6 steps to paradise: How to grow a new high-tech industry

**Continuing firms**

- Intrapreneurship
- M&A

**New firms**

<table>
<thead>
<tr>
<th>Number of firms</th>
<th>Post-entry growth (&quot;scale-up&quot;):</th>
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<tbody>
<tr>
<td>Start-up size</td>
<td>High-Growth Firms</td>
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<td>Moderate growth</td>
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</table>
Too fast to live?
Effects of growth on survival across the growth distribution

Alex COAD, Julian S. FRANKISH, Richard G. ROBERTS, David J. STOREY
JRC-IPTS, University of Sussex and Barclays Bank

6th IRIMA workshop, Brussels, 3rd December 2015
Growth is good for survival

- Entrants struggle to find customers, assemble resources, obtain legitimacy, reach MES, cover fixed costs, and build on growth opportunities
- Banks and investors look for growth potential
- First mover pre-empts competitors in factor markets
- And if it doesn’t work: downsize, discard marginal areas and refocus on most profitable areas
- Growth and survival as alternative indicators of ‘performance’ (Miller et al., 2013)
- “growth and survival go hand in hand” (Wiklund 2007, p145)

- “26.0% of the firms entering with one to four employees and adding no net employees survived six years. ... If an entry firm having one to four employees grows at all, even adds only one employee, its survival rate more than doubles to 65.0%. And, as the extent of growth increases, the survival rate increases as well, ultimately reaching 77.5% for high growth firms.” (Phillips & Kirchhoff 1989 SBE, p69)
Why might fast growth lead to exit?

- Penrose effects: emphasis on managerial constraints and organizational strain
- “Time compression diseconomies” or “strictly convex adjustment costs” (Dierickx & Cool, 1989 MS, p1507)
- Cashflow problems
  - Disrupting the balance between cash consumption and cash generation
  - Cash needed for working capital, facilities & equipment, operating expenses, etc
  - Key role of the Operating Cash Cycle (“OCC”; Churchill & Mullins 2001 HBR)
- Firms make hasty hires instead of waiting for a better match (Coad-Daunfeldt-Johansson-Wennberg 2014 ICC)
- Asymmetries between growth & decline: costs of firing employees, low prices for used machines
- Risk-taking drives either high-growth or disaster
Barclays data

• Month and year of start-up accurately observed
  – Cohort of 6000 businesses starting March-May 2004
  – Only firms showing trading activity April-June 2004

• Businesses observed as from their first sales
  – Commercial incentives that all subsequent data is correct

• NOT conditional on other banking service (e.g. loan)

• Barclays provide business accounts for 1 in 5 businesses in England and Wales
  – a “random” sample of new firm starts in those countries (excluding financial services sector)
Growth rate distribution
Survival rates across growth deciles

Growth deciles of Year 2: survival into year 3
Growth deciles of Year 2: survival into year 6
twoway (function y=-0.193 + 0.815*x -0.446*x^2 -0.180*x^3 + 0.0369*x^4 + 0.0123*x^5 - 0.000428*x^6 - 0.000156*x^7, range(-2.5 2.5)) || (function y=0.418 + 0.397*x -0.401*x^2, range(-2.5 2.5)), legend(lab(1 "7th order polynomial") lab(2 "squared term"))
Conclusions

• Growth generally enhances survival
  – Non-monotonic effects from 7th order polynomials
  – Highest survival found for moderate growth firms

• Caution regarding implications
  – Associations not causality
  – Should firms deliberately put the brakes on?
  – Will moderate growth lead firms to better build on opportunities, or will these opportunities spoil?
APPENDICES
Checklist for further work

- Regressions for individual years
- Cox proportional hazard survival models
- Spline regressions
  - e.g. 10 splines
- Remove outliers
  - SD-based outliers
  - %-based outliers
Barclays data

• Size (growth) measured by ‘sales’ (credit turnover)

• Structural variables observable at start-up
  – (mean) age of the business owner
  – educational attainment
  – gender
  – prior business experience (self or family)
  – sources of advice/support approached prior to start-up

• Time-varying business-specific variables relating to individual bank accounts
  – overdraft use, unauthorized OD use, volatility

• Switchers are identified and removed
• No IPOs, M&As or trade sales in our data
Growth deciles of year 2: Survival into year x
Summary stats across the deciles

- Survival is lowest for the decile with lowest growth
  - Increases non-monotonically
- Lowest decile: smaller, more volatile, remain in unauthorized OD excess
- Size increases across deciles
  - Largest decile – largest average size
- High HC founders (“Degree or higher”) either in fast-decline or fast-growth
Regression equation

\[ \text{Survival}_{i,t+1} = \alpha_0 + \sum_{k=1:n} \beta_{1,k}(\text{Growth}_{i,t})^k + \beta_2 X_{it} + \epsilon_{it} \]

- Control variables \( X_{it} \): lagged size (+ squared), age (+ squared), education, business experience, sources of advice, # owners, sex, legal form, industry, region

- Not always included: volatility, overdraft use & duration, unauthorized overdraft use & duration
Polynomial specification

• Growth above a certain threshold
  – Hence, nonlinear

• Previous literature has only included quadratic terms

• AIC and BIC support a 7th-order polynomial
Predicted probabilities across the GRD
Logits across the deciles

- Overall: similarities across deciles
  - Similar signs if not sig. levels
  - Exit in decile 10 seems to be due to ‘failure’ rather than ‘success’

- Growth no longer affects survival *within* deciles

- Key role of bank account activity
Using theory to tentatively identify causal effects

<table>
<thead>
<tr>
<th>Theory</th>
<th>Domain</th>
<th>Effect of slowing down growth on survival</th>
<th>Reason</th>
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<tbody>
<tr>
<td>Penrose effects (Penrose, 1989)</td>
<td>Managerial attention</td>
<td>+</td>
<td>Managers can focus on keeping costs down</td>
</tr>
<tr>
<td>HGF hires Coad et al 2014 ICC</td>
<td>HGFs must quickly find new hires</td>
<td>+</td>
<td>HGFs can wait for better matches</td>
</tr>
<tr>
<td>Time Compression diseconomies (Dierickx &amp; Cool, 1989)</td>
<td>Costs of shortening the time period</td>
<td>+/-</td>
<td>Slower growth is less costly</td>
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<td>Risk that the firm doesn’t pre-empt the competition</td>
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<tr>
<td>First mover advantage</td>
<td>Factor markets</td>
<td>-</td>
<td>Rivals will pre-empt the firm in key factor markets</td>
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