Intangible Capital, Aggregate Supply, and Inflation Challenges

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Subir Lall (MCD) and Li Zeng (EUR)
International Monetary Fund

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Intangible Capital, Aggregate Supply, and Inflation

- **Intangible Investment and Low Inflation: A Framework and Some Evidence**
  
  S. Lall and L. Zeng, 2020, IMF Working Paper 20/190

  - Rising importance of intangible capital, together with globalization, has led to more elastic aggregate supply in many economies, reflected as a flattened short-term aggregate supply (AS) curve.
  
  - A flattened short-term AS curve can help to explain the persistent low inflation observed in many advanced economies prior to the Covid-19 pandemic.

- **Policy implications, including in the context of today’s high inflation challenge**
  
  - Aggregate demand policies may be less effective than in the past in addressing inflation challenges.
  
  - Supply-side policies and structural reforms are also key.
  
  - Broader implications on issues such as monopoly, inequality, and taxation
Inflation gap = current inflation – long-term Consensus inflation forecast. Output gap data is retrieved from OECD.

Structural break test: ***, p-value < 0.01; **, p-value < 0.05; *, p-value < 0.1.
HAS THE AS CURVE FLATTENED OVER TIME – A VISUAL ILLUSTRATION (2)

Inflation gap = current inflation – long-term Consensus inflation forecast or WEO 5-year inflation forecast. Output gap data is retrieved from OECD. Structural break test: ***, p-value < 0.01; **, p-value < 0.05; *, p-value < 0.1.
Why has the AS curve become flatter? (1)

Because marginal production cost (MPC) curve has flattened over time

Condition for profit maximization

Lower MPC, higher sensitivity of production to price
Why has the AS curve become flatter? (2)

Globalization and rising importance of intangible capital has helped to flatten the MPC curve over time

Globalization
- Global sourcing of intermediate inputs -> lower MPC

Intangible capital
- Scalability -> lower MPC
  - Distribution of streaming contents
  - Development of auto drive chip and software
  - Tele physicians and online training programs
Empirical evidence: Intangible capital, globalization, and the AS curve (1)

Regressions analysis: \[ AS \ slope_t = \alpha + \beta \cdot X_t + \epsilon_t \]

Dependent variable
Time series of the AS curve slope
Estimated for each country based on a 40-quarter rolling window

Regressors
Degree of global integration (proxied by trade openness)
Intangible capital (stock ratio to tangible capital, percent share of GDP)

Regressions
For Individual economy
Panel regression
**Empirical evidence:**
Intangible capital, globalization, and the AS curve (2)

From the cross-country perspective, higher degree of global integration and higher shares of intangible capital are associated with flatter AS curves.

<table>
<thead>
<tr>
<th></th>
<th>Without time dummies</th>
<th>With time dummies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Trade openness</td>
<td>-0.60***</td>
<td>-0.43***</td>
</tr>
<tr>
<td>Intangible capital, ratio to tangible capital</td>
<td>-1.08***</td>
<td>-0.63***</td>
</tr>
<tr>
<td>Intangible capital, percent share of GDP 2</td>
<td>-0.51***</td>
<td>-0.31***</td>
</tr>
<tr>
<td>N</td>
<td>968</td>
<td>812</td>
</tr>
<tr>
<td>r2</td>
<td>0.32</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Legend: * p<.1; ** p<.05; *** p<.01

All the regressions include country fixed effects, and those in columns (6) to (10) also include time dummies.
Puzzle: Small/closed output gap, along with persistent low inflation

Flattened AS curve “solves” the puzzle, with profound implications

Flattened AS curve and pre-Covid low inflation
Supply shocks have played an important role behind the current high inflation

**Flattened AS curve:** Quantities can adjust more easily without large price changes
- Demand-side policies may be less effective in addressing inflation challenges
- Structural reforms to boost supply are also key
The rise of intangible capital – broader implications

- “Best performing” firms in the past two decades
  - Big technology firms…
  - All heavy on intangible, light on physical capital

- Intangible capital is still a rising trend
  - Monopoly. Could be a feature and not a bug of the system
  - Financing. With little tangible collateral, bank-funding or VC-type funding?
  - Labor market and inequality. When labor competes with AI…
  - Optimal taxation. When monopoly profits are becoming more common…
Thank you!
Intangible capital over time

Sources: INTAN-invest database and IMF WEO database.