Discussion: The impact of artificial intelligence on output and inflation

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How does AI adoption affect output, inflation, and sectoral dynamics?

Empirical and theoretical approach:

- Construct industry-level AI exposure index
- Calibrated (US) multi-sector model (AI as productivity shifter; (un)anticipated scenarios)

Key Findings:

- Upward shift of GDP (+35% in long run)
- Initially disinflationary, then inflationary (unanticipated)/ inflationary (anticipated)
- Low correlation between initial sectoral AI exposure and long-run output increase
  - Role of sectoral interlinkages: significant amplification of output gains when AI has relatively stronger impact on consumption vs. investment goods sectors

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Policy Implications:

- **"Goldilocks" scenario** (imperfect anticipation) for **monetary policy:** AI alleviates short-term inflation pressures; monetary contraction over the longer-term.
- AI adoption policies should focus on consumption goods sectors.

My take

Very interesting paper, studies key questions for monetary policy:

1. How is the adoption of AI technologies going to affect longer-term output growth?
2. What are the inflation implications of AI adoption?

My comments focus mainly on:

1. Additional, unaccounted for channels
2. Alternative mechanisms and paths of key variables:
   - Labor-augmenting vs. displacing AI, unemployment, distributional consequences
   - Potentially very different outcomes for wages, inflation, and TFP
   - Implications for monetary policy may be fundamentally different $\rightarrow$ highly uncertain policy outcome
3. Suggestions, additional analysis

Inconclusive Evidence on the Productivity Effects of AI

- Ad-hoc assumption of 1.5 annual TFP growth (based on other studies), assumption that this additional growth prevails for a decade.
- Literature inconclusive on the productivity effects of AI, big range of plausible estimates.
- Unclear if this effect will be evenly distributed across sectors.
- Debate on if the expectations about the productivity effect has been exaggerated ($\rightarrow$ e.g, technology "hype cycle").
- Key input in this model, if this changes, so do inflation dynamics and the implications for monetary policy stressed in the paper.
- Uncertainty around this could be more discussed in the paper $\rightarrow$ more detailed scenario analysis regarding the productivity effects of AI?

AI and Labor Market Heterogeneity

- AI adoption modeled as a large (permanent) technology shock, with interesting sectoral transmission and propagation.
- Labor market heterogeneity is though crucial, arguably especially for the case of AI.
- Ultimately predominantly an occupational question:
  - Whose productivity is going to increase?
  - Crucial: is this effect labor-augmenting or displacing?
  - Possibility of unemployment (potentially large-scale)
- No clear mapping between exposure measure and worker productivity: high exposure may mean large productivity gains or displacement (productivity $= 0$).

Mapping between Productivity Growth and Inflation

- Productivity increases may translate into wage gains for some occupations, and unemployment for others $\rightarrow$ Impact on wages and inflation depends on the balance of these effects.
- Possible divergence between productivity and the output gap (unemployment).
- Demand-effects depend also on MPCs of affected workers.
  - AI-induced technological change not only confined to low wage workers.
- Distributional of gains from AI between workers vs. firms? $\rightarrow$ markups?
- Possibility of persistent unemployment, wages $\downarrow$, demand $\downarrow$

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- Possibility of persistent unemployment, wages $\downarrow$, demand $\downarrow$
- **Implications for monetary policy** may shift potentially differ drastically: subdued inflation, challenge of aligning inflation with target from below.
- Potential cross-country heterogeneities: role of adverse euro area demographics (f.ex. Jones (2021)).

General Purpose Technology and R^*

Do the simulations model a general purpose technology or rather a permanent technology shock?

Definition of GPT: fundamental innovation characterized by three key properties:

Brynjolfsson et al. (2023), Helpman (1998).

1. **Pervasiveness:** Used across multiple sectors
2. **Continuous improvement:** Evolves and improves over time
3. **Innovation spawning:** Enables creation of new innovations

Examples: electricity, steam power, internal combustion engine, computing/semiconductors, internet

Macro and monetary policy implications:

- Growth rather than level effect
- Transition to a new BGP with higher growth rate
- $g \uparrow \Rightarrow R^* \uparrow$

$\Rightarrow$ **Alters monetary policy implications** over the short-term (transition) and long-term (BGP)

Sectoral Dynamics and Structural Change

- Aggregate TFP effects are ultimately also going to depend on the share of high-productivity vs. low productivity sectors ($\rightarrow$ Domar weights).
  - Influences also cost pressures.
- Impact on the speed of structural change: if you increase one sectors' productivity, reallocation of resources from this sector to low productivity sectors may occur(Ngai and Pissarides (2006)).
- Could the interesting sectoral structure of the model be exploited more here?
- Important also against the background that monetary policy induces sectoral reallocation across sectors and can accelerate the speed of structural change (Amador and Elfsbacka-Schmöller (2024))

Further suggestions

- Utilize more the interesting sectoral dynamics:
  - Highlight more the propagation across sectors and industries, to emphasize the strengths and valuable additional channels inherent to the framework more
  - Dissect the different mechanisms at play (additional simulations; analytical results; importance of sectoral interlinkages)
- Exploit model-inherent household heterogeneity (f.ex. as to marginal propensity to consume etc.)?
- Extend analysis to natural rate?
- Simulations under alternative AI-induced TFP growth scenarios
- Discussion section (alternative channels and trajectories)

Conclusion

- Very interesting paper on the sectoral transmission of AI adoption on growth and inflation, and its implications for monetary policy.
- Additional simulations and discussion of key model-inherent mechanisms could provide further interesting insights.
- Highlights also the importance of understanding implications of AI adoption for monetary policy more generally.