Global Rates: A Secular Approach

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Discussion by Şebnem Kalemli-Özcan

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Question and Approach

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Why do real risk free rates decline?

How long they will stay low?

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Approach: 4-step

1. Decompose Consumption/Wealth ratio into 3 components:
   - Risk free rate
   - Risk premia
   - Consumption growth

   C/W=f(risk free rate, risk premia, consumption growth)
2. Write down a model to analyze role of shocks on each component and relate to C/W
3. Estimate components empirically with VAR and see which estimated component co-moves with actual C/W
4. Predict risk free rates using C/W

   Risk free rate=f(C/W)

Results

1. C/W is a strong predictor of risk-free rates, term premium and population growth
2. Macro shocks and financial shocks both have a role in explaining $\downarrow$ in real risk free rates via $\uparrow$ savings
3. Risk free rates will stay low for an extended period of time
4. Suggestive decline in *natural* interest rate—what policy makers care about.

General Impression

- Excellent paper
- I believe the results
- My comments will be on interpretation:
  - how to make it sharper
  - what more we can do to understand the underlying shocks/causes

Literature and Framework

Real rate, r = real risk free rate + real risk premium

Natural rate, r*= real rate at potential output, Y*

$r = r*$ **only under monetary policy neutrality**

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- Directly observable real rates: yields on inflation-indexed bonds
- Approximate real rates: Nominal rates − inflation expectations
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Investment Decline—Summers view

- Lower relative price of investment; Lack of investment opportunities

Saving Increase

- Saving glut, China; Aging/demographics—Bernanke view
- Deleveraging after financial crises (debt cycles)—Reinhart-Rogoff view

Monetary Policy Easing—BIS view

Portfolio Shifts/Risk Appetite—Caballero-Farhi-Gourinchas; Gorton-Metrick; Krishnamurthy and Vissing-Jorgensen

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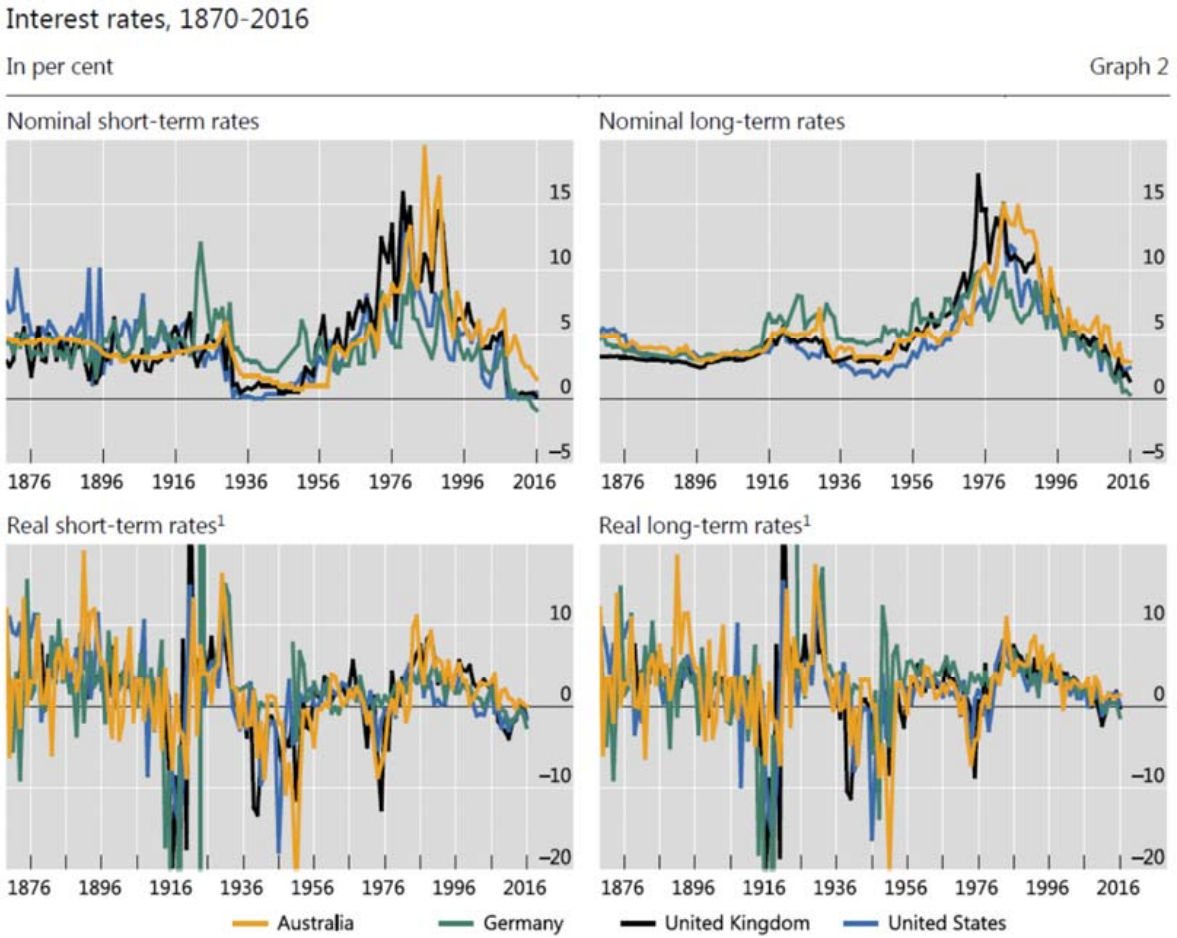
GR paper: Long-run approach–role for savings via debt/financial crises

From Borio and Hoffman, 2017



Decomposition

Assume:

- Global intertemporal budget constraint
- Transversality condition
- **Stationary consumption/wealth ratio**

C/W (today)=(future) risk-free rate + risk premia + C growth

My Comments

1. Decomposition assumes stationarity of log(C/W)
   $\Rightarrow$ **Revisit results checking stationarity**

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2. Decomposition of C/W does not have a causal interpretation
   - VAR says risk premium is not important for C/W.
   - OLS says term premium is very important for C/W.
   - VAR says productivity shocks and demographic shocks seem to be more important than deleveraging shock
   - Data seems to suggest a bigger role for deleveraging and risk appetite shocks
     $\Rightarrow$ **Use the model to identify the effect of all shocks on C/W and risk free rates**

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3. Is C/W the only variable that can predict risk free rates?
   $\Rightarrow$ **A horse-race predicting regression**

Comment 1: Stationarity of C/W

Null hypothesis: The variable has a unit root				
Variable	Sample	Specification†	t-statistic	p-value
U.S. ln(C/W)	1870 - 2015	No intercept and trend	0.534	0.830
		Intercept only	-2.592	0.097
		Intercept and trend	-3.430	0.052
	1920 - 2015	No intercept and trend	0.629	0.851
		Intercept only	-1.173	0.683
		Intercept and trend	-1.303	0.881
G-4 ln(C/W)	1920 - 2015	No intercept and trend	0.876	0.897
		Intercept only	-0.862	0.796
		Intercept and trend	-1.123	0.919

Notes: The equation for the augmented Dickey-Fuller test is specified as $\Delta y_t = \gamma y_{t-1} + \sum_{s=1}^{k} \delta_s \Delta y_{t-s} + c + \beta t + \epsilon_t$

Reject unit root and establish stationarity only for 1870-2015 for US.
Caveat: DF test performs better with long time series.

Predictive Regressions

GR runs:

$$y_{t+k} = \alpha + \beta ln(C_t/W_t) + \epsilon_{t+k}$$

$$\downarrow$$

- ST risk free rates
- C. growth
- Equity premium
- Pop. growth
- Term premium
- (and in the latest version credit growth)

Add a trend.

United States (1870 - 2015)

Forecast Horizon	1	2	5	10	1	2	5	10
	(1) No Trend				(2) With Trend			
A. Short term interest rate								
$ln(C/W)_t$	0.13**	0.14**	0.14***	0.15***	0.09	0.10	0.12**	0.13***
	(0.06)	(0.06)	(0.04)	(0.03)	(0.08)	(0.08)	(0.05)	(0.03)
R^2	[0.09]	[0.11]	[0.19]	[0.29]	[0.10]	[0.13]	[0.21]	[0.30]
B. Consumption Growth (per capita)								
$ln(C/W)_t$	-0.03	0	0.01	-0.01	-0.03	0.01	0.03	0
	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)	(0.04)	(0.03)	(0.02)
R^2	[0]	[0]	[0]	[0]	[0]	[0]	[0.03]	[0.07]
C. Equity Premium								
$ln(C/W)_t$	0.13	0.12	0.01	-0.04	0.29	0.26	0.09	-0.01
	(0.15)	(0.15)	(0.09)	(0.07)	(0.19)	(0.19)	(0.10)	(0.07)
R^2	[0]	[0]	[0]	[0]	[0.01]	[0.03]	[0.02]	[0.02]
D. Population Growth								
$ln(C/W)_t$	0.03***	0.03***	0.03***	0.02***	0.01	0.01	0.01*	0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
R^2	[0.30]	[0.32]	[0.34]	[0.31]	[0.62]	[0.64]	[0.67]	[0.68]
E. Term Premium								
$ln(C/W)_t$	-0.05***	-0.05***	-0.05***	-0.04***	-0.03	-0.03*	-0.03***	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
R^2	[0.11]	[0.15]	[0.27]	[0.27]	[0.17]	[0.23]	[0.40]	[0.52]

U.S., U.K., France and Germany (1920 - 2015)

A. Short term interest rate								
$ln(C/W)_t$	0.07	0.08	0.12***	0.17***	0.07	0.08	0.13***	0.17***
	(0.05)	(0.05)	(0.04)	(0.04)	(0.06)	(0.06)	(0.05)	(0.04)
R^2	[0.03]	[0.05]	[0.18]	[0.35]	[0.02]	[0.04]	[0.17]	[0.35]
E. Term Premium								
$ln(C/W)_t$	-0.03**	-0.04**	-0.05***	-0.04***	-0.03	-0.03**	-0.04***	-0.04***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
R^2	[0.07]	[0.12]	[0.36]	[0.38]	[0.09]	[0.14]	[0.40]	[0.44]

Comment 1: Stationarity of C/W: Takeway

Their main result holds: (with the exception of population growth)

C/W is a predictor of risk free rate and term premium at **long horizons**

Comment 2: Identification

Decomposition does not have a causal interpretation

Key Issues:

- What is causing C/W to change over time?
- Are there other predictors of risk-free rates or only C/W?

Why C/W changes over time?

- Productivity shock: risk free rate and consumption growth moves (-)
- Demographic shock: Ambiguous since demography effects both savings and return to capital
- Deleveraging shock: risk free rate and consumption growth moves (+); risk free rate and C/W moves (+)
- Risk Appetite shock: safe asset demand $\uparrow$, risk free rate $\downarrow$, risk premium $\uparrow$

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VAR results:

- C/W moves (+) with the risk free rate component ⇒ deleveraging shock
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LR Co-variability results:

- Risk free rates do not move with population and consumption growth
- C/W (-) moves with term premium
- Risk free rates (-) moves with term premium

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⇒ Deleveraging and risk appetite shocks in the data; productivity and demographic shocks in the model based VAR (Euler equation)
⇒ Deleveraging shock can deliver (-) movement of risk free rate and risk premium by adding debt overhang on investment (Kalemli-Ozcan et al., 2018): ↑ saving and ↓ investment so ↑ MPK

Can we use the model to identify the causal shock?

- A nice structural model but not use it to explain data; rather do reduced form VAR and predictive regressions.
- Understandable since decomposition result depends on model specification.
- Still, can add all the shocks to the model and calculate share of variance explained by each shock from the model as another way of interpretation.
    - Risk free rate becomes a function of deleveraging and risk appetite shocks and since these fluctuate more in the data, they dominate the negative relation between risk free rate and consumption growth.

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A quick test of the fit of the model:

Data Risk Free Rate Predicting (U.S., 1870 - 2015)

	Forecast Horizon (Years)			
	1	2	5	10
ln(C/W)	0.13**	0.14**	0.14***	0.15***
R^2	[0.09]	[0.11]	[0.19]	[0.29]

Model Risk Free Rate Predicting

	Forecast Horizon (Years)			
	1	2	5	10
ln(C/W)	0.11***	0.11***	0.10***	0.08***
R^2	[0.20]	[0.23]	[0.25]	[0.22]

Comment 2: Identification: Takeaway

- Deleveraging shock explains C/W
- Deleveraging shock + risk appetite shock explain risk free rate

U.S. (1870 - 2015), Contribution of each shock (percent)

	Productivity (g)	Demographics (n)	Deleveraging (ρ)	Risk App. (θ)
ln(C/W)	2.18	1.34	92.01	4.47
Risk free rate	5.80	0.24	30.58	63.38

The table reports the share of unconditional variance of log consumption to wealth (C/W) and risk free rate explained by each shock. The share of productivity and population growth shocks includes both first and second moment shock.

Comment 3: Horse-Race Prediction for Rates

United States (1870 - 2015)

Horizon	1	2	5	10	1	2	5	10
	No C/W and other variables				All variables			
$ln(C/W)_t$					0.06	0.08	0.09**	0.11***
					(0.06)	(0.07)	(0.05)	(0.03)
C. growth $_t$	-0.02	-0.05	0.03	0.00	-0.04	-0.07	0.01	-0.02
	(0.13)	(0.10)	(0.06)	(0.06)	(0.13)	(0.09)	(0.05)	(0.04)
EP_t	-0.01	0.02	0.03*	0.01	0.00	0.03	0.03*	0.02*
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
Pop. growth$_t$	1.34	1.25	1.69*	1.83**	0.77	0.50	0.81	0.94
	(1.13)	(1.13)	(0.93)	(0.83)	(1.36)	(1.39)	(1.12)	(0.81)
TP_t	-1.22***	-1.20***	-0.81***	-0.58***	-1.17***	-1.13***	-0.73***	-0.47**
	(0.36)	(0.39)	(0.27)	(0.20)	(0.36)	(0.40)	(0.27)	(0.19)
R^2	[0.21]	[0.22]	[0.24]	[0.27]	[0.21]	[0.25]	[0.30]	[0.38]

U.S., U.K., France and Germany (1920 - 2015)

Horizon	1	2	5	10	1	2	5	10
	No C/W and other variables				All variables			
$ln(C/W)_t$					0.02	0.04	0.10**	0.14***
					(0.04)	(0.04)	(0.04)	(0.03)
C. growth $_t$	-0.05	0.01	0.16	0.17*	-0.07	-0.03	0.06	0.05
	(0.16)	(0.15)	(0.14)	(0.09)	(0.15)	(0.13)	(0.13)	(0.09)
EP_t	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Pop. growth$_t$	1.01	1.18	1.66*	1.32*	0.91	0.80	0.72	0.15
	(1.00)	(1.16)	(0.93)	(0.74)	(1.15)	(1.20)	(0.93)	(0.60)
TP_t	-1.42***	-1.49***	-1.00**	-0.80***	-1.40***	-1.45***	-0.93**	-0.65***
	(0.34)	(0.36)	(0.39)	(0.29)	(0.34)	(0.37)	(0.37)	(0.24)
R^2	[0.24]	[0.27]	[0.20]	[0.19]	[0.24]	[0.28]	[0.28]	[0.41]

Conclusion

- Important contribution showing effects of debt super cycle and deleveraging on real risk free rate decline
- Term premium and C/W ratio can predict risk free rates
  - C/W can also predict term premium
- Different approach relative to the literature, so need little bit more work to nail down identification
- **Important policy implications:**
  - Role of expectations: Term premium can predict short-term risk free rates.
  - Long run persistent effects of debt driven financial crises on risk free rates.
  - Puts effectiveness of monetary policy under persistent low interest rates in doubt (Borio and Hoffman, 2017)