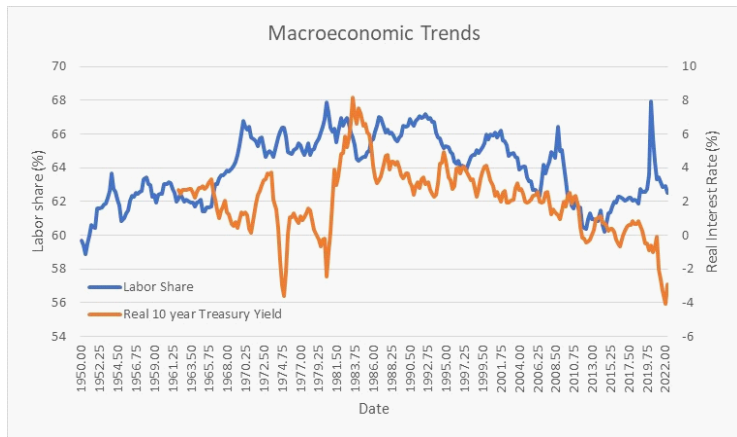


Fornaro and Wolf: Monetary Policy in the Age of Automation

A Discussion

Morten O. Ravn, University College London and the CEPR

ECB ARC 2022



- Decline in labor share from early 1980s to mid 2010s
- Decline in real interest rate post-Volcker

Factors behind declining labor share:

- Changes in goods market power: Increasing mark-ups.
- Changes in labor market power: Declining mark-downs.
- Changes in technology: Automation.

Factors behind declining real interest rate:

- Demographics.
- (Low) productivity growth.
- Increase in idiosyncratic risk + Chinese savings glut.

Where does monetary policy come in? It doesn't - standard view is:

- MP impacts labor share temporarily and through mark-ups.
- MP manipulates short/medium run real rate.

Key new idea: Monetary policy may have medium/long term effects on productivity and on real rates.

Key channels:

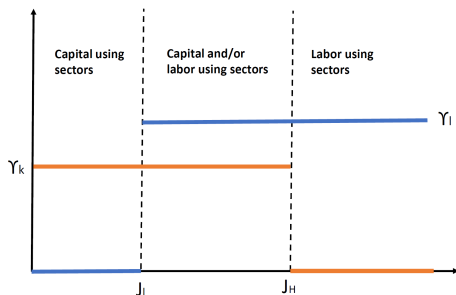
- 1 Effects on productivity through firms' automation choices.
- 2 Effects on real rates through wealth-real rate nexus.

Key insights:

- Unconventional MP effects on employment and inflation in SR/MR.
- Fiscal policy may improve productivity without inflationary costs.
- Run economy hot to escape low employment/productivity trap.

The Setting: Model with following features.

(a) Endogenous technology choice: $y_j = \gamma_l l_j + \gamma_k k_j$



- Technology choice for $j \in [J^L, J^H]$ determined by $w/r^k \geq \gamma_l/\gamma_k$

(b) Wealth in the utility function:

$$V_0 = \sum_{t=0}^{\infty} \beta^t \left[\log C_t - \frac{(L_t/\bar{L})^{1+\eta}}{1+\eta} + \zeta \left(\frac{B_{t+1}}{P_t} + K_{t+1} \right) \right]$$

- induces $\partial C^{LR}(r) / \partial r|_{bgp} < 0$:

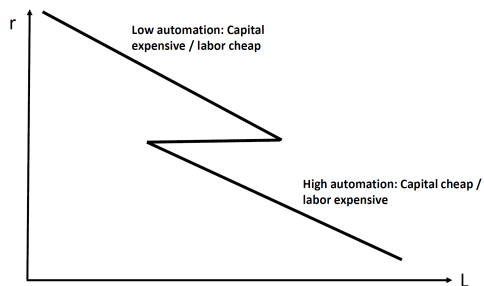
$$\frac{C_{t+1}}{C_t} = \beta(1 + r_{t+1}) + \zeta C_{t+1}$$

(c) Sticky nominal wages:

$$W_t = \left(\frac{L_t}{\bar{L}} \right)^{\psi} W_{t-1}$$

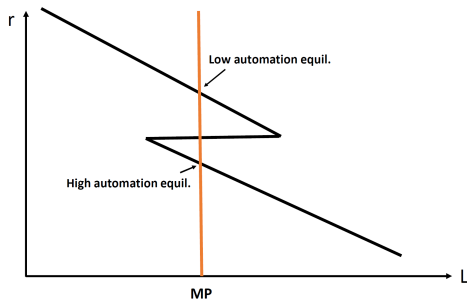
- so that MP has real effects through relative factor costs.

Key Diagram

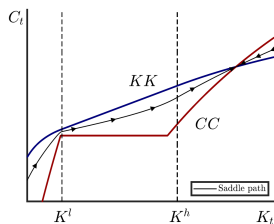


- Non-monotonic labor demand because of automation choice for $j \in [J^L, J^H]$

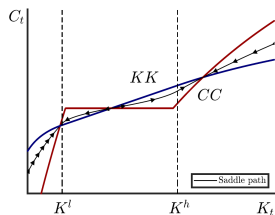
Equilibrium



- Even if MP aims for full employment, economy may end up in:
- **Low automation equilibrium:** Low productivity.
- **High automation equilibrium:** High productivity.



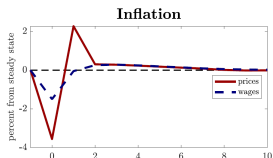
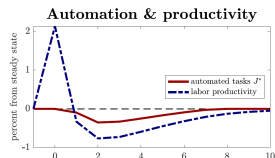
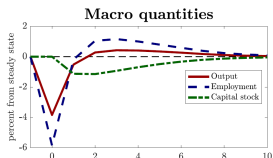
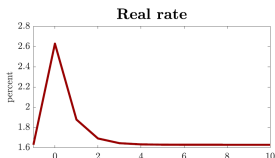
(a) Unique steady state.



(b) Multiple steady states.

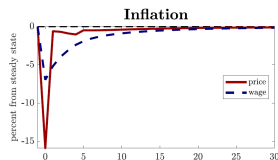
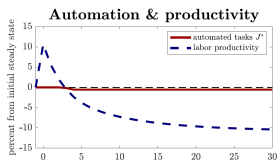
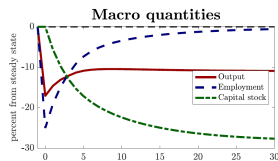
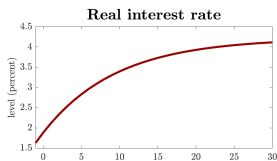
- CC locus upward sloping because of wealth-real rate nexus.
- Two stable equilibria may arise - low and high automation.
- Large shocks may shift economy between these equilibria.
- Without wealth in utility: Unique (saddlepath) stable equilibrium.

Exercise 1: Temporary but large tightening of MP



- Tightening of MP increases cost of capital.
- Induces de-automation \rightarrow inflation reversal and productivity slump.
- Δr large, economy close to threshold, fast techn. adoption.

Exercise 2: Permanent MP tightening in the ME economy



- Economy goes from “good” to “bad” equilibrium.
- Employment recovers but economy settles in low productivity / low automation equilibrium.
- On the reverse: Run economy hot to escape bad equilibrium.

Comment 1: Great paper - full of ideas!

Comment 2: Elegant paper - simple model, many insights.

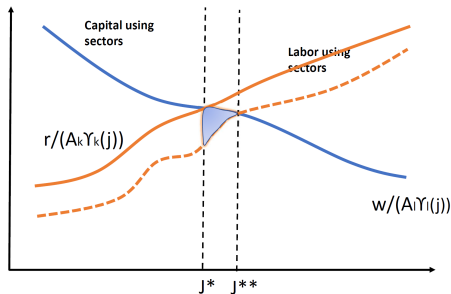
Comment 3: Provocative:

- Unconventional impact of monetary policy.
- There might be instances where running economy hot is exactly the right medicine.
- Fiscal/monetary policies may be used to impact on automation and productivity with no effects on inflation and employment.
- Monetary policy may have to be designed to also account for automation effects.

Comment 4: Extremely well-written.

Question 1: Automation productivity or distribution?

With a unique equilibrium, automation is more about distribution than productivity.

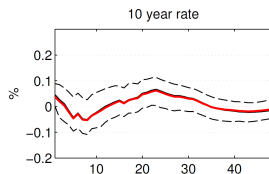
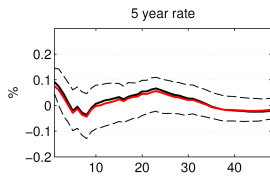
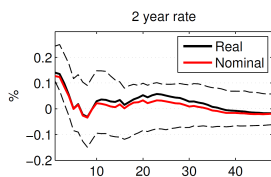


- Automation on the margin where effective productivity differences are small.
- Significant distributional effects as income shift from labor to capital.
- Shift emphasis from productivity to distribution?

Question 2: MP shocks likely to impact automation?

How sensitive are technology choices to MP over the frequencies that MP can affect real interest rates?

- Significant fixed costs likely when adopting new technology.
- Therefore, long term real rates are key.



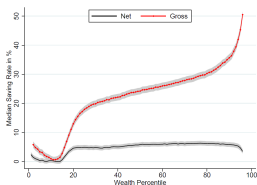
(source: Gertler and Karadi, 2015)

- Transitory and small impact on longer term real rates.
- Would be interesting to get some evidence on MP impact on automation.

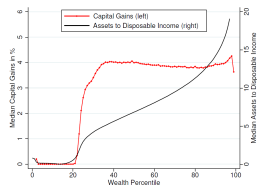
Question 3: Wealth real rate nexus

- EE^{LR} negatively sloped - else unique LR equilibrium.

$$\frac{C_{i,t+1}}{C_{i,t}} = \beta (1 + r_{t+1}) + \underbrace{\xi C_i(A_{i,t+1})}_{\text{higher wealth} \rightarrow \text{higher savings}}$$



(a) Saving rates by wealth percentiles



(b) Average capital gains and asset-to-income ratio

(source: Fagereng, Blomhoff Holm, Moll and Natvik, 2022)

- Net savings rates flat in wealth, higher wealth higher asset returns.
- EE may be negatively sloped in SR, more evidence needed on LR.

Question 4: Demand managing structural problems?

Paper shows also that when there is a lower bound on the real rate:

(a) Savings glut $\xrightarrow{\text{can}}$ policy choice between automation and unemployment.

(b) Increased automation $\xrightarrow{\text{can}}$ liquidity trap with unemployment.

- ZLB: Conventional MP ineffective but fiscal expansion can restore desired equilibrium.

Similar role of fiscal policy in standard NK model w/o technology choice.

- Fiscal multipliers large.
- Large fiscal interventions can rule out LT (Benhabib et al, Michau).

But fiscal interventions need to be **very** large to rule out LT.

A. Exciting research agenda on structural issues / monetary policy.

B. How many tasks do we give Central Banks?

- Anchor inflation expectations, aim for natural rate of (un)employment.
- Financial stability, green transition, inequality, automation.

C. Can Central Banks do much about technology choice?

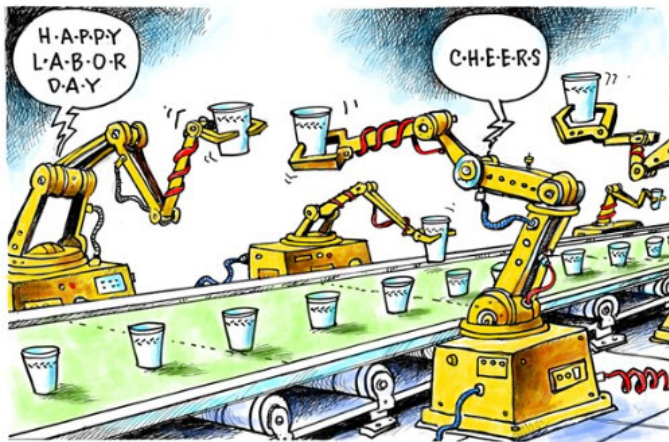
- What does the data say?

D. Better instruments for structural issues?

- If lack of adoption is an issue: Invest in education/infrastructure?
- If fast adoption is an issue: Promote re-skilling?

Conclusion

Important paper!



Thanks for the attention!