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Regional Innovation and the Role of University Spin-offs in the Waterloo Region

Preliminary results based on joint research with Dieter Kogler & Andrew Munro

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1. Introduction: The Case of the Waterloo Region

- Focus: to understand processes driving regional innovation
- Case: Waterloo region (Kitchener/Guelph metropolitan areas)
- Successful regional development (especially since the 1970s)
  - High economic growth/low unemployment
  - Successful regional transformation from traditional manufacturing to new technologies, i.e. IT
  - Successful start-ups around UW (firms such as RIM, Open Text, Sybase)
- Region has become a hot spot for academics/politicians to learn about successful regional transformation
- BUT: knowledge behind this success is inconclusive

1. **Introduction: The Case of the Waterloo Region**
   - The region is clearly not a true industry cluster
     - Quite heterogeneous: large vs. small firms; old vs. new industries; manufacturing vs. services
   - No simple regional evolution due to a lack of coherence
     - Highly fragmented: no value-chain focus
   - Despite success reports: notable restructuring activities/ threat of an upcoming crisis makes empirical work difficult
   - <u>Goals:</u>
     - Regional and trans-regional innovation linkages
     - Evidence regarding the existence of local knowledge networks and cross-sectoral linkages

Structure of Presentation

1. Introduction: The Case of the Waterloo Region
2. Core Argument and Research Strategy
3. Methodology of Identifying University Start-ups/Spin-offs
4. University Start-up/Spin-off Processes in the Waterloo Region
5. Producer-User Linkages and Knowledge Flows
6. Institutional Linkages and Support
7. Conclusion

2. Core Argument and Research Strategy

- Hypothesis: university spin-off processes and growth in traditional sectors are strongest when they are linked/support one another
- University spin-offs have little legitimacy/large potential
  - If they can link to local networks, they gain legitimacy
  - Local networks, in turn, provide incentives for established firms to learn/adapt
- Established firms benefit from trans-local pipelines which provide legitimacy in wider markets
  - They likely grow faster than start-ups if they can permanently adapt to changes
- BUT: small firms grow faster through these networks
  - This opens possibilities for wider global linkages

2. Core Argument and Research Strategy

A. First stage 2007-08

- Interviews focusing on IT university start-ups
  - Regional vs. non-regional linkages in innovation and knowledge flows
  - Linkages with suppliers/users; institutional linkages
  - Linkages with other regional sectors
- Interviews conducted 2007-08:
  - 18 theme 1 interviews
  - 7 theme 3 interviews

2. Core Argument and Research Strategy

B. Second stage 2008-09

- Interviews focusing on traditional industries
  - Branches selected: fabricated metals, machinery, electrical equipment, transportation equipment (N > 600 firms; > 35,000 employees)
  - Regional vs. non-regional linkages in innovation and knowledge flows
  - Linkages with suppliers/users; institutional linkages (i.e. with university research)
  - Linkages with university start-ups (especially in IT)
- Intended interviews 2008-09:
  - 30 theme 1 interviews
  - 20 additional telephone interviews
  - Further Theme 3 interviews

3. Methodology of Identifying University Start-ups/Spin-offs

- In some studies, university spin-offs are defined narrowly as being a direct outcome of university research
- In others, firms started by a graduate are seen as spin-offs

→ Both definitions are problematic

- <u>Definition in this study:</u>
  - Knowledge produced/circulated at the university
  - Founders who met at/through the university
  - Business opportunities around university competence areas
- <u>Firm selection process for semi-structured interviews:</u>
  - Systematic random sample
  - A-priori identification of key accounts

3. Methodology of Identifying University Start-ups/Spin-offs

- Total number of firms: 288 (100%) = 227 (PWC) + 47 (UW) + 14 (UG)
- Non-IT firms: 169 (58.7%) = 133 + 23 + 13
- IT firms: 119 (41.3%) = 94 + 24 + 1

- Of the IT firm population: 119 (100.0%)
  - Confirmed closed: 17 (14.3%)
  - Not found: 16 (13.4%)
  - Not in region: 36 (30.3%)
  - Acquired in region: 8 (6.7%)

- Relevant population (N): 42 (35.3% of IT population)
- Contacted firms: 32 (14 rejections)
- *Interviewed firms (n): 18 (n / N = 42.9%)*

Table: Spin-off/start-up types according to university sponsorship and involvement in firm formation processes

	University research	**University-industry joint ventures**	**Decentralized idea development**
Sponsored spin-offs	Publicly funded research; part of standard university operations	Formal agreement between industry and university	Start-ups by former students based on classroom experience
Unspon-sored spin-offs	Researchers develop an idea, pay for IP and leave	Innovation by someone in the research group; possibly not central to research project	Completely self-developed firms; founders have social ties with the university

Table: Start-up types according to the character of university knowledge applied and co-localization of the founders

	Co-localized founders	**Founders originally not co-localized**
Generic knowledge	Broad knowledge based on focus of the local incubator university	Broad knowledge based on a wider set of experiences at different places
Specific knowledge	Specific knowledge in the university's competencies (incl. tacit knowledge)	Drawing from different specific knowledge pools; large potential for innovation

4. University Start-up/Spin-off Processes in the Waterloo Region

- Firms captured were software-focused
- One third drew core technology from university research
- BUT: almost half said the university played no role
- Where the university played a key role in the creation of core technologies (5 firms), its role decreased over time
- Only few firms indicated that they remain actively involved in activities at the university
  - No significant inputs to innovation
- Inventor-own IP policy
  - Attributed to the growth of the region
  - BUT: the number/size of such firms is limited
  - Rate of firm formation decreased over time

→ <u>Overall:</u> weak university–start-up relationships

5. Producer-User Linkages and Knowledge Flows

A. Suppliers

- 11 out of 12 firms: local supplies 20% or less
- Key supplies not drawn from the region
- This is not unexpected for software firms
- The 3 firms that indicated significant supplier role in idea generation were in hardware – BUT: they were global players who draw from global supply chains
- Location of suppliers was not deemed to be important

5. Producer-User Linkages and Knowledge Flows

- Location of customers was also not that important in innovation
- Almost all firms indicated southern Ontario sales were < 5%
- 13 of 15 indicated important role of customers in innovation
  - Each firm indicated customers as a central source for new ideas
  - YET: customers were not key in problem solving
- Problem-solving was often based on Internet communities/ international corporate networks

6. Institutional Linkages and Support

- Hardly any of the firms had collaborations with public R&D laboratories or universities
  - University research was often not rated very highly/nor leading edge
  - Bit of a surprise that few firms benefited from specific knowledge developed at UW
- Communitech, the local business organization, and CTT did not impact regional innovation
  - YET: it was recognized as important in drawing public attention to the industries
  - Peer-to-peer groups involve competitors
  - This primarily affects the local business climate

6. Institutional Linkages and Support

- Reasons for slow collaboration between industry and economy
  - Intellectual property policy of UW only affected few firms
  - Co-op programme
- Local economic development offices were not mentioned as significant for innovation
  - Although UW is pioneer, few firms benefited it

7. Conclusion

- Empirical data: regional customers/suppliers/universities do not play a large role in innovation
- **To gain legitimacy firms aim to:**

  (a) Build a customer base quickly (relatively easy for software firms)

  (b) Link up with other firms in the region (BUT: firms are diversified, limiting opportunities for local network creation

  (c) Firms that have been acquired by larger entities rely on corporate networks
- University spin-off firms create little local buzz
  - Firms in our sample are local, stand-alone firms in the regional economy with strong external customer linkages

7. Conclusion

- Positive benefits are from university skill flows (primarily in the form of graduates/co-op students)
- BUT: these are generic skill flows, not the specialized knowledge that the firms need
- Role of University of Waterloo spin-offs as a source of persistent knowledge transfers has likely been over-stated
- This is very different from the image of the region