Long-run Macro-Finance

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Macro-Finance in the Long-Run

- Typical macro-finance questions relate to boom/bust business cycle frequency issues.

- Long-Run Macro-Finance: How do small but persistent low frequency forces shape the relationship between macro and finance? ... Long-Run determines the “state variable” for short-run / business cycle freq.

- Today: ... the role of changes in distribution (inequality) on supply and demand for credit via consumption-saving decisions.

  ... implications for secular trends in credit, interest rate and asset prices.
  ... implications for monetary policy.
  ... implications for fiscal policy.
  ... empirically estimating long-run expectations of “natural rate”.
Indebted Demand model

• Non-homothetic preferences
  … people derive greater utility from accumulating wealth \((a)\) as they get richer
  \[
  \int_{0}^{\infty} e^{-(\rho+\delta)t} \left\{ \log c_t^i + \frac{\delta}{\rho} \cdot v(a_t^i) \right\} dt
  \]

• Euler equation in steady-state for the rich
  … determines the long-run saving supply schedule
  \[
  r = \rho . \frac{1 + \rho/\delta}{1 + \frac{\rho}{\delta} . av'(a)}
  \]

See Mian, Sufi and Straub (QJE 2021) for formal details
Standard homothetic models

Rise in Inequality has NO EFFECT on $r$ or debt!
Rise in Inequality lowers $r$ and raises debt!
Indebted Demand

- When rich save more out of lifetime income, and extreme inequality rises
  … need to stimulate demand today through debt creation: rich save/lend, non-rich borrow
  … but that reduces demand in the future when borrowers have to repay the debt
  … only solution is for interest rate to fall, so non-rich could borrow even more!
  … this **indebted demand** cycle continues, until interest rate hits zero lower bound (ZLB)
  … if extreme inequality persists, remain stuck in perpetual **debt trap**
Rising inequality is associated with rising debt and falling rates.
Is credit financing the demand-side of the economy?
Where does the saving glut of the rich go?

See Mian, Sufi and Straub ("Saving Glut of the Rich") for formal details.
Implications for monetary policy

- Rising inequality forces the hand of monetary policy by lowering r*
  ... reduces space for monetary policy to operate

- Easy monetary policy often raises demand through debt creation
  ... but that creates indebted demand, putting downward pressure on future rates: monetary policy has limited ammunition.

  “the sustainability of debt burdens depends on interest rates remaining low” – Mark Carney

- Persistent extreme inequality pushes monetary policy against ZLB, and economy stagnates inside a debt trap
Implications for fiscal policy

• With “specialness”, such as “convenience yield”, of government debt, $R < G$ for government borrowing when aggregate demand is weak … fiscal policy is like a wealth tax!

• Rising inequality expands fiscal space

• There is an MMTesque “free lunch” when $R < G - \psi$, i.e. government can increase primary deficit permanently without ever having to raise taxes

• The design of tax policy is really important for moving and staying away from the ZLB

See Mian, Sufi and Straub “A Goldilocks Theory of Fiscal Policy”
Implications for fiscal policy

Rise in inequality expands fiscal space!
What should policy makers do?

- Revise macroeconomic models to incorporate the key role that inequality plays in determining macroeconomic dynamics and fundamentals
  ... possibly explains persistent over-forecasting of interest rates
- Monetary policy is ill-equipped to deal with weak aggregate demand resulting from extreme inequality. Emphasis should be on,
  ... policies that deliver equitable and inclusive growth
  ... progressive taxation, consider wealth taxes
  ... Increase public investment, especially in areas that promote equality of opportunity
  ... promote competitive markets
Where is the natural rate heading?

- Wicksell: natural rate that clears market for saving and investment

- Natural rate of interest, \( r^* \), and LW and HLW estimates by New York Fed
  ... but estimates are very imprecise
  ... subject to serious misspecification concerns (e.g. broke down during pandemic)

- BHM estimate natural rate of return on capital, \( r_k^* \), using a natural experiment approach: lease extension experiments in UK
  ... precise, no structural assumption, real-time, public data

See Backer-Peral, Hazell and Mian “Measuring The Natural Rate With Natural Experiments”
What is the natural rate of return on capital, $r_K^*$?

- Price $P_t$ of capital with dividend $R_t$:

$$P_t = R_t \int_0^\infty e^{-\int_0^S r(u) + \zeta(u) - g(u) du} dS$$

where $r$ is safe return, $\zeta$ is risk premium and $g$ is dividend growth

- The natural rate of return on capital is the long-run expectation of the dividend-price ratio

$$\frac{R_{t+\infty}}{P_{t+\infty}} \equiv \lim_{u \to \infty} \frac{r(u) + \zeta(u) - g(u)}{r(u) + \zeta(u) - g(u)} \equiv r_K^* = r^* + \zeta^* - g^*$$

- Equivalently $r_K^*$ is the Hall-Jorgensen user cost of capital, normalized by its price
Empirical Methodology

Price change after lease extension difference-in-difference:

\[
\Delta_{it} = \log \left(1 - e^{-r_{kt}^* (T_{it} + 90)}\right) - \log \left(1 - e^{-r_{kt}^* T_{it}}\right)
\]

Control: non-extenders within \{0.1, 0.5, 1, 5, 10, 20\} km and ±10% of extender duration \(T_{it}\)

- Robustness: residualize prices by hedonic characteristics

Validating control group + parallel trends:

- Balance test: hedonics vs. treatment
- Placebo: growth in (market) rents + hedonics vs. treatment
- Lack of pre-trends: growth in prices before extension vs. treatment
- Stable coefficients w/ controls

Nonlinear least squares: estimate \(r_{kt}^*\) given \((\Delta_{it}, T_{it})\) from lease extensions

- Time varying estimator of \(r_{kt}^*\) is feasible
Event Study

Event Study Plot Over Time & Duration  Lease Term Distribution

90 year extensions

Price change from lease extension helps to identify $r_{Kt}^*$
Duration Before Extension Predicts Price Change After Extension

Binscatter with 100 bins, 90 year extensions

Model prediction: price gain from extension decreasing in duration before extension (helps to identify $r^*_K$)
Main Result

Fall of $r_K^*$ from 4.8% to 2.3%, more than doubling of natural price-rent ratio.
Long-run Macro-Finance

• Today we focused on the “demand side” – how inequality, via consumption-saving decisions, impacts determination of long-run interest rate and debt to GDP, shapes (and constrains) monetary and fiscal policies

• We took the “supply side” as given – but falling rates should be expansive, why has investment not exploded (e.g. see Liu, Mian and Sufi Ectma 2022)? What is the impact on asset prices, and the Q theory of investment?

• What about feedback effects of long-run debt and interest rate to inequality and mobility?
What are the consequences of long-run credit expansion?
Macro-Finance and the long-run

- Huge rise in quantity and large fall in price of credit since about 1980. Why did this happen? What are its consequences?
Is credit financing the supply-side of the economy?
• Is credit financing the supply-side of the economy?
Where is long-run credit expansion coming from?
Fact: The rich save more out of *lifetime* income
Household problem

- Fraction $1 - \mu$ savers solve (de-trended) problem

$$\max_{\{c_t, b_t\}} \int_0^{\infty} e^{-\rho t} \left\{ \log c_t + v(b_t) \right\} dt$$

$$c_t + b_t \leq (R_t - G_t) b_t + (1 - \mu) y_t - \tau_t$$

- $b_t =$ government debt to potential GDP

- $v(b_t)$ captures convenience benefits of government bonds
  [Krishnamurthy Visser-Jorgensen 2012, Greenwood Hansen Stein 2015]
  - increasing and concave

- Spenders consume constant share of income $\mu y_t$

- $y_t =$ labor endowment, sold to repr. firm. If rationed, $y_t < 1$
Government

- Fiscal policy consists of \( \{x, b_t, \tau_t\} \) that satisfy
  \[
  x + (R_t - G_t) b_t \leq b_t + \tau_t
  \]
  primary deficit: \( z_t \equiv x - \tau_t \)

- Monetary dominance, natural rate implemented whenever possible
  \[
  R_t = \max\{R^*_t, 0\}
  \]

- Simple downward nominal wage rigidity
  \[
  \pi_t = \frac{\dot{W}_t}{W_t} \geq \pi^* - \kappa (1 - y_t)
  \]

  When demand is low, \( y_t < 1 \) and \( \pi_t < \pi^* \)

  \([\kappa < \nu'(0) \text{ avoids Benhabib Schmitt-Grohe Uribe (2001) issues, as in Michaillat Saez (2019)}\]

What determines fiscal space?

- Fiscal space shrinks with greater discount rate $\rho$
  - more “aggregate demand” shrinks fiscal space
- Fiscal space rises with greater inequality $1 - \mu$
  - conflict between large deficit-financed programs and reducing inequality?