The Consequences of Commercialization Choices for New Entrants in High-Tech Industries: A Venture Emergence Perspective

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Motivation

• We focus on **commercialization strategy choice** for new entrants in high-tech industries:
  • There is a trade-off between licensing to incumbents or full commercialization (Gans & Stern 2003).
  • Complementary assets and IP appropriability influence the choice.
  • But, is it a static (one-off) or dynamic choice? Do we see strategic switchbacks? (Marx & Hsu 2015).

• Example of **Fractus** (fractal-based antennas for cellphones):
  • Early **patenting** behavior allows them to **license** their IP in 2007.
  • Over $400 million annually from **royalties**.
  • Launches **new product** “antenna booster” (tiny little cube) in 2017.

• Is this an isolated case? What explains commercialization choice at entry, does it change?
Background

Drivers of technology commercialization choices in new ventures:

- **Business environment (external)** – focus of Gans & Stern (2003) work, effect on *market entry* choice:
  - Complementary assets are necessary for successful commercialization (Teece 1986)
    - They can make direct commercialization unfeasible for startups.
    - Need time to develop assets, it can make sense to collaborate (license) to incumbents.
  - Excludability: can the technology innovation be protected.
    - IP appropriability mechanisms generates excludability for incumbents. Effective protection of the technology innovation.
Background

Drivers of technology commercialization choices in new ventures (cont’d):

- **Characteristics of the startup (internal):** not all new ventures start with the same resources.
  - Founding team industry and start-up experience (Shu & Simmons 2017).
    - Human Capital view. Entrepreneurs transfer learned routines & skills (Ucbasaran et al. 2008), access to established networks.
    - Experience in the industry related to pattern recognition, industry trends identification (Baron & Ensley 2006).
  - Technological resources: IP Resource endowments: patents and research intensity.
    - Case of corporate spin-offs, new entrants but with IP assets. Different paths and growth strategies than academic spin-offs or other new ventures with limited resources (Fryges & Wright 2014).
Background

Static (one-off) vs dynamic approaches to technology commercialization (Marx et al. 2014):

- Potential changes between the two options:
  a) **Licensing** approach (market for ideas)
  b) **Product** or Service **commercialization** (market for products)

- Need to account for within changes:
  - The learning process of new entrants – takes time to see effects.
  - Changes in the complementary assets or technology resources.

Dynamic strategies: combination of moves (Marx & Hsu 2015):

- From licensing to offering products, *building complementary assets*.
- From products to licensing, *learning on obstacles to commercialization*.

**Open question:** consistency of the drivers of first ”market entry” and successive technology commercialization choices.
Hypotheses development

**Innovation appropriability**
- Have IP
- R&D intensity

**Human Capital** (learning capacity)
- Entrepreneurial experience
- Industry experience

**Moderator**
- Venture Status (venture emergence)

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**Technology Commercialization strategy**

*At market entry:*
- **H1a:** Positive effect on adoption of IP licensing strategy
- **H1b:** Positive effect on both IP licensing or Product strategy

*Successive choices:*
- **H2a:** Positive effect on both IP licensing or Product strategy
- **H2b:** Positive effect on Product strategy
- **H3:** Positive effect on Product strategy (including services)
Research Design
Method & Data

- Sample of high tech industries new entrants (206 firms) in 2004 in the US.
- Selected from Kauffman Firm Survey (KFS) data (DesRoches et al., 2010, Robb et al. 2009), our sample is an unbalanced panel data.
- Observe their commercialization choices in the subsequent 4 years (2004-2008).

Method:
- Multinomial logit analysis, operationalizing tech commercialization as DV with three different possible values.
Research Design
Measures

DV:
- **Tech Comm Strategy**
  - a) IP Licensing strategy
  - b) Product/service strategy

IV:
- Entrepreneurship & Industry experience
- Have IP? & R&D Intensity (% employees in R&D)

Controls:
- Size, Status*

(*) Status as Venture Emergence (0 to 4): external funding (1/0), sales (1/0), employees (1/0), profit (1/0) – Newbert & Tornikoski (2010).

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<thead>
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<th>Commercialization Strategy</th>
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<th>Service (only or mix w/ product)</th>
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<td>b) Product strategy (not licensing)</td>
<td>1</td>
<td>2</td>
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<tr>
<td>a) IP-Based strategy (licensing)</td>
<td>-</td>
<td>3</td>
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Findings

At market entry (2004):

- Base outcome is "2" – hybrid product strategy (prod & service)

- Firms opting for "pure" product strategy "1":
  + Have IP, Entrepreneurial Experience,
  - Status (venture emergence)

- Firms opting for IP licensing strategy "3":
  + Industry Experience,

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Findings

During early stage (2004-2008):

- Base outcome is "2" – hybrid product strategy (prod & service)

- Firms opting for "pure" product strategy "1":
  + Have IP, Entrepreneurial Experience,
  - Status (Venture Emergence)

- Firms opting for IP licensing strategy "3":
  + Entrepreneurial experience, Industry Experience, Have IP (strong)

Mlogit results: Log likelihood -575.61 // Pseudo R2: 0.15 // LR chi2 (12) 208.92 // Prob > chi2 = 0.00
Implications

On Technology Commercialization choices:

• Changes in the effect of the IP position of new entrants:
  • At market entry – related to ”pure” product commercialization ”1”.
  • At overall early stage – favors ”pure” mode adoption (either product ”1” or licensing ”3”)

• Hybrid strategy (services or services & products), related to higher level of venture emergence (operating status indicators).
  • High correlation with survival (longer duration in the dataset).

• Contribution from Human Capital view:
  • Experience (entrepreneurial and/or industry) favors the adoption of ”pure” choices in the commercialization strategies.
    • Attention, we are not suggesting a positive impact on venture performance or survival.
Next steps

Empirical analysis:
• Clarify selection biases & sources of endogeneity:
  • Industry selection to enter?
  • Initial IP assets biases commercialization choice?
• Determine patterns in commercialization choice changes and interaction effects. Alternative econometric analytical strategies.

Framework development:
• Link commercialization choices to differential performance (or growth) by industry
  • Need to cluster outcomes by industry & location.
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