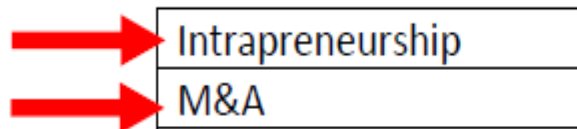
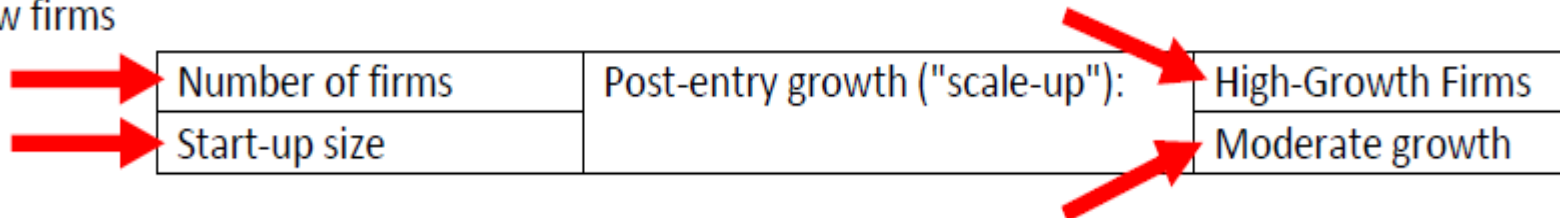


6 steps to paradise: How to grow a new high-tech industry

Continuing firms



New firms



Too fast to live?

Effects of growth on survival across the growth distribution

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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?

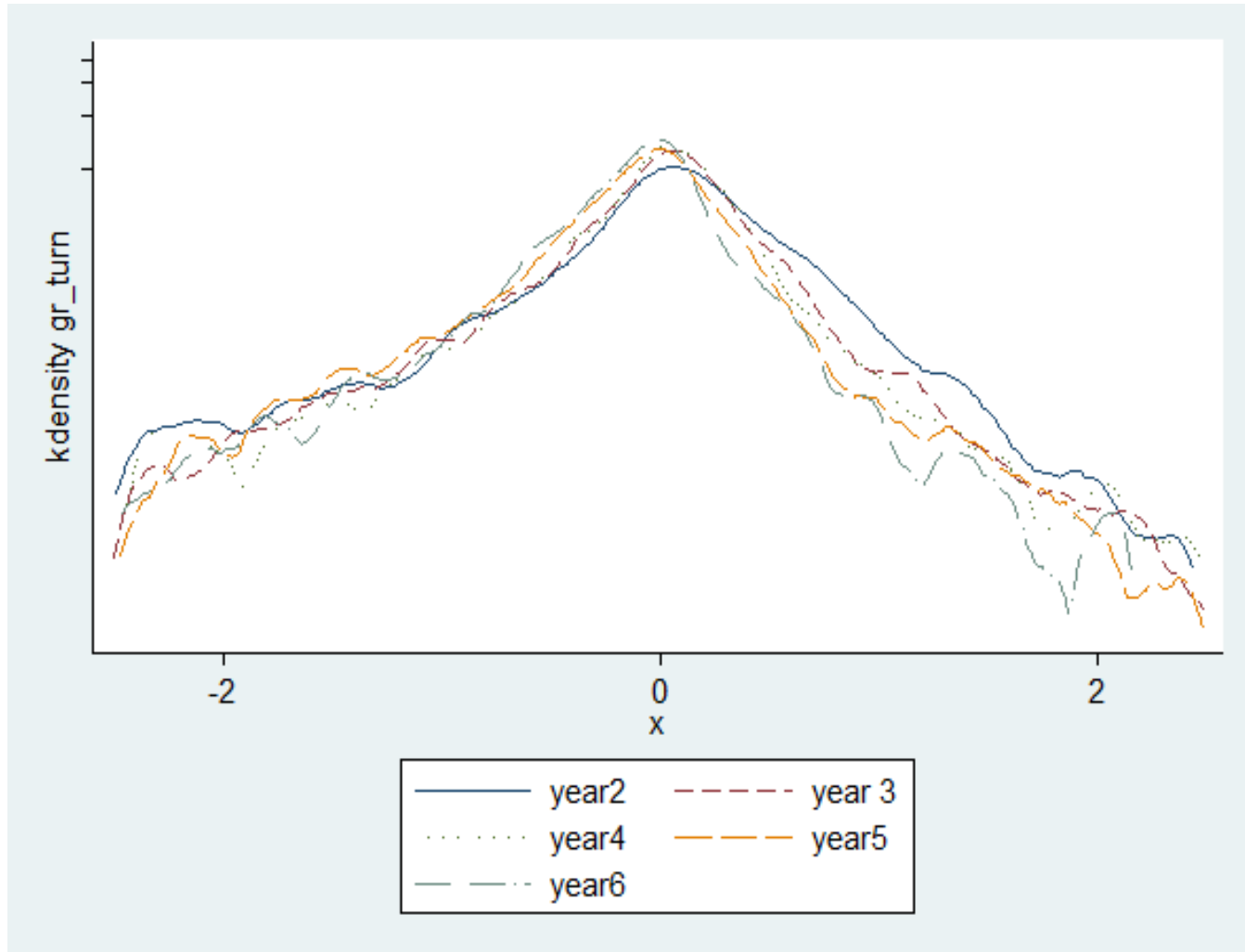
- Penrose effects: emphasis on managerial constraints and organizational strain
- “Time compression diseconomies” or “strictly convex adjustment costs” (Dierickx & Cool, 1989 MS, p1507)
- Cashflow problems
 - Disrupting the balance between cash consumption and cash generation
 - Cash needed for working 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

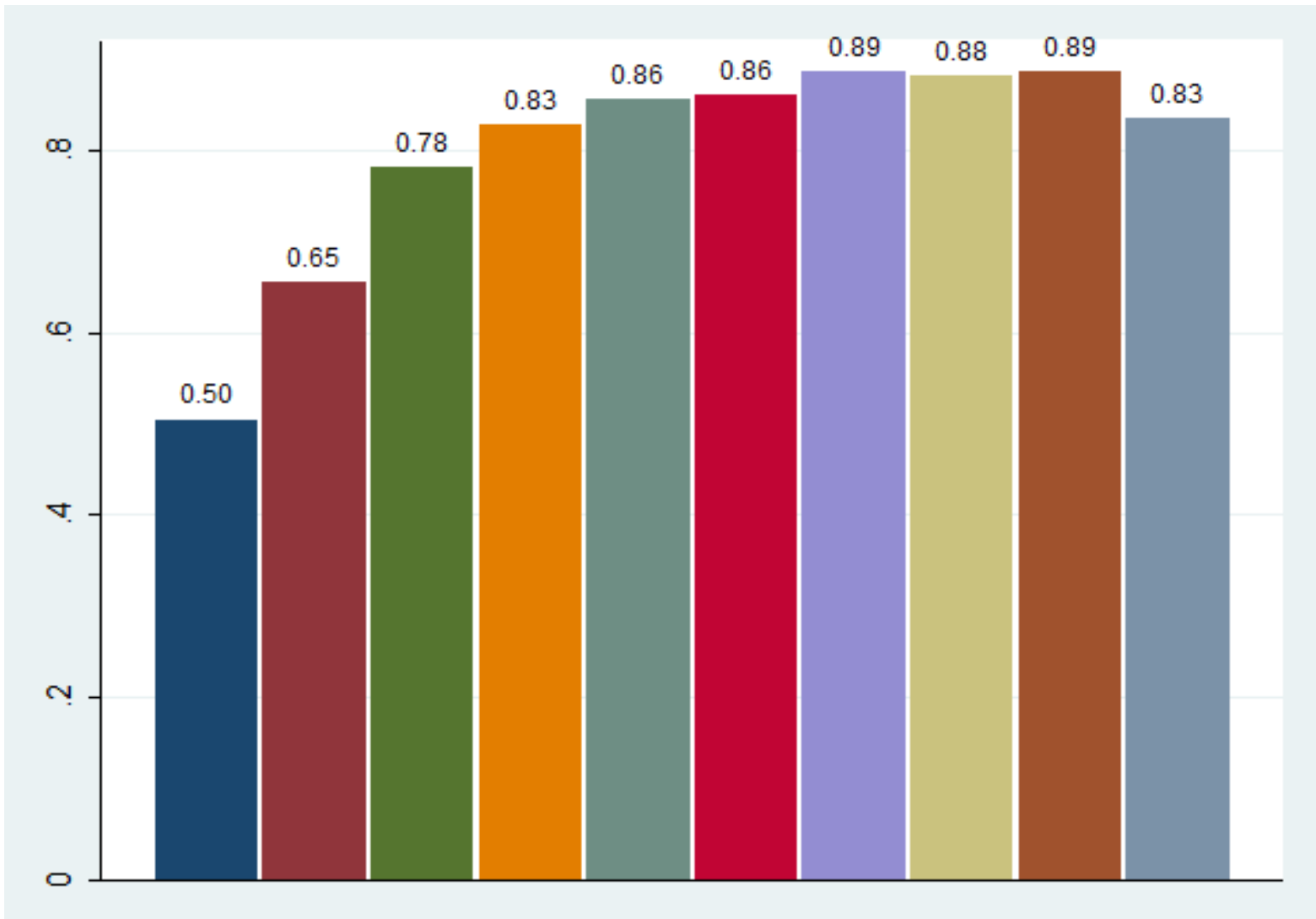
- Month and year of start-up accurately observed
 - Cohort of 6000 businesses starting March-May 2004
 - Only firms showing trading activity April-June 2004
- Businesses observed as from their first sales
 - Commercial incentives that all subsequent data is correct
- NOT conditional on other banking 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

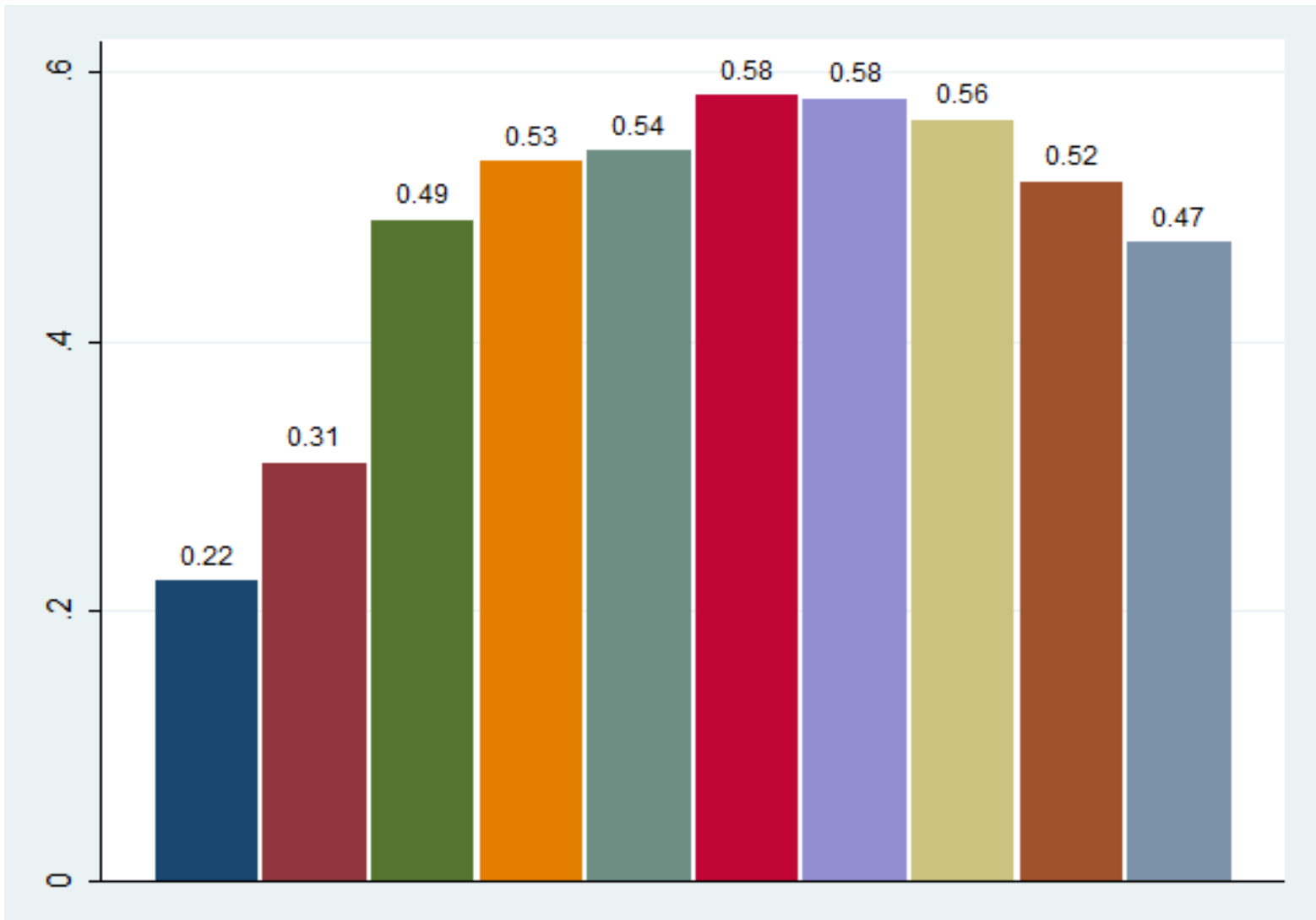


Survival rates across growth deciles

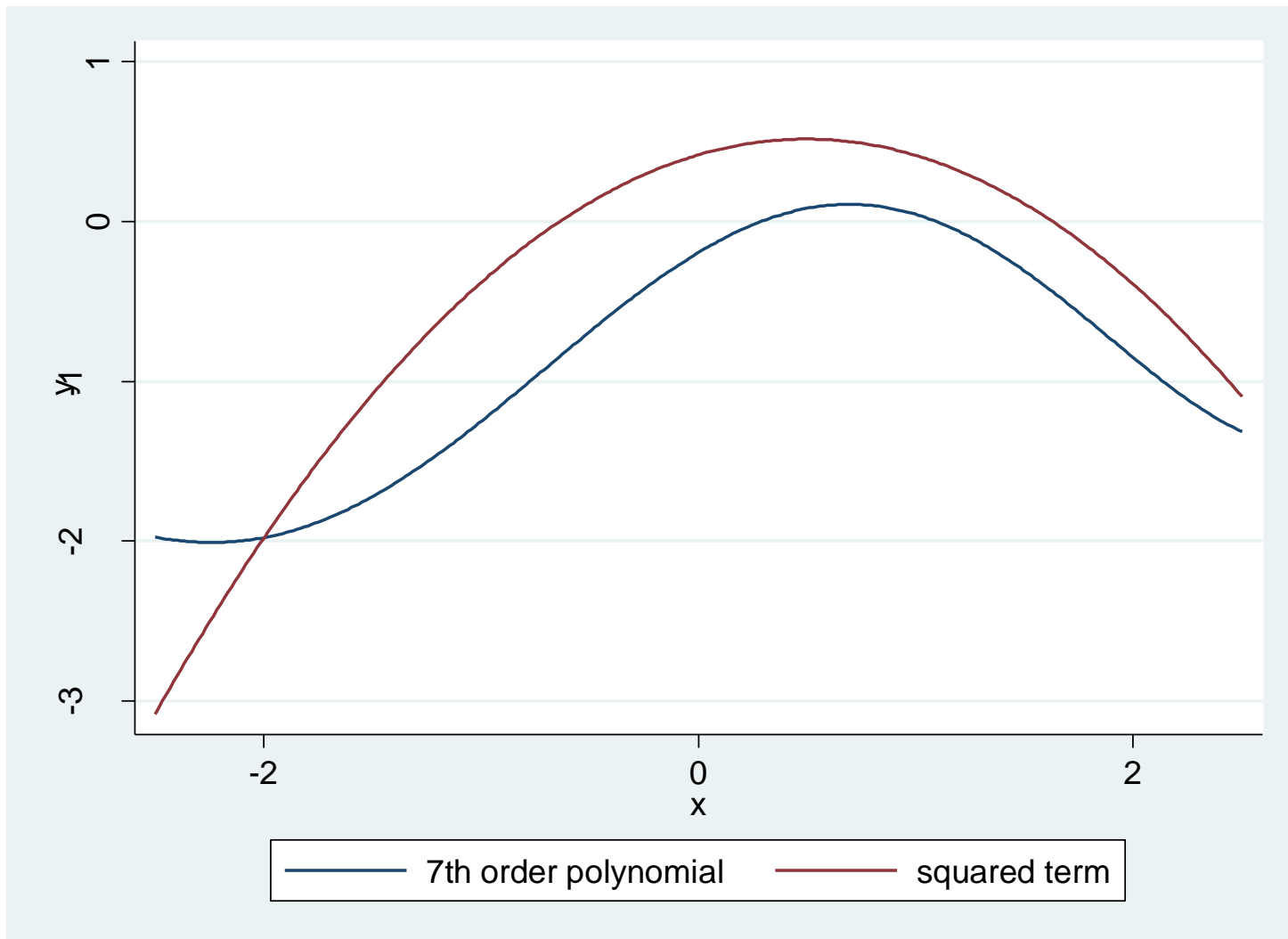
Growth deciles of Year 2: survival into year 3



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

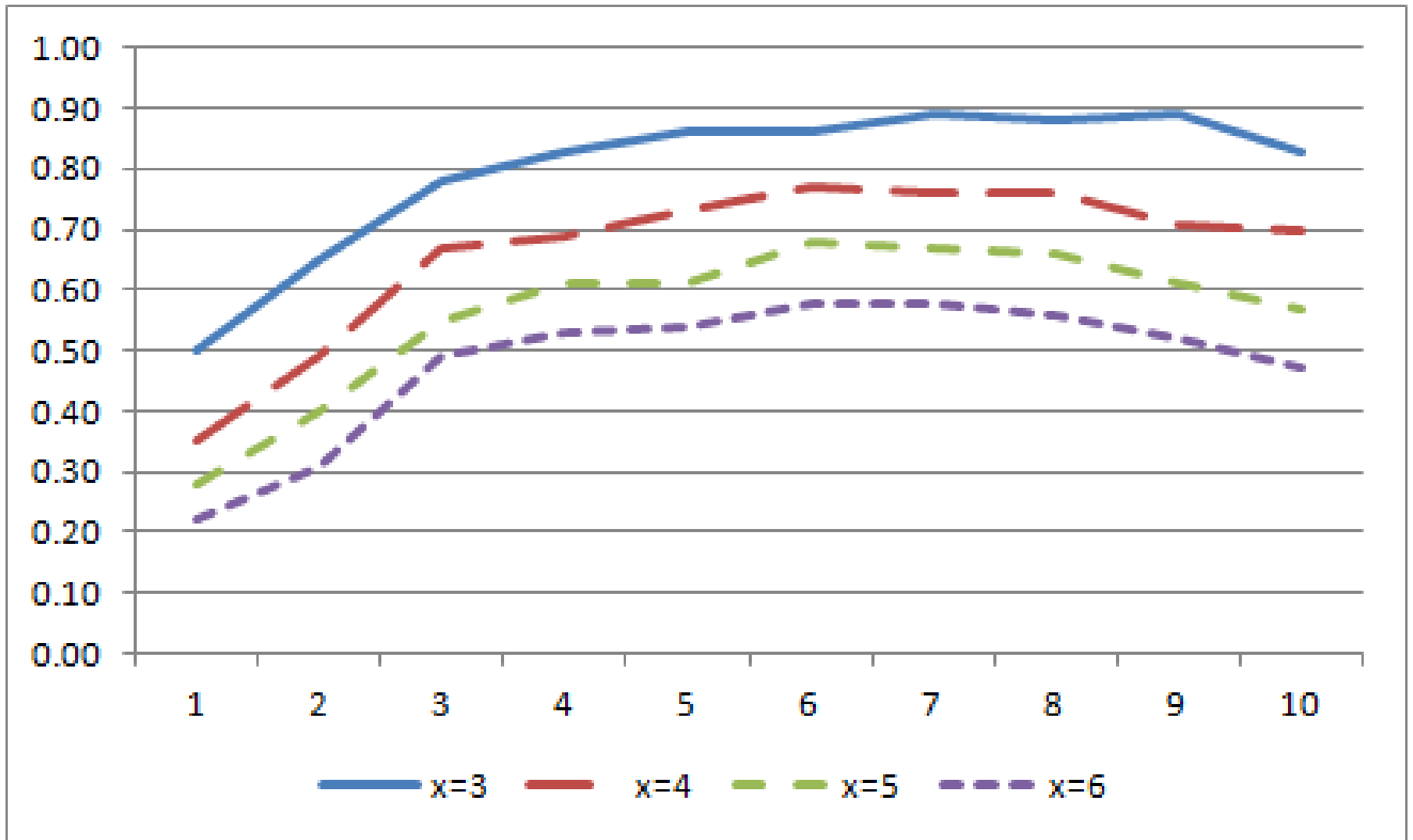
Checklist for further work

- 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

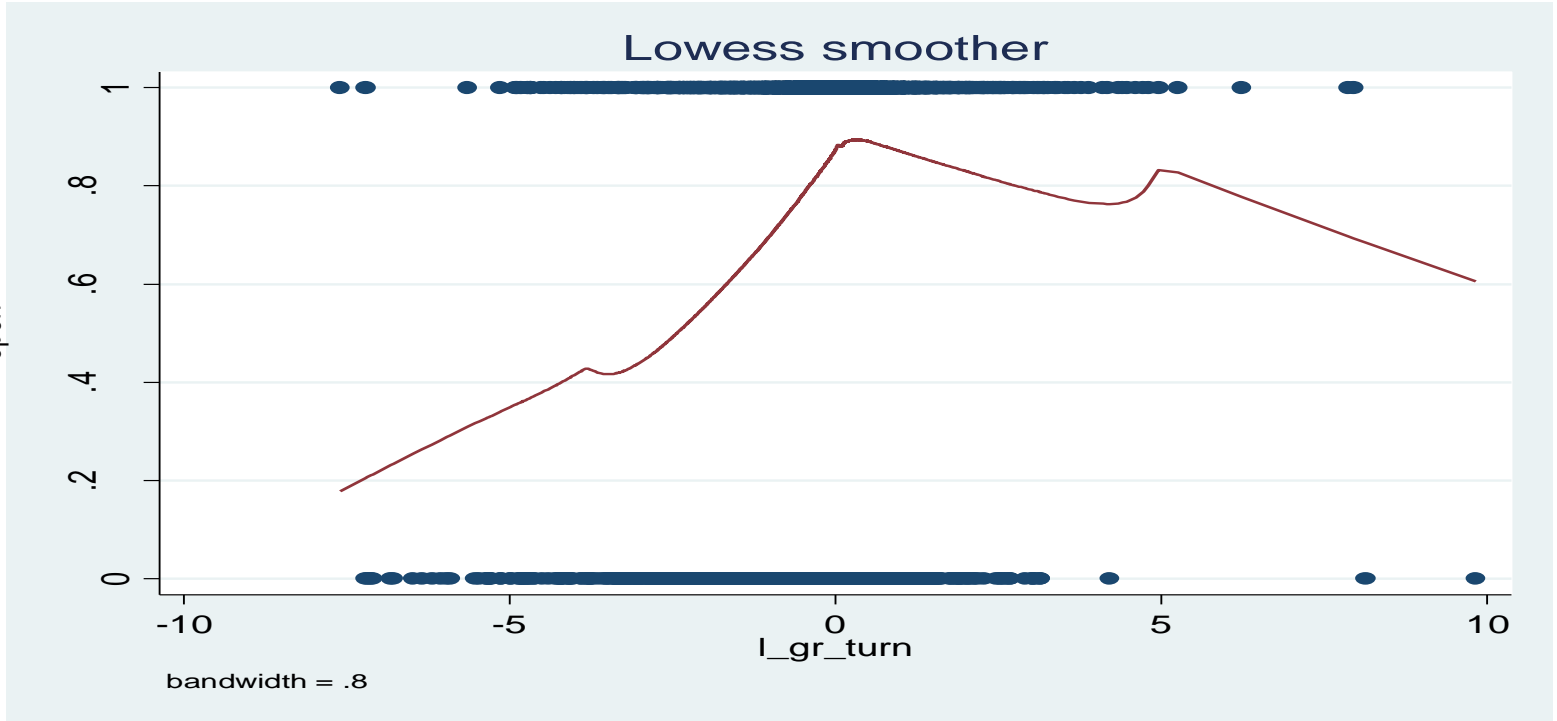
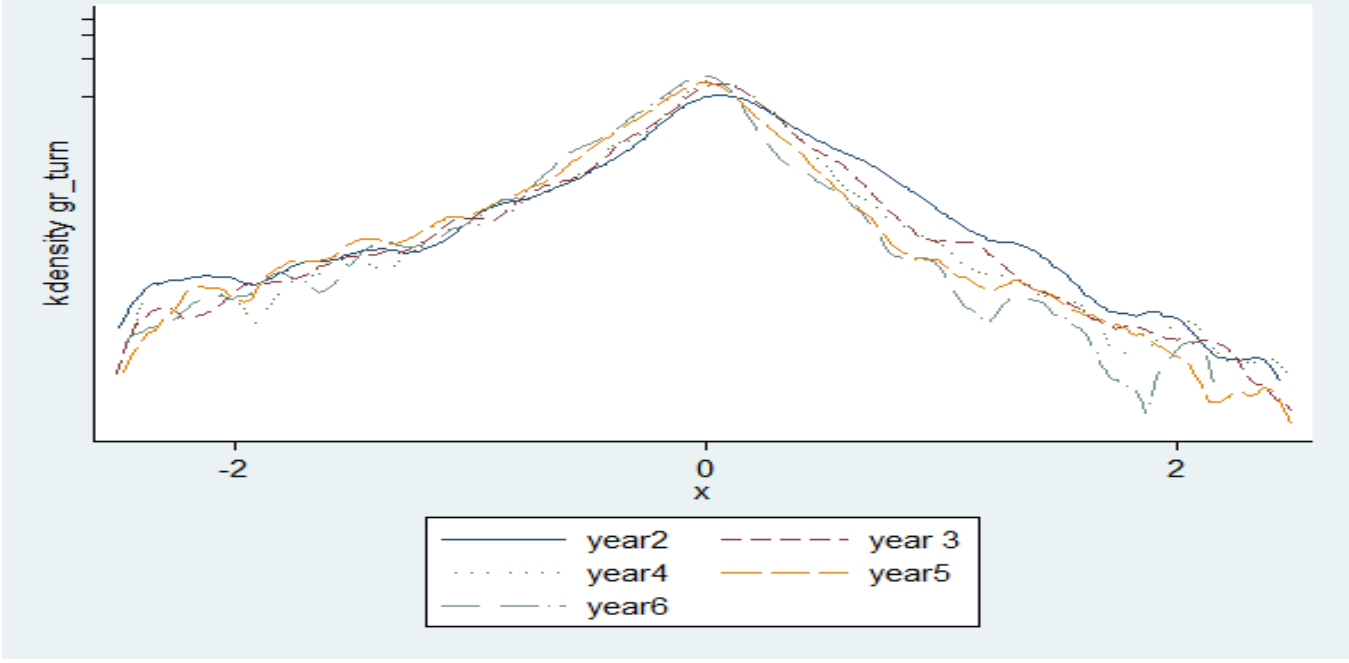
Regression equation

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

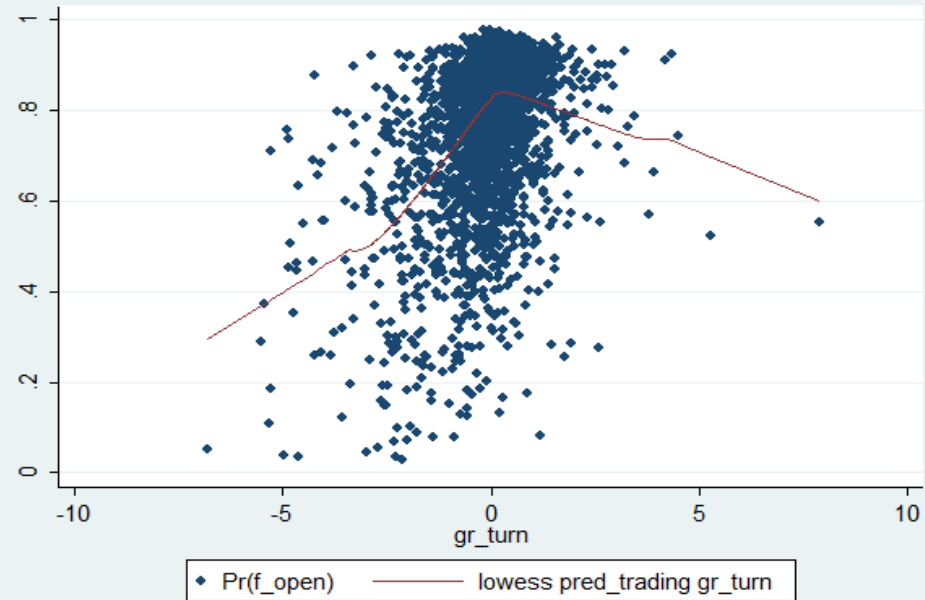
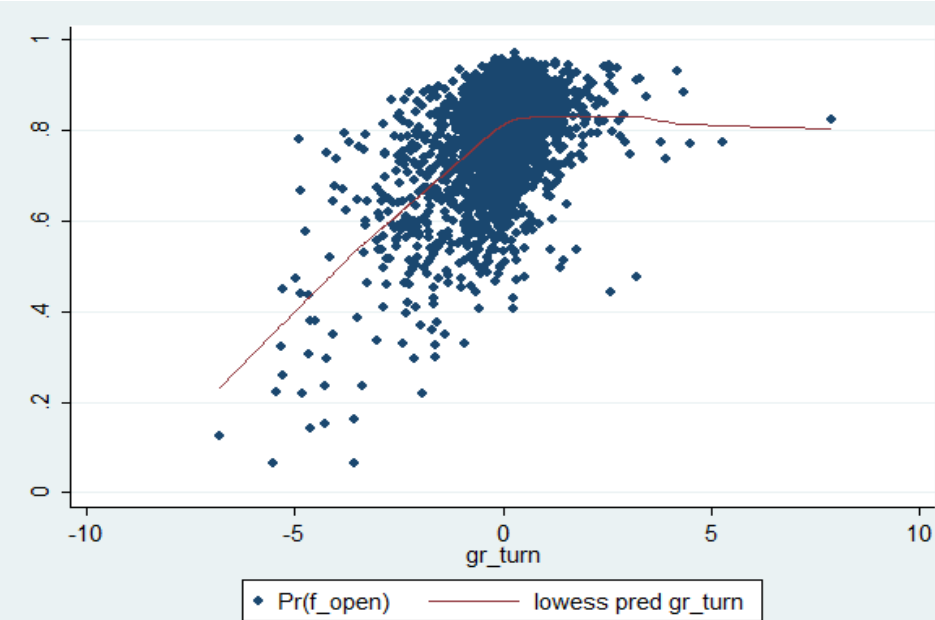
- Control variables X_{it} : lagged size (+ squared), age (+ squared), education, business experience, sources of advice, # owners, sex, legal form, industry, region
-
- Not always included: volatility, overdraft use & duration, unauthorized overdraft use & duration

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

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