Productivity, Demand and Growth

Ignaszak and Sedláček
Discussion by Maarten De Ridder

DNB Annual Research Conference - 5 November 2021
Firms are heterogeneous in demand and production efficiency

\[ C_t = \left[ \int b_{jt}^{1/\eta} \cdot q_{jt}^{1-1/\eta} \cdot l_{jt}^{1-1/\eta} dj \right]^{\eta/(\eta-1)} \]

1. Demand evolves randomly (though not unpredictably)
2. Production efficiency evolves through R&D (innovation)
This Paper

Firms are heterogeneous in demand and production efficiency

\[ c_{jt} = b_{jt} \cdot p_{jt}^{-\eta} C_t \]

- Demand evolves randomly (though not unpredictably)
- Incentive to innovate if demand is expected to grow
- Path of production efficiency is affected by demand
Analytical Model

Keep things simple:

- Firms die exogenously, rate $\delta$
- Firms are born with some demand $b_0$, grows at rate $\theta$
- Choose some convenient but not crazy parameters
- Result: some stationary distribution of firm age (overlaps with demand)
Analytical Results

Firm’s innovation increases in demand growth rate $\theta$

- Innovation raises productivity in the future at some cost today
- Higher $\theta \rightarrow$ greater demand for output in the future

Growth rate of total factor productivity rises in $\theta$

- Productivity growth maps directly into firm’s innovation rate

Subsidy for innovation has greater effect on growth rate at higher $\theta$

- Effect of a subsidy is proportional to firm’s returns to R&D.
Full model

Use moments from detailed micro data to estimate complicated demand profile

- 3 components: firm’s natural output level, AR(1) demand shock, noise shock
- Add fixed operating costs, endogenous exit, endogenous entry
- Carefully evaluate model fit using micro data
- Show that demand fits excellently with existing empirical findings on firm growth, productivity and demand
- Policy experiments: operation subsidies, growth-enhancing policies → demand matters
Discussion

**Intriguing paper,** bridging the gap between literatures with two ways of thinking:
- Firm dynamics with exogenous productivity but rich dynamics
- Endogenous growth: endogenous productivity, but simplistic heterogeneity

Comments:
- What is the mechanism?
- What is demand? Should monetary policy maker care?
- Lesson: heterogeneity matters
Back to analytics: firm’s innovation increases in demand growth rate $\theta$

- Innovation raises productivity in the future at some cost today
- Higher $\theta \rightarrow$ greater demand for firm’s output in the future
- Higher innovation rates cause higher productivity growth
- Counter-intuitive? Demand has a stationary distribution!
Understanding the Results

Back to analytics: firm’s innovation increases in demand growth rate $\theta$

- Answer: firm-level demand growth makes R&D relatively cheap

$$rd_{jt} = b_{jt} q_{jt}^{\eta-1} x_{jt}$$

- R&D costs are scaled by current demand
- Demand expected to grow: wedge between current and future demand
- That wedge determines incentive to innovate
- Young firms: demand profile is such that today’s demand $<\text{ future demand}$
- Hence young firms are relatively innovative
Understanding the results

So if we take the mechanism seriously:

- A positive anticipated ‘demand shock’ across firms raises R&D today
- A positive temporary ‘demand shock’ across firms lowers R&D today
- Is that really true in reality?

Why do we think R&D costs scale with size?

- Usually: large firm produces sophisticated product
- Question is: what determines how complicated innovation is!
What is demand?

Demand in this paper is not really ‘aggregate demand’ in the AD-AS model:

\[ C_t = \left[ \int y_{jt}^{1-1/\eta} \, dj \right]^{\eta-1}_{\eta}, \quad y_{jt} = b_{jt}^{-1} \cdot q_{jt} \cdot l_{jt} \]

- Demand is **real**: positive demand shock raises utility
- Demand shock is **deflationary**: same utility for lower spending
- Demand reflects **broad factors** that determine firm life cycle
- **Monetary policy**: not clear if it should learn lessons from this paper
Heterogeneity Matters

Real contribution: serious attempt to think about firm heterogeneity in the context of innovation and productivity growth

- Data-driven model of dispersion in firm size for non-technological reasons
- Key for innovation decisions: demand has a profile (non-random)
- Time to reconsider homogeneous firm model of innovation?
- Rise of oligopolistic competition, winner takes all. Concave returns to R&D?
- Great avenues for future research: think about implications for the concentration and misallocation of research and development
Productivity Growth

Figure: Trends in Productivity Growth and Research & Development

(a) Productivity Growth

(b) R&D Investments
Conclusion

- Paper offers an intuitive model of heterogeneous demand and innovation
- Quantification shows that demand could be relevant for growth (policies)
- How confident are we about the mechanism?
- Heterogeneity matters!