Fifteen years of Academic Entrepreneurship in Italy: Evidence from the TASTE project

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Porto Business School
Agenda

- TASTE project: overview
- TASTE project: results
TASTE project

The Project:
- TAking STock: External engagement by academics
  - www2.sa.unibo.it/taste
- FP7-PEOPLE-CIG MARIE CURIE (2012 – 2016)

Aim:
- To systematically map entrepreneurship from Italian universities’ labs
- To provide reliable data on how science-based entrepreneurship unfolds and generate wealth
- To better understand the determinants of high-growth entrepreneurship
Definitions

• Academic entrepreneurship
  ➔ Creation of new a business based on university-developed knowledge

• Academic spin-off is a firm in which:
  (a) the university is a shareholder and/or
  (b) (at least) one of the founder is an academic (i.e., faculty member, researcher or PhD student)

In Italy formally regulated by Law 297/1999

(Shane, 2004; Grimaldi et al., 2011; Fini et al., 2014)
Approach

- Multilevel- population-based approach:
  - Population of (Italian):
    - Universities (95)
    - Academics ($\approx 50,000$)
    - Spin-offs ($\approx 1,100$)
    - Patents ($\approx 1,000$)
    - University Students and Alumni ($\approx 2,000,000$)

- Data sources (primary and secondary):
  - Cineca, MiurNuclei, Infocamere Telemaco, Eurostat, EPO, Patiris, Ape-inv Lissoni, Abilitazioni MIUR, Linked-in
  - Survey to: research offices, TTOs, spin-offs, entrepreneurs and students
Data structure

• Relational database

• 5 Domains
  1. Institutional (i.e., “Universita’)
  2. Contextual (i.e., “Contesto”)
  3. Firm (i.e., “Impresa”)
  4. Individual (i.e., “Individuo”)
  5. Knowledge (i.e., “Brevetti-Pubblicazioni”)

• 200 tables – 3000 variables
Multilevel in nature
Institutional level (ID: 1)

Data on:
94 MIUR Universities
4 Public Research Centers

Time-variant data:
1999-2011

Information on:
- Employees (academics and technicians)
- Departments and faculties (e.g., research performance, number of students)
- Support mechanisms and policies (e.g., incubators and patent policy)

-23 tables
Contextual level (ID: 2)

Data on:
20 Italian Regions

Time variant data:
1999-2011

Information on:
- Regional munificence
- Social capital
- Credit availability
- Infrastructural support

10 tables
Firm level (ID: 3)

**Data on:**
- 540 Academic Spin-offs (spun-off from the Italian Universities and Public Research Centers)
- 60 Private Firms (control sample)
- Time-variant data: 1999-2011

**Information on:**
- Firm performance and operations
- Founders and top management teams

46 Tables

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Individual Level (ID: 4)

Data on:
- a) Firms people:
  - 2800 founders and 480 managers
  - Time-variant data: 1940-2011
  - Information on:
    - Career
- b) Population of Italian academics:
  - 60000 academics
  - Cross sectional data: 2008
  - Information on:
    - Demographics
  - 15 tables
Knowledge level (ID: 5)

Data on:
Patenting activity by Italian academics

Time-variant data:
1970-2011

Information on:
- Technology
- Patents and patent families

22 tables
Research team

• **Unibo:**
  – Daniela Bolzani
  – Riccardo Fini
  – Rosa Grimaldi
  – Gian Luca Marzocchi
  – Maurizio Sobrero

• **Externals:**
  – Tim Folta (Uconn)
  – Enrico Forti (UCL)
  – Antonio Giuliani (UIC)
  – Einar Rasmussen (Bodo)
  – Simone Santoni (Ucass)
  – Mike Wright (ICL)
Outcomes

**Scientific Papers**


- Fini, Grimaldi, Santoni, Sobrero, 2011. *Complements or substitutes? the role of universities and local context in supporting the creation of academic spin-offs*, Research Policy


- Baldini, Fini, Grimaldi, Sobrero, 2014. *Organisational Change and the Institutionalisation of University Patenting Activity in Italy*, Minerva


**Technical Report**

The TASTE Project: Some Evidence
Content

• Characteristics
• Shareholders and Equity Composition
• Innovation and Growth Strategies
• Performance
Year of Incorporation

Operating companies: 863
(152 innovative start-ups)

Source: TASTE; N = 1,010
Localization

<table>
<thead>
<tr>
<th>Region</th>
<th>Academic spin-offs</th>
<th>Innovative start-ups</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>53.4%</td>
<td>58.7%</td>
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<tr>
<td>Center</td>
<td>20.9%</td>
<td>22.3%</td>
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<tr>
<td>South</td>
<td>25.7%</td>
<td>19.0%</td>
</tr>
</tbody>
</table>

Source: Ministero Sviluppo Economico 2014 and TASTE; N = 1,010
University of affiliation

Top-10 “parent” Universities

Source: TASTE; N = 1,010

- Università degli Studi di BOLOGNA: 67
- Università degli Studi di PADOVA: 58
- Politecnico di TORINO: 50
- Politecnico di MILANO: 40
- SSUP S.Anna di PISA: 37
- Università degli Studi di UDINE: 35
- Università degli Studi di MILANO: 33
- Università degli Studi di GENOVA: 33
- Università degli Studi di TORINO: 31
- Università degli Studi di PISA: 31

Number of founded firms
Shareholding composition

<table>
<thead>
<tr>
<th>Year</th>
<th>(number of operating firms in parentheses)</th>
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<tbody>
<tr>
<td>1999</td>
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<td>2000</td>
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<td>2012</td>
<td>(884)</td>
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<td>2013</td>
<td>(863)</td>
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</tbody>
</table>

Year

- Individuals
- Public institutions
- Financial institutions
- Industry

Average number of shareholders at foundation: 6
Average number of shareholders in 2013: 6

Source: TASTE; N = 1,010
Equity composition

Average equity at foundation: € 52,000
Average equity in 2013: € 100,000

Source: TASTE, N = 1,010
Entrepreneurial teams at foundation

Gender
83% males

Career
98% have academic experience
13% have professional experience in industry
5% have founded other companies

Education
57% holds a Doctoral degree
3% holds a Master degree
40% holds a University degree

Scientific productivity
84% have at least one scientific publication
18% are inventors of a patent
Patenting activities

• 229 spin-offs (22.7%) with at least one patent assigned

By University (Top-10)

<table>
<thead>
<tr>
<th>University</th>
<th>Number of assigned patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Università degli Studi di BOLOGNA</td>
<td>52</td>
</tr>
<tr>
<td>SSUP S.Anna di PISA</td>
<td>46</td>
</tr>
<tr>
<td>Università degli Studi di MILANO</td>
<td>45</td>
</tr>
<tr>
<td>Università degli Studi di PISA</td>
<td>32</td>
</tr>
<tr>
<td>Università degli Studi di FERRARA</td>
<td>30</td>
</tr>
<tr>
<td>Politecnico di TORINO</td>
<td>30</td>
</tr>
<tr>
<td>Università degli Studi di PADOVA</td>
<td>28</td>
</tr>
<tr>
<td>Politecnico di MILANO</td>
<td>26</td>
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<tr>
<td>Università degli Studi di GENOVA</td>
<td>25</td>
</tr>
<tr>
<td>Università degli Studi di FIRENZE</td>
<td>23</td>
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</tbody>
</table>

Source: EPO, Espacenet and TASTE databases – N = 1,010
Internationalization Strategy

**Speed**
- At foundation: 14% of companies
- After 3 years since foundation: 57% of companies
- After 5 years since foundation: 74% of companies

**Mode**
- Import: 7%
- Export: 40%
- Partnership: 36%
- Licensing: 11%

**Place**
- Europe: 44%
- North America: 18%
- Central-South America: 17%
- Asia: 7%
- Middle East: 6%
- Africa: 8%

Source: TASTE Survey 2013 (n = 123/354 – RR = 35%)
Milestones

Average Annual Revenue (K€)

Years since foundation (number of operating firms in parentheses)

1° sale (ita)
1° employee
1° financing
1° collaboration (ita)
1° patent application
1° export
1° collaboration (abroad)
1° office (abroad)

Source: TASTE Survey 2013 (n = 123/354, RR = 35%)
Performance: Revenues per Year

Revenues per year (number of operating firms in parentheses)

Total revenues (M/€)

Average annual revenue (K/€)

Source: AIDA and TASTE; N = 1,100
Performance: Revenues since Establishment

Source: AIDA and TASTE; N = 1,100
Performance: survivals/failures

Failures = 124 (12.3%)
M&As = 12 (1.2%)
Transformations = 11 (1.1%)
Survivals = 863 (85.4%)
Inactive in the last 3 years = 35 (4%)
To summarize

**Characteristics**
- 1,010 spin-off (1978-2013); 935 after Law 297/1999
- 7 years old on average
- 53% established in the North of Italy
- 79% operating in services

**Shareholders and Equity Composition**
- Equity
  - at foundation: € 52,000
  - in 2013: € 100,000
- Decreasing role of industrial, financial and public partners

**Innovation and Internationalization Strategies**
- 25% with at least one patent-assigned
- 57% of firms work abroad after 3 years since establishment

**Performance**
- 12.3% of spin-offs failed; 1.2% merged/acquired; 1.1% transformed;
- Growing total revenues (2013: 184 M/€) and
- Growing average revenues (2013: 200 K/€ per company) + crisis 2008
- Growing revenues up to 6 years since inception – but different groups of firms
Conclusions

Weaknesses
• 2 out of 10,000 registered companies are academic spin-offs
• Limited capitalization and turnover
• Decreasing relative capitalization by financial, public and industrial shareholders
• Very few M&A / IPOs

Opportunities
• Relatively low failure rates
• High levels of human capital, presence of patent-related knowledge, international proactivity
• Fast growing firms – early stage milestones
What’s next

Research pipeline

• Fini, Folta, Grimaldi, 2014, *Creating the Context for Entrepreneurship: Organizational Subunits as Determinants of New Venture Creation*

• Santoni, Fini, Grimaldi, Wright, 2014, *How Does Team Diversity Evolve? Exploring Adaptation and Perpetuation Perspectives in Entrepreneurial Team Change*

International collaborations

• TRIC project (ICL) – PI: Markus Perkmann

• Norwegian Spin-off Project (Bodo) – PI: Einar Rasmussen

Grants and Financing

• Horizon 2020

• ERC
Riccardo Fini
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www.unibo.it/faculty/riccardo.fini
TASTE database

Numbers of firms per year

Numbers of firms per year - All regions

Year of establishment

Filter by: All regions
TASTE DB - Revenues

**TASTE database**

**Annual revenues**

**Note:** Number of operating firms per year is reported between parentheses.
- K: 1,000 €
- M: 1,000,000 €
TASTE DB - Revenues

As of 31/12/2012:
- 1100 Entry, of which:
  - 610 with revenues >>0
  - 213 failures
  - 277 with revenues (still) ≈ 0

**Note:** Number of operating firms per year is reported between parentheses.
- $1,000$ €
- $1,000,000$ €
Sector of activity

- Services: 79%
- Information and communication: 22%
- Professional scientific and technical activities: 55%
- Other: 2%
- Manufacturing: 18%
- Commerce: 1%
- Tourism: 2%
Shareholders:
total shareholders, by year

Number of shareholders by year:
- **1999**: 172
- **2000**: 104
- **2001**: 129
- **2002**: 160
- **2003**: 214
- **2004**: 301
- **2005**: 371
- **2006**: 452
- **2007**: 544
- **2008**: 621
- **2009**: 691
- **2010**: 782
- **2011**: 837
- **2012**: 884
- **2013**: 863

The chart shows the number of shareholders by year, with the number of operating firms in parentheses. The chart includes data for individuals, public institutions, financial institutions, and industry shareholders.
Shareholders: total individual shareholders, by year

Academic entrepreneurs
Non-academic entrepreneurs

Year
Number of individuals
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000
(72) (129) (160) (214) (301) (371) (452) (544) (621) (691) (782) (837) (884) (863)
Shareholders:
total financial shareholders, by year

Number of partners

Venture Capitalist  Bank  Financial bodies

ALMA MATER STUDIORUM - UNIVERSITÀ DI BOLOGNA
Shareholders: total public shareholders, by year
Shareholders: total industrial shareholders, by year
Equity:
total equity, by year

Year

(72) (104) (129) (160) (214) (301) (371) (452) (544) (621) (691) (782) (837) (884) (863)

Equity capital (M/€)

0 10 20 30 40 50 60 70 80 90 100

Individuals Public institutions Financial institutions Industry

(number of operating firms in parentheses)
Equity: equity from individual shareholders, by year

<table>
<thead>
<tr>
<th>Year</th>
<th>Total equity value (M/€)</th>
<th>Equity per individual (K/€)</th>
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</table>

(Number of operating firms in parentheses)
Equity: equity from financial shareholders, by year
Innovation and growth strategies: patenting - entrepreneurs

282 spin-offs (27.9%) with a patent inventor among the entrepreneurs

Top-10 Universities of affiliation

Source: PATIRIS and TASTE; N = 1,100
Innovation and growth strategies: patenting - firms

Firms assignees of 79 EPO patents

Top-10 Universities of affiliation

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<td>12</td>
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<tr>
<td>Università degli Studi di GENOVA</td>
<td>6</td>
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<tr>
<td>Università degli Studi di FIRENZE</td>
<td>6</td>
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<tr>
<td>Politecnico di BARI</td>
<td>6</td>
</tr>
<tr>
<td>Università degli Studi di PISA</td>
<td>5</td>
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<tr>
<td>Università degli Studi di BOLOGNA</td>
<td>4</td>
</tr>
<tr>
<td>SSUP S.Anna di PISA</td>
<td>3</td>
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<tr>
<td>Politecnico di MILANO</td>
<td>3</td>
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<tr>
<td>Università degli Studi di PAVIA</td>
<td>3</td>
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<tr>
<td>Università degli Studi di MODENA e</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: PATIRIS and TASTE; N = 1,100
Innovation and growth strategies: University-company collaborations

- None collaboration: 13%
- Collaboration with Universities: 46%
- Collaboration with Universities & PRCs: 41%

- Research: 35%
- Consultancy: 7%
- Training: 9%
- Creation of infrastructures: 2%
- Participation to grant calls: 7%

Source: TASTE survey 2013 (n = 123)
Frameworks

Organizational theories
- Institutional theory/logics (Greenwood et al., 2008)
- Organizational design (Sorensen & Fasiotto, 2011)

Psychosocial theories
- Theory of the planned behavior (Ajzen, 1991)
- Construal level theory (Liberman & Trope, 1998)
- Opportunity recognition/creation (Alvarez & Barney, 2013)
- Team diversity and evolution (Harrison & Klein, 2008)

Technology management, entrepreneurship and policy making
- a la Shane, Siegel, Martin, Link, Kenney, Feldman, Salter, Rasmussen, Delmar, Wiklund, Wright, Clarysse, Mustar, D’Este, Autio.
Projects

Project Iris:
- Italian Research on Innovation Systems
- http://patiris.uibm.gov.it/home (Patiris)
- FIRB Financing
- 2005 – 2009
- PI: Maurizio Sobrero

Project Taste:
- TAking STock: External engagement by academics
- www2.sa.unibo.it/taste
- FP7-PEOPLE-CIG MARIE CURIE Financing
- 2012 – 2016
- PI: Riccardo Fini
Focus

• Focus on:
  – Commercialization activities by academics
    • spin-off, patenting, external collaborations
  – University and local context support mechanisms:
    • policies, TTOs, incubators
  – Researchers’ careers and scientific productivity
  – Student entrepreneurship