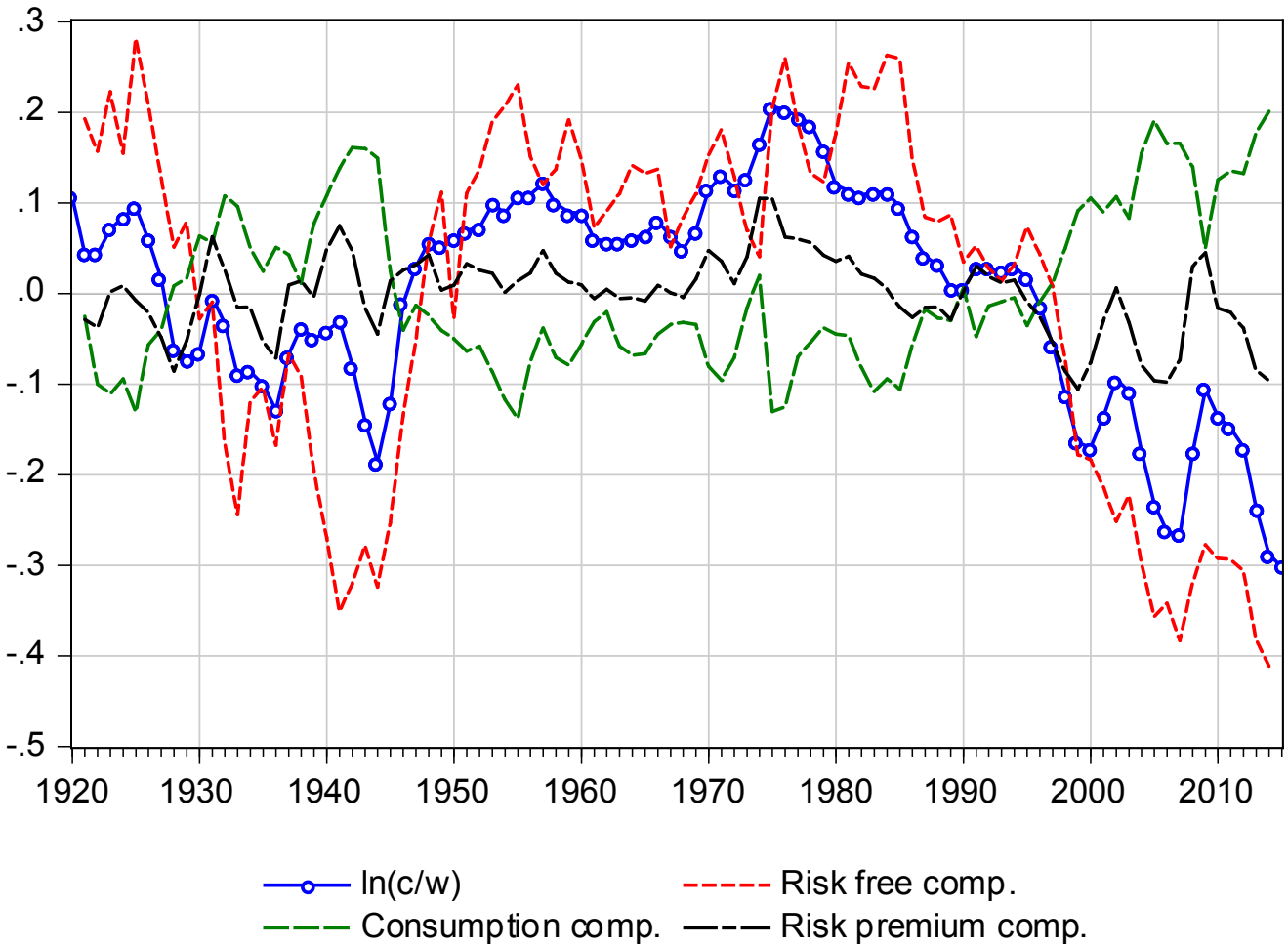

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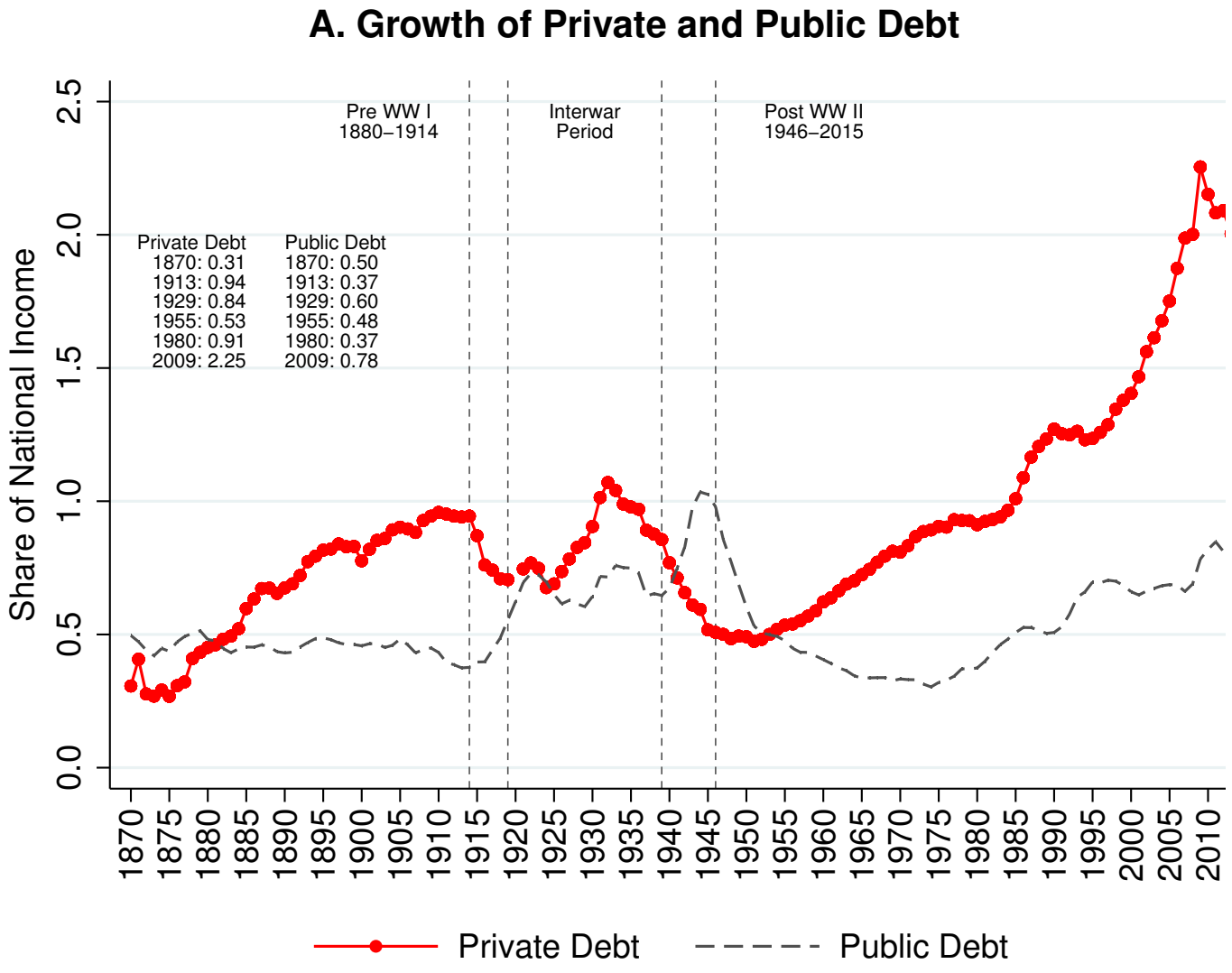
Unconditional Variance Dec.

#	percent	U.S.	G4
1	β_{r^f}	1.446	1.361
2	β_{rp}	0.191	0.266
3	β_c	-0.420	-0.548
	of which:		
3	β_{cp}	-0.096	-0.315
4	β_n	-0.324	-0.232
5	Total (lines 1+2+3)	1.217	1.079

Results & Interpretation

- Very good fit of the decomposition
- Most of the movements in C/W reflect expected movements in the future risk-free rate
- Productivity and demographic shocks: some contribution.
- Demand for Safe Assets: risk premium is a residual.
- Deleveraging shocks: most plausible suspect...? Timing is very striking.

Deleveraging Episodes



N. Hildebrand (2018)

Interpretation

- Most of the action is in the joint dynamics of the consumption wealth ratio and the return component, particularly the risk free rate.

- Plausible interpretation:
  - 'Irrational exuberance' in asset prices in the 1920s and in the 1990-2000s: fast growing financial wealth and fast declining consumption-wealth ratios.
  - Large financial crises in 1929 and in 2008: deleveraging (increased savings and low consumption) for an extended time. Low consumption wealth ratios and low real rates.

- This is consistent with debt overhang effects (Reinhart and Rogoff (2014)) and a global financial boom/bust cycle (Miranda-Agrippino & Rey (2015)).

Predicting Global Real Risk-free Rates

- Predictive power of the consumption-wealth ratio:

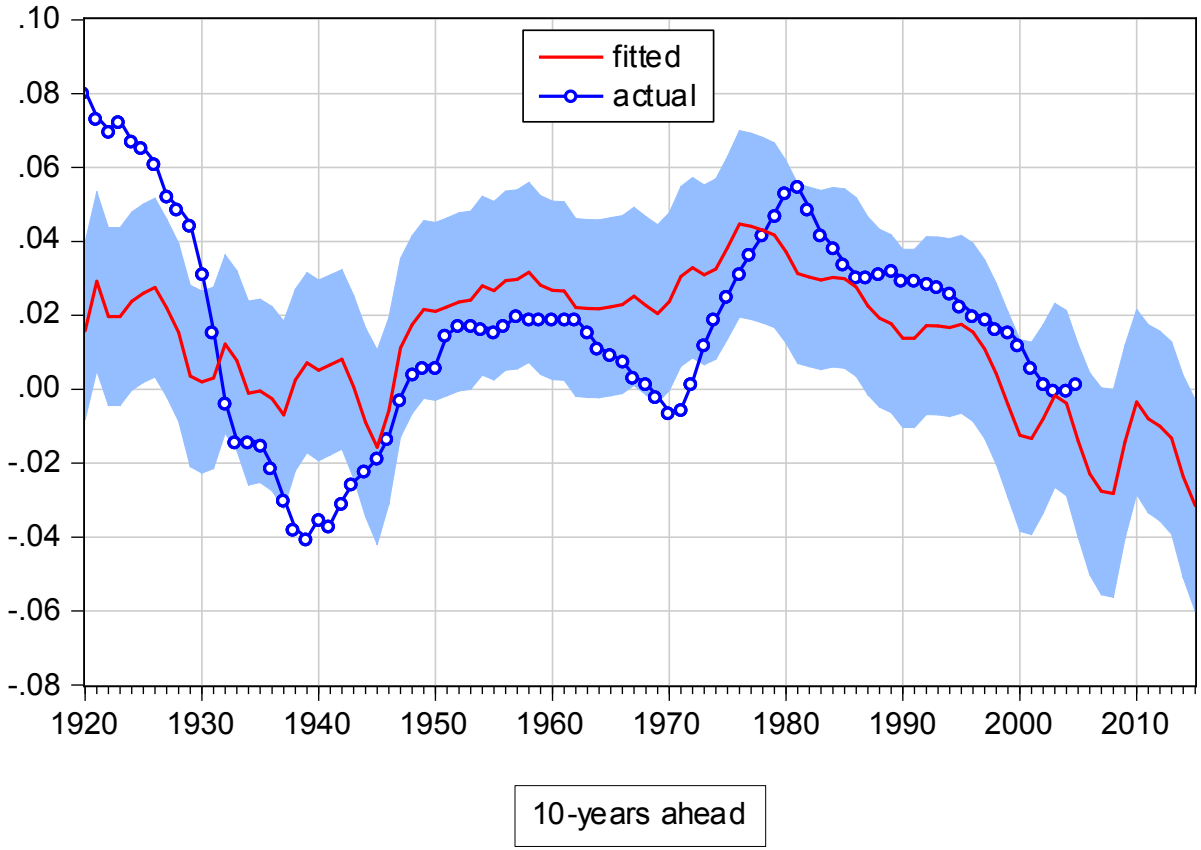
$$y_{t+k} = \alpha + \beta cw_t + \epsilon_{t+k}$$

- y_{t+k} denotes the variable we are trying to forecast at horizon k and cw_t is the consumption-wealth ratio at the beginning of period t.

- Candidates are: real risk free rates, equity premium, consumption growth per capita, population growth, term premium, credit growth.

- Strong predictive power for long run real rates. (Adj.R^2 is 0.43 on a 10 year horizon).

Predicting Global Real Risk-free Rates



The figure forecasts the 10-year average future short risk-free rate using $\ln(C/W)$. Graph includes 2 standard deviation bands.

2015-2025 forecast: -3.1%

U.S. real rates: A Kalman Filter Approach

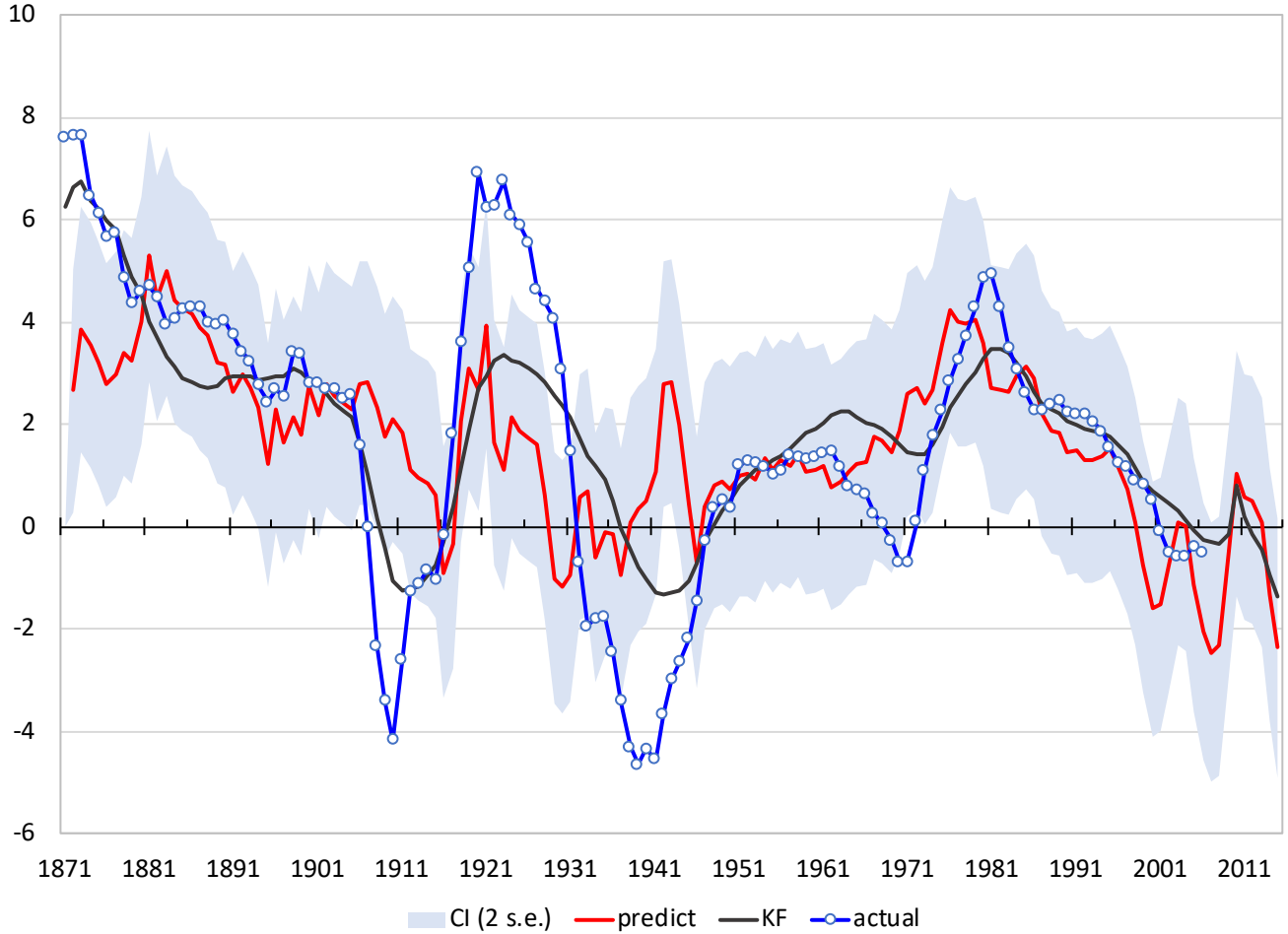
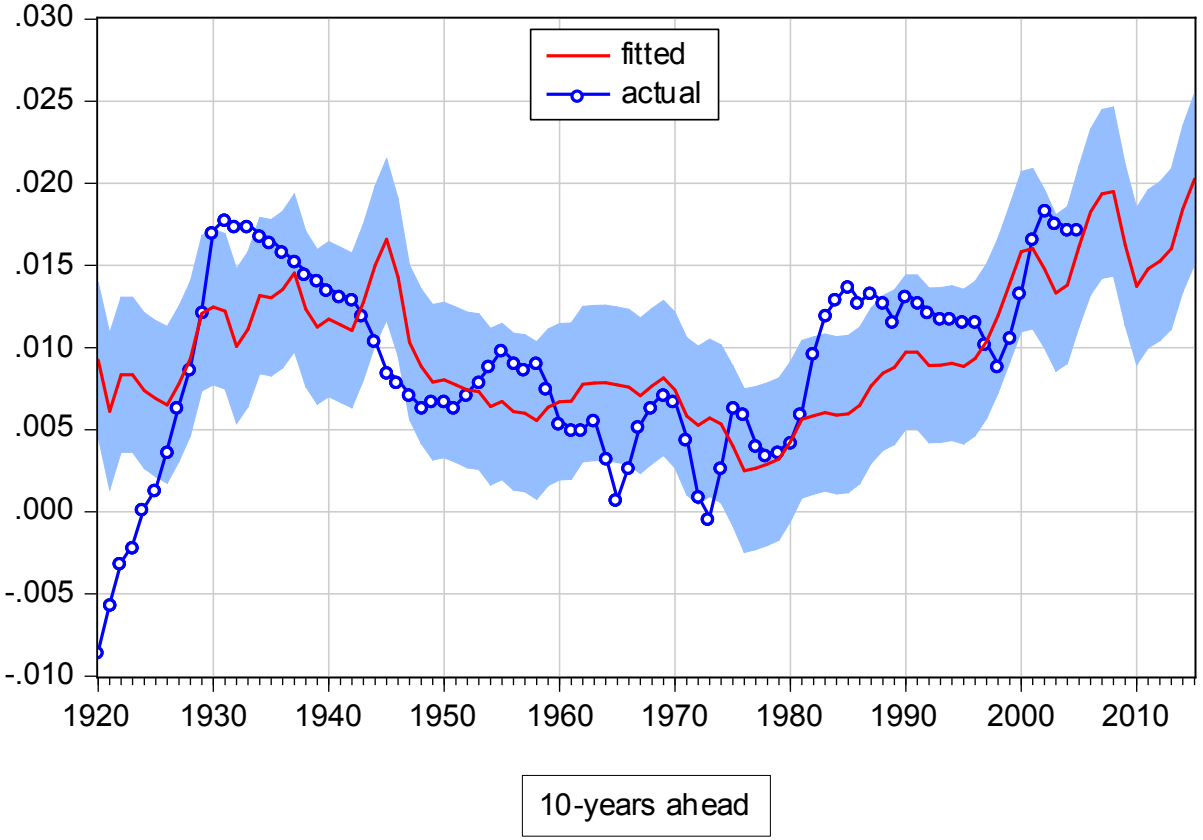


Figure: **Predictive Regressions: Real interest rate, 1870-2015.** Note: The graph reports forecasts at 10 years of the annualized risk-free rate: a simple forecast using $\ln(C/W)$ and a Kalman Filter estimate using Koijen and van Binsbergen (2010). **2015-2025 forecast:** -2.35%**, KF:** -1.37%**.**

Predicting Global Term Premium



The figure forecasts the 10-year average future global term premium using $\ln(C/W)$. Graph includes 2 standard deviation bands.

2015-2025 forecast: 2.0%.

Implications for International Policy Coordination

- Fragile global environment: recurrence of ELB
- Limits of traditional policies and limited policy space (monetary, fiscal)
- Propagation of recessions via external surpluses; Exchange rate policies matter (currency wars)
  Caballero, Farhi & Gourinchas (2016)
- Incentives for debt issuance from safe asset providers, but potential instability from multipolar system
- International provision of liquidity, global safety nets. Outside liquidity vs. Inside liquidity.

Conclusions

- We use a very general almost a-theoretical framework to understand determinants of long run real rates.
- Empirical evidence favors global financial boom/bust cycle.
- Euphoria pre-crisis leads to rapid increase in wealth (1920s, 1990s). This is followed by deleveraging post crisis (1929, 2008) and increased demand for 'safe' assets.
- Low consumption-wealth ratios are associated with lower future real rates.
- Evidence for technological slowdown or demographic factors (?)
- Predictive power: How long will the real rates stay low?
  Into next decade!