What Anchors for the Natural Rate of Interest?
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Secular decline in real interest rates

Prevailing explanations

- Natural rate, S-I factors
  - Secular stagnation, savings glut, safe asset shortage
- Monetary factors “neutral” in the long-run

What if...

- Market rates diverged from natural rate persistently
- Monetary policy not neutral in the long-run
  - Financial cycle
Real interest rates and S-I factors

S-I a theory for the natural rate applied to market rate

- Equality to market rate a maintained hypothesis
- Underlying theory not tested

A long historical perspective (Borio et al (2017))

- Since 1870-2016, 19 countries
- Direct link with “usual suspects”
  - Growth, productivity, demographics, income distribution, relative price of capital
Real interest rates and S-I factors

Link or no link?

Per cent

-3 0 3 6 9 12

Per cent

-3 0 3 6 9 12

Per cent

-3 0 3 6 9 12

Years

75.0
62.5
50.0
37.5

Note: Median values of 19 advanced countries
# Real interest rates and S-I factors

## Usual suspects: Not guilty

<table>
<thead>
<tr>
<th></th>
<th>(1) Full sample</th>
<th>(2) Gold standard</th>
<th>(3) Interwar</th>
<th>(4) Postwar</th>
<th>(5) Pre-Volcker</th>
<th>(6) Post-Volcker</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP growth (+)</td>
<td>-0.09**</td>
<td>-0.00</td>
<td>-0.07</td>
<td>0.08</td>
<td>0.07</td>
<td>0.03</td>
</tr>
<tr>
<td>Population growth (+/-)</td>
<td>-0.83*</td>
<td>-0.50</td>
<td>0.25</td>
<td>-0.77**</td>
<td>-0.00</td>
<td>-0.68</td>
</tr>
<tr>
<td>Dependency ratio (+)</td>
<td>0.02</td>
<td>-0.03</td>
<td>-0.04</td>
<td>0.03</td>
<td>0.14***</td>
<td>-0.03</td>
</tr>
<tr>
<td>Life expectancy (-)</td>
<td>0.04</td>
<td>-0.20***</td>
<td>0.41</td>
<td>0.23**</td>
<td>0.47***</td>
<td>-0.32***</td>
</tr>
<tr>
<td>Relative price of capital (+)</td>
<td>0.01</td>
<td>0.11**</td>
<td>-0.06</td>
<td>-0.00</td>
<td>-0.06*</td>
<td>0.01</td>
</tr>
<tr>
<td>Income inequality (-)</td>
<td>0.10*</td>
<td>-0.01</td>
<td>0.00</td>
<td>-0.26***</td>
<td>-0.10</td>
<td>-0.10</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.97</td>
<td>15.33***</td>
<td>-17.90</td>
<td>-14.27*</td>
<td>-42.48***</td>
<td>31.18***</td>
</tr>
</tbody>
</table>
Real interest rates and S-I factors

Monetary regimes and real long-term rate

• Globally, monetary policy of anchor countries outperform S-I factors
Safe asset shortage?

Key elements

• Change in relative demand/supply of safe assets
• Higher spread between risky and safe assets

But...

• Conceptual and empirical drawbacks
Premia and spreads: widen or tighten?

US equity excess returns

Per cent

US corporate bond spreads

Per cent

Source: Jorda et al (2017)

Safe asset shortage?
Safe asset shortage?

Premia and spreads: widen or tighten?

Global corporate bond OAS

10-year sovereign bond term premia
Sign-restricted VAR: Contribution of SAS small

Historical decompositions of real 5y5y rate
(Percent)
What compass for monetary policy?

Natural rate model-dependent

• Inflation sufficient?
• Equilibrium should be sustainable
  – Financial instability incompatible with sustainability
  – Definition of natural rate should encompass “financial equilibrium”

The long hand of the financial cycle

• Credit booms predict busts
• Busts leave long-lasting scars
• Monetary non-neutrality
Key Ideas (Juselius et al. (2017))

- Financial cycle anchored to two long-run relationships that pin down sustainable credit-GDP ratio
  - Leverage gap
    \[ \tilde{lev}_t = (cr_t^r - y_t^r) - \beta_{lev} p_{A,t}^r - \overline{lev} \]
  - Debt service gap
    \[ \tilde{dsr}_t = (cr_t^r - y_t^r) + \beta_{dsr} i_{L,t} - \overline{dsr} \]

where \( cr_t^r \) = real credit, \( y_t^r \) = real output, \( p_{A,t}^r \) = real asset price, \( i_{L,t} \) = nominal average lending rate on stock of credit

- Credit-to-GDP, real asset prices, and nominal lending rate proportional in the long-run
An empirical model

US Leverage and Debt Service Gaps

The two gaps interact...leading to endogenous cycles

- Output effects large and very persistent
- Crisis not result of shocks

Source: Juselius et al. [2017]
An empirical model

Policy can smooth the financial cycle

GDP

Nominal short-run money market rate

Leverage gap

Debt service gap

- Actual  - Counterfactual 2003  - Potential
What anchors for the natural rate of interest?

An empirical model
A theoretical model

Underlying theme

• Multiplicity of outcomes subject to policy
• Path-dependency
  – Busts linked to booms
  – CB reaction function conditions vulnerability to boom-bust, thus intertemporal policy trade-off
Key features

• OLG of firms and households; financing essential
• Strategic complimentarity among banks
  – Pool of borrowers depends on loan rate
• Multiple equilibria
  – Boom: low rate, ample credit, high output
  – Bust: high rate, scarce credit, low output
  – Regime switch conditional on bank capital
• Policy determines risk-taking, hence bank profits and evolution of bank capital
A theoretical model

Monetary hysteresis

Optimal policy

Simulated policy rate

$R^*$

$K$

Time

$\beta=0.95$

$\beta=0.90$

$\beta=0.85$
A theoretical model

Monetary hysteresis

Histogram of policy rate

Frequency of regimes
What anchors for the natural rate of interest?

• Path-dependence implies that asymmetric policy may bias rates down over successive cycles

• Endogeneity of natural rate to policy undermines it as anchor for policy

Policy frameworks

• Monetary policy is the ultimate financial anchor; Sets the price of leverage

• Potential for highly persistent effects needs to be recognized;
  – Monetary policy is the wind