Growth through Innovation Bursts

by Berlingieri, De Ridder, Lashkari, and Rigo

Discussion by Nicolas Crouzet (Kellogg)

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Overview

Creative destruction / QL models: continued **product improvement** is a key source of growth

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Data on firms' product portfolio

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Embedding this in QL model: effects of creative destruction on productivity growth ↑; concentration ↑

Roadmap

1. Data
2. Model

1. Data

Stylized facts

firm j, year t

$n_{j,t}$ = # products

$\Delta^{(+)} n_{j,t}$ = gross # products added from $t-1$ to t

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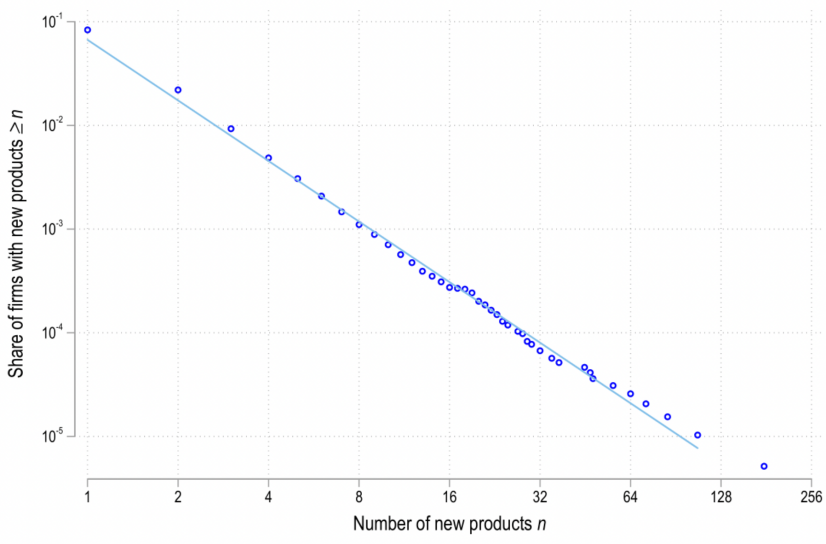
$n_{j,t}$ = # products

$\Delta^{(+)} n_{j,t}$ = gross # products added from $t-1$ to t

1. $n_{j,t}$ follows a power law
2. $\Delta^{(+)} n_{j,t}$ follows a power law
3. "churn" in $n_{j,t}$ contributes substantially to aggregate revenue growth

Power law for $\Delta^{(+)} n_{j,t}$



Some basic "innovation accounting"

$$\begin{aligned}\mathbb{E}\left[\ \Delta^{(+)} n_{j,t} \mid n_{j,t}\right] &= \mathbb{P}\left(\ \text{Innovation in } (t, t+\Delta t) \mid n_{j,t}\ \right) \\ &\times \quad \mathbb{E}\Big[\ \#\text{ new products} \mid \text{Innovation in } (t, t+\Delta t)\ , n_{j,t}\Big]\end{aligned}$$

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Product Innovation Rate						
All	1	2	3	4-5	6-8	8+
.066	.066	.067	.068	.058	.056	.083
(.001)	(.002)	(.001)	(.002)	(.002)	(.003)	(.004)

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$$\approx \quad \lambda \qquad \text{[Innovation intensity]}$$

$$\times \quad \mathbb{E}\left[\ \#\text{ new products} \mid \text{Innovation in } (t, t+\Delta t)\right] \qquad \text{[Innovation scope]}$$

What is a product?

NACE 22.22 : Manufacture of plastic packing goods

CPA 22.22.11 : Sacks and bags (including cones), of polymers of ethylene

22.22.11.00	Sacks and bags of polymers of ethylene (including cones)	3923 21

CPA 22.22.12 : Sacks and bags (including cones), of other plastics than polymers of ethylene

22.22.12.00	Plastic sacks and bags (including cones) (excluding of polymers of ethylene)	3923[.29(.10 + .90)]

CPA 22.22.13 : Boxes, cases, crates and similar articles of plastics

22.22.13.00	Plastic boxes, cases, crates and similar articles for the conveyance or packing of goods	3923[.10(.10 + .90)]

CPA 22.22.14 : Carboys, bottles, flasks and similar articles of plastics

22.22.14.50	Plastic carboys, bottles, flasks and similar articles for the conveyance or packing of goods, of a capacity ≤ 2 litres	3923 30 10
22.22.14.70	Plastic carboys, bottles, flasks and similar articles for the conveyance or packing of goods, of a capacity > 2 litres	3923 30 90

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This is a carboy (in case you were wondering)

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   Are there firms that growth without continuous product churn?

2. Model

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Klette and Kortum (2004)

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$$\mathbb{P}(\Delta^{(+)} n_{j,t} = k) = \frac{k^{-\theta}}{\zeta(\theta)} \quad \theta \geq 2$$

$$\mathbb{P}(\Delta^{(+)} n_{j,t} = 1) = 1 \quad \theta \to +\infty \quad \text{[Klette and Kortum]}$$

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v: value of incumbent (per variety)

$$(r + \tau)\, v = \max_{\lambda} \; \pi - \left(\frac{\alpha}{\psi}\lambda^{\psi}\right) w + \lambda v$$

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$$\alpha \lambda^{\psi-1} w = \underbrace{\frac{\zeta(\theta-1)}{\zeta(\theta)}}_{>1} v$$

Entry and growth

$w\ l_S$: cost of setting up a new firm

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"Rescaled" KK, with:

$$\tilde{l}_S = \overbrace{\frac{\zeta(\theta)}{\zeta(\theta-1)}}^{<1} l_S \qquad \text{[lower entry costs]}$$

$$\tilde{\alpha} = \underbrace{\left(\frac{\zeta(\theta)}{\zeta(\theta-1)}\right)^{\psi}}_{<1} \alpha \qquad \text{[lower flow innovation costs]}$$

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What else is there in the full model?

Process innovation

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Suggestion: KK + innovation bursts + "only" process innovation

Conclusion

Exciting set of stylized facts + nice articulation with model

- additions to product portfolio $\leftrightarrow$ quality improvements in QL models?
- what else can we learn about product innovation strategies of firms?

A paper people should read!