Innovation, Diversity & Knowledge Flows in Canadian Cities

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Theme I: Primary Hypothesis

- The economic performance of city-regions depends on:
  - the strength of local knowledge circulation processes *within* individual industries/clusters;
  - the strength of local knowledge circulation *between* individual industries/clusters; and
  - the strength of knowledge-based linkages *between* local and non-local economic actors.
The Benefits of Specialization

• Focus on clusters highlights the benefits of specialization (Marshall, Krugman, Porter)
  – Dense network of specialized suppliers
  – Thick labour market
  – Local knowledge spillovers
  – Specialization alone can be risky
    • Danger of being ‘locked into’ failing specialization

• Specialization tends to be found in medium-sized and smaller cities
  – Established industries move to take advantage of lower land, transportation costs, etc. outside of large cities (Duranton and Puga)

• Diversity may be more significant for high tech (analytic) industries and specialization for capital goods industries (synthetic) (Henderson)
  – Stage of product life cycle affects location
Jane Jacobs on Diversity

• ‘Jacobs’ view stresses the benefits of diversity
  – Larger cities are more diverse

• Diversity, not specialization, contributes to employment growth
  – Transmission of knowledge across diverse sectors stimulates growth in additional sectors (Glaeser)

• Diversity across complementary industries sharing a common science base stimulates innovation
  – Degree of local competition for new ideas within a city also stimulates innovation (Audretsch & Feldman)

• Competition for new ideas within a city creates a conducive environment for innovative activity
Cities as Nodes in Global Networks

• Most innovative firms use more external sources of knowledge than less innovative ones (CIS3)
  – Ability to access external knowledge critical for innovative firms
  – Localities embedded in wider sets of national and international linkages

• Merging roles of manufacturing and service activities
  – Centrality of service-based knowledge for urban competitiveness

• An international hierarchy of cities and regions is emerging
  – Repositories of leading edge knowledge for specialized activities
  – Regions are leading nodes for internationally distributed system of innovation
    • Play role as gateways for diffusing leading edge knowledge through their respective national urban and regional hierarchies
Specialization vs. Diversity
Reprised

- Dilemma of lock-in for older industrial centres
  - Remain invested in technologies and industries in which they are efficient
    - Pittsburgh, Hamilton, Akron, Windsor
- Older regions may lag in R&D
  - Preference for incremental over radical innovation
  - Lower R&D intensity
- “Important question may be whether a city has specialized in the right thing at the right time” (Storper and Manville)
From the Creative Class to the Creative Economy

• Leading edge technologies facilitate shift to deroutinized production and outputs
  – In leading edge sectors
  – ‘Cognitive-cultural economy’ (Scott)

• Cities are breeding ground for new production or consumption oriented experiments
  – Cities are being reconstituted as ‘Schumpeterian hubs’ - “giant matrices for recombining resources in order to generate innovations.” (Veltz 2004)
Toronto, Vancouver and Montreal: Innovation in the Largest Cities

- Highly diversified local economies
  - **Mature** synthetic industries (steel, auto, advanced manufacturing) co-exist with research-intensive **analytic** industries (biomedical) and cognitive-cultural **symbolic** industries (architecture, media, design)
- Hubs for creative/symbolic industries: large fashion, design, film and digital media, gaming and wi-fi
- Sectors participate in global networks of knowledge transfer
- Evidence of cross-sectoral knowledge flows in some analytic (biomedical, fuel cells, biopharma) and symbolic industries
  - Few cross sectoral knowledge flows in Montreal (aerospace, fashion design, Multimedia) – constraints of cluster strategy that concentrates knowledge flows **within** sectors?
- BUT significant variation between sectors – “the dynamics of each cluster and the lifecycle stage of each activity appear to be different”
Synergies of Technology and Culture: Toward a Cognitive/Cultural Economy?

- Strong cross sectoral knowledge flows in most symbolic industries – a “diverse array of industries shaped by synergies of technology and culture”
  - Fashion designers work in film, art, dance and theatre doing costume design - seen as “more creative”, less commercial
  - Synergies between publishing, design, music film and television - magazines, books and digital media all feed off proximity to other cultural and creative industries
  - Synergies in ‘marginal’ emerging sectors - new media, applied design, and advanced technology research, development and production

- Deep pools of creative, technical and business talent (intermediary finance and consultancies)

- Alternative innovation culture of ‘dynamic, entrepreneurial and micro-scale’ start-ups and SMEs
Ottawa, Calgary, and Saskatoon: Innovation in Specialized Cities

- Beyond diversity/specialization - nexus between synthetic and analytic industries
- All have globally recognized specializations in knowledge-intensive analytic activities – operate in niches in global markets
- Weak cross-sectoral knowledge flows
  - Tacit knowledge embedded in self-contained sector-specific local labour markets
  - “bafflement at the idea of learning from another sector”
- Importance of informal personal/professional ties
  - Knowledge flows are highly relational through informal personal contacts – “most knowledge sharing is done within a framework of social norms instead of market norms”
Specialization and Integrated Knowledge Platforms

- Each city has a highly specialized local economy that acts as a node in global supply chains
- Integrated local knowledge platforms
  - Industries clustered around specialization (ICT, oil and gas, canola) and provide **knowledge platform** of expertise in management, finance and technology that provides a knowledge base for production (ICT, canola), exploration and extraction activities (oil and gas)
- Key linkages to strong research infrastructure (universities and PROs) and for purposes of talent creation
- Supporting role of professional scientific and engineering firms, ICT firms, and financial services firms
- Weaker attachment to trade associations (seen as less relevant)
Hamilton, Waterloo and London: Innovation in Medium Cities

- Economically diverse with mix of synthetic (steel, auto, advanced manufacturing) and analytic industries (ICT, biomedical, and health services), but few symbolic ones
  - All affected by de-industrialization, but Hamilton and London hardest hit
  - Waterloo and Hamilton have home-grown anchor firms (RIM and Dofasco/Stelco), but London does not
  - Evidence of a ‘manufactured’ cognitive cultural economy emerging in Waterloo?

- Innovation processes mostly in-house and customer-driven
  - Waterloo & Hamilton nodes in global knowledge networks, London not so much
  - Relationship to local universities varies but important for talent creation

- Weak local cross-sectoral & inter-sectoral knowledge flows
  - “almost nonexistent”

- Major difference in intermediary organizations
  - Business community highly organized and active in Waterloo, not well-organized in Hamilton (lacks industry associations), and much weaker in London
Moncton and Trois-Rivières: Knowledge Flows in Small Cities

- Firms in all sectors have stronger non-local linkages than local ones
  - “when you have no one to talk to, you don’t interact much at the local level”
- Weak correlation between local knowledge flows & innovation
  - Moncton and Trois-Rivières share many social characteristics, but their economic performance is different
  - Mature and emerging sector firms in Moncton have weak local knowledge flows and strong non-local ones
  - Mature sector firms in Trois-Rivières have strong local and non-local ties and emerging sector firms have weak local ties and strong non-local ties
  - BUT Firms in all sectors in Moncton doing better than firms in Trois-Rivières
- RIS assumptions about social characteristics of innovation may not apply as well to smaller city-regions
  - True for some small cities (Kingston), but not others (Saskatoon, St. John’s)
Key Findings

• Most industries and sectors report some form of participation in global knowledge networks and/or supply chains

• Role of intermediaries/industry associations varies greatly
  – important (Montreal, Ottawa, Waterloo) to limited (Hamilton) to very weak (London, Saskatoon)
  – Enable (mediate conflict) AND constrain (prevent cross-sectoral knowledge flows)

• Role of universities – talent creation more important than R&D
  – Close collaboration with universities and PROs only in research-intensive high tech sectors (aeronautics, ocean technology, canola)

• Innovation processes vary by sector – no two sectors are alike
  – Majority is non-local customer-driven incremental product and process innovation in analytic and synthetic industries
  – Weak cross-sectoral knowledge flows - “bafflement at the idea of learning from another sector”

• Knowledge flows are relational - informal personal ties between workers rather than ‘how-to’ knowledge sharing between firms
Key Insights

• Social learning in cities
  – Importance of informal personal ties over transfer of firm-centred tacit knowledge

• Specialization vs. diversity
  – Significant variation within and between cities – no two the same

• Technology convergence & cross-sectoral knowledge flows
  – Weak to non-existent cross-sectoral knowledge flows outside of large hub cities
  – Little evidence in synthetic industries, some evidence in analytic industries, strongest in symbolic industries

• Cities as nodes in global networks
  – Schumpeterian ‘hubs’ in larger cities with diverse economies
  – Integrated knowledge platforms in small and medium cities with specialized knowledge bases act as nodes in global knowledge networks and supply chains

• Towards a cognitive/cultural economy?
  – Social dynamics of innovation different for different sized cities
  – Primarily in largest hub cities and even then, qualified – cross-sectoral knowledge flows in analytic and symbolic industries, less so in synthetic industries