Aggregate Dynamics and Microeconomic Heterogeneity: The Role of Vintage Technology

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Starting point: “lumpiness” of investment

Firms’ investment function is not smooth but rather is characterized by periodic jumps

Main result: firms that recently experienced a large investment episode (spike) are more productive

Causal effect of investment on productivity
Robustness tests:
- alternative empirical definitions of spikes
- different sample periods
- accounting for firms’ propensity to innovate
- age composition of the firms
- Rule out that news about current or future profitability is
  • Comment: Market to book ratio would be a better measure

Conclusion: The timing of firms’ investment decisions leads to productivity heterogeneity across firms and contributes to determining aggregate productivity
They also present a RBC model that incorporates the effect

Simulations of the model for the Italian economy are consistent with the empirical evidence

In the model permanent technology shocks are also considered: Newer vintage investment increases productivity more than older vintages

Result: when the growth rate of productivity of newer vintages slows down, firms postpone adopting the latest technology and reduce capital expenditures

Reason: the productivity gap with the technology frontier increases less
Figure 1: Investment Age and Productivity
General comments

- Nice data: 75% of Italian value added

- Paper using micro data to estimate macro general equilibrium effects

- I will not comment (much) on the RBC model the authors develop, but focus on the estimates of the link between investment and productivity
  - Results are very similar for labor productivity and for TFP (solow residual), so I will use just the term “productivity”

- Split the paper in two?
What drives productivity?

Is it investment spikes as this paper suggests?

Or are the investment spikes themselves driven by something else?

If investment spikes drive productivity growth then understanding what drives these spikes is central to understanding productivity growth.
General comments

- Crucial assumption: Investment spikes that drive productivity are exogenous to the firm
- Investment in new capital then increases productivity
- Paper makes no attempt at explaining why investment is so lumpy
- What are the frictions that keep firms from investing in new technologies?
  - Credit constraints
  - Transaction costs
  - ...
The paper suggests a causal relationship between investment and productivity.

What could be alternative explanations?

– Page 13: “..., higher productivity for firms with more recent investment spikes could be the byproduct of the propensity of the firm to innovate.

– Causality would then run differently: the firm innovates (registers a patent for example), and then invests in order to implement the innovation.

– The interesting aspect of this explanation is that it would also explain why firms invest rarely, but if they do big amounts.
The authors perform a number of tests to address this

- One, they estimate the persistence of productivity and obtain estimates of around 0.38.
  - They then claim: Such a low persistence, ..., makes it hard to rationalize the productivity gap observed over 12 years with the idiosyncratic component of productivity
  - Explain...
- Second, the authors control for future news about profitability
- Sample split between innovative and non-innovative firms (this seems somewhat contradictory to the underlying idea of the paper...)
- Use the share of intangible capital as a proxy for innovation.
Figure A.3: Investment Age and Labor Productivity - Sectoral Analysis
Comments

 boca we may be able to learn something from the large heterogeneity across sectors
 – Economies of scale vs. innovation?
 – Continuous innovation in some sectors?

 boca i was missing a table that links investment lumpiness to size
 – In larger firms, innovation (as in registering a patent) may be a smoother process
 – Is investment less lumpy in very large firms? Or in relatively diversified firms (conglomerates)? Conglomerates are generally less innovative, but innovation may be smoother
Slow down in productivity growth is not explained in the paper
If anything, it would suggest that productivity growth should have increased
Is there a way to incorporate the dissemination of technology into the approach of the paper?
  – Do firms in the same sector experience spikes simultaneously?
  – Has this changed over time?