Defining High Growth Firms

Sustainable Growth, Volatility, and Survival

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Theory
Policy shift from creating *more* firms to creating *better* firms

*Better* defined as firms with high and sustainable growth

(Shane, 2009; Stangler, 2010 [Kauffman]; Bosma & Stam, 2012 [OECD*]; Brown *et al.*, 2014 [Nesta UK])

*OECD = Organization for Economic Co-operation and Development

Increasing number of high growth policies/programs

Countries are experimenting with initiatives to foster high growth firm (HGF) creation

(Autio, 2007; Mason & Brown, 2013; Autio & Rannikko, 2015; Soderblom *et al.*, 2015)

HGF policies are needed, yet research offers “bland” proposals

Research needs to create a solid background for better informed policies

(Shane, 2009; Mason & Brown, 2013)
Motivation - Research side

High variation in defining growth and high growth firms (HGFs)

Choices of indicator, measure, time period, growth type and HGF definition

(Delmar 2006; Shepherd & Wiklund, 2009; Henrekson & Johansson, 2010; Daunfeldt et al., 2013)

Link between HGFs and sustainable growth is implied, not discussed

Some definitions include consecutive period growth, others do not (in selection)

(Henrekson & Johansson, 2010)

Research is limited in helping design policies for sustainable growth

Limited knowledge accumulation between studies; superficial policy recommendations

(Delmar 2006; Shepherd & Wiklund, 2009; Daunfeldt et al., 2013)
RESEARCH QUESTION
Do high growth firms have more sustainable growth and does this depend on the definition used?
A measure of the “quality” of growth, implying that high positive growth rates can be sustained (replicated) in multiple consecutive periods, instead of one-shot growth events

* not related to environmental sustainability

Sustainable organizations successfully manage rapid expansion
Measures of sustainable growth - persistence, volatility, survival

Growth persistence

The correlation of growth rates over time - a measure of continuity
Usually large firms show higher persistence, small firms show a random process
(Coad, 2007a; Coad and Holzl, 2009; Holzl, 2014)

Growth volatility

The variance, or “unpredictability”, of growth - a measure of uncertainty and risk
Few results - Higher volatility for HGFs selected on relative versus absolute growth
(Delmar, 2003)

Firm survival

Probability of exiting the market - a measure of market fitness
Underperforming firms will be pushed out when industries enter a shakeout period
(Gort & Klepper, 1982; Klepper, 1996)
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Revenue, Employees, Profit, Productivity, Assets, Equity, Market Share Absolute, Relative (percentage, log difference) Birch Index (absolute * relative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Measurement</td>
<td></td>
</tr>
<tr>
<td>Growth Type</td>
<td>Organic (hiring), Acquired (M&amp;As), or Total</td>
</tr>
<tr>
<td>Time Period</td>
<td>1, 3, 5, 7 years, depending on the available data</td>
</tr>
<tr>
<td>HGF Definition</td>
<td>Birch (&gt;20% for 3 periods), OECD (&gt;20% average), Top X% (X% highest performing)</td>
</tr>
</tbody>
</table>
Examples from literature

>20% yearly Sales growth over the interval + base-year revenue $100,000

5% fastest growing firms in Emp Index; 1%/10% in multiple indicators

Birch (all studies)

Schreyer (2000); Daunfeldt et al. (2013); Delmar (2006)

Surviving firms, growing >100% + >5 employees in the studied period

Bruderl & Prisendorfer (2000)

Double Sales + Emp index >2 over the period (4 years)

Acs, Parsons & Tracy (2008)

All are called HGFs! Are they all the same?

** Adapted from Henrekson & Johansson (2010)
Data & Model
Data Sample

1.1m firms, 6.7m observations, 13 years, 2000-2012
~70% of the population of Romanian firms

Sample Selection

SRL firms (LLCs) - most common (96%) [1m]
No missing data; consecutive years [540k]
Active between 2000-2004, no entry [70k]
> $50k* revenue in 2000; SMEs < 250 emp. [45.5k]

*all financial values were converted to constant 2013 USD

45,500 firms, 535k observations
Highly-performing selected sample**
### HGF Definitions [Selection 2000-2004]

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>Birch (&gt;20% yearly growth for 3+ years)</td>
</tr>
<tr>
<td></td>
<td>OECD (&gt;20% growth average p.a. over 3 years)</td>
</tr>
<tr>
<td>Employees</td>
<td>Top 5% - Absolute</td>
</tr>
<tr>
<td></td>
<td>Top 5% - Percentage</td>
</tr>
<tr>
<td>Profit (gross profit)</td>
<td>Top 5% - Logarithmic ((\text{Log}(X_t) - \text{Log}(X_{t-1})))</td>
</tr>
<tr>
<td>Productivity (profit / employees)</td>
<td>Top 5% - Index ((\text{Absolute} \times \text{Percentage})) over 5 years (2000-2004)</td>
</tr>
</tbody>
</table>

** Note: Our Productivity measure is different than the traditional one based on Value Added

** Note: Log and % select the same firms, so we have Absolute, Relative and Index for each
Sustainability Indicators [Observation 2005-2012]

Persistence = the autoregressive coefficient ($\beta_1$)

Volatility = standard deviation of GrowthRate ($\sigma \sqrt{T}$)

Survival (exit) = year of last observation in the sample

Autoregressive model AR(1), First Differenced

$$GrowthRate_t = \alpha \times GrowthRate_{t-1} + \delta_t + \eta_i + v_{it}$$

$\alpha$ - autoregressive coefficient

$\delta_t$ - time dummy

$\eta_i$ - firm fixed effect

$v_{it}$ - idiosyncratic error term

$$\Delta GrowthRate_t = \alpha \times (\Delta GrowthRate_{t-1}) + \delta_t + \Delta v_{it}$$

Estimated using Anderson-Hsiao (IV) and Arellano-Bond (GMM)
Summary

**Selection**

- 2000 Y1
- 2004 Y5
- 5 years
- OECD (4)
- Birch (4)
- Top 5% (12)

**Observation**

- Y5
- 2005
- Y13
- 2012
- 8 years

**Persistence** (autoregressive coefficient)

**Volatility** (standard deviation of growth rate)

**Survival** (percentage of firms closed)
Results
### Percentage of firms found at the intersection of two definitions

<table>
<thead>
<tr>
<th>Definition</th>
<th>OECD</th>
<th>Revenue</th>
<th>Employees</th>
<th>Profits</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Abs</td>
<td>2,137</td>
<td>5,659</td>
<td>3,793</td>
<td>4,786</td>
<td>3,549</td>
</tr>
<tr>
<td>Revenue Perc / Log</td>
<td>2,185</td>
<td>69%</td>
<td>49%</td>
<td>25%</td>
<td>12%</td>
</tr>
<tr>
<td>Revenue Index</td>
<td>2,160</td>
<td>78%</td>
<td>51%</td>
<td>25%</td>
<td>11%</td>
</tr>
<tr>
<td>Employees Abs</td>
<td>2,141</td>
<td>54%</td>
<td>62%</td>
<td>17%</td>
<td>12%</td>
</tr>
<tr>
<td>Employees Perc / Log</td>
<td>2,170</td>
<td>44%</td>
<td>48%</td>
<td>17%</td>
<td>4%</td>
</tr>
<tr>
<td>Employees Index</td>
<td>2,145</td>
<td>58%</td>
<td>69%</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td>Profits Abs</td>
<td>2,139</td>
<td>53%</td>
<td>37%</td>
<td>29%</td>
<td>16%</td>
</tr>
<tr>
<td>Profits Perc</td>
<td>2,197</td>
<td>25%</td>
<td>15%</td>
<td>28%</td>
<td>22%</td>
</tr>
<tr>
<td>Productivity Abs</td>
<td>2,256</td>
<td>23%</td>
<td>9%</td>
<td>24%</td>
<td>20%</td>
</tr>
<tr>
<td>Productivity Perc</td>
<td>2,254</td>
<td>12%</td>
<td>4%</td>
<td>23%</td>
<td>22%</td>
</tr>
</tbody>
</table>

**Result**

Different definitions select different firms
HGFs selected on Revenue have highest persistence

Estimations of autoregressive coefficients averaged per indicator

Result

Variation in persistence results based on the indicator

Highest persistence for Birch Revenue (24%)
HGFs have lower volatility

**Result**

HGFs have lower volatility
Profit and Revenue give lowest volatility
OECD and Birch give lowest volatility
Exit rates per year and total, all firms vs averages for HGFs

Result

HGFs have lower exit rates

Exit rates for Profit and Revenue are lowest (18%)

Exit rates for Productivity are highest (32%)
Hazard ratios are lower for HGFs

**Result**

HGFs have lower exit rates.

Exit rates for Profit and Revenue are lowest (18%).

Exit rates for Productivity are highest (32%).
Result

Probability of exit increases with volatility
Conclusion
HGFs have more sustainable growth (after selection), but result vary

Different definitions select different firms with different characteristics
Birch & OECD / Rev & Emp give better results in terms of sustainable growth

(Labor) Productivity and Employment have an opposite relation
Productivity HGFs have negative persistence, higher volatility and higher exit
Indicates a potential mismatch between public and private incentives

Why it matters? HGF policies should target high quality growth
Autio & Rannikko (May, 2015) evaluate a 6-year HG policy program in Finland
“The initiative had more than doubled the growth rates of treated firms”
<table>
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<th>Limitations &amp; Future Work</th>
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<tr>
<td><strong>Limitations</strong></td>
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<tr>
<td>Limited generalizability - selected sample, specific context</td>
</tr>
<tr>
<td>Data quality - significant amounts of missing data</td>
</tr>
<tr>
<td>Small timeframe - only 8 years for observation</td>
</tr>
<tr>
<td><strong>Contributions</strong></td>
</tr>
<tr>
<td>Benchmarking HGF definitions on future performance</td>
</tr>
<tr>
<td>Methodology to evaluate sustainable growth of HGFs</td>
</tr>
<tr>
<td>Unique context - dataset on Romania (developing country)</td>
</tr>
<tr>
<td>Limited generalizability - selected sample, specific context</td>
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<tr>
<td><strong>Future work</strong></td>
</tr>
<tr>
<td>Reduce the sample selection and missing data issues</td>
</tr>
<tr>
<td>Explore in more detail - size, age and industry</td>
</tr>
<tr>
<td>Multiple datasets - Portugal and United States</td>
</tr>
</tbody>
</table>
References


Shane, F. (2009) Why encouraging more people to become entrepreneurs is bad public policy. Small Bus Econ 33:141-149


Thank You!

Questions?
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