
Analytical Measures to Assess and Evaluate Clusters

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Clusters: In Theory

- How would we know a 'successful' cluster when we see one?
 - Inflows (capital, talent, knowledge)
 - Outflows (products, knowledge)
 - Local social dynamics (cooperation, competition, circulation of people and knowledge, governance)
 - History / path dynamics (discontinuities, robustness, adaptation / evolution, learning)
- **CHALLENGE:** How can we operationalize these quantitatively to compare the ISRN case studies?



Clusters: Challenges in Practice

- Availability of data (proprietary information, cost, structure, coverage)
- Geographic scale / level of data
- Limited to industrial-based definitions (a cluster is more than just a group of firms in same / similar industries)
- Data integration (multiple sources, definitions, concordances)



Core Research Questions

- How do the ISRN case studies perform compared to similar 'clusters' in other regions?
- Is there a correlation between cluster-specific assets and the performance of individual clusters?



Defining Clusters: Data

- Geography
 - 27 Census Metropolitan Areas (CMAs)
- Industry
 - 1997 North American Industrial Classification System (NAICS)
 - Groups of industries (4-digit level) based on ISRN case studies
 - Definitional issue with some clusters
- Data Sources
 - Census of Population, 2001
 - Canadian Business Patterns, 1998-2002
 - Canadian Intellectual Property Office, 1998-2002
 - Macdonald & Associates VCReporter™, 1998-2003



Cluster Indicators

- **Critical Mass / Specialization**
 - Absolute number of employees
 - Relative number of employees (location quotient)
- **Knowledge Intensity**
 - Proportion of labour force with university degree or higher
 - Proportion of labour force belonging to 'creative class'
- **Performance and Dynamism**
 - Average Annual Establishment Growth, 1998-2002
 - Average Employment Income
 - Patents, 1998-2002 (cumulative)
 - Venture Capital, 1998-2003 (cumulative)
 - Proportion of labour force moved to region in past five years (domestic and foreign)



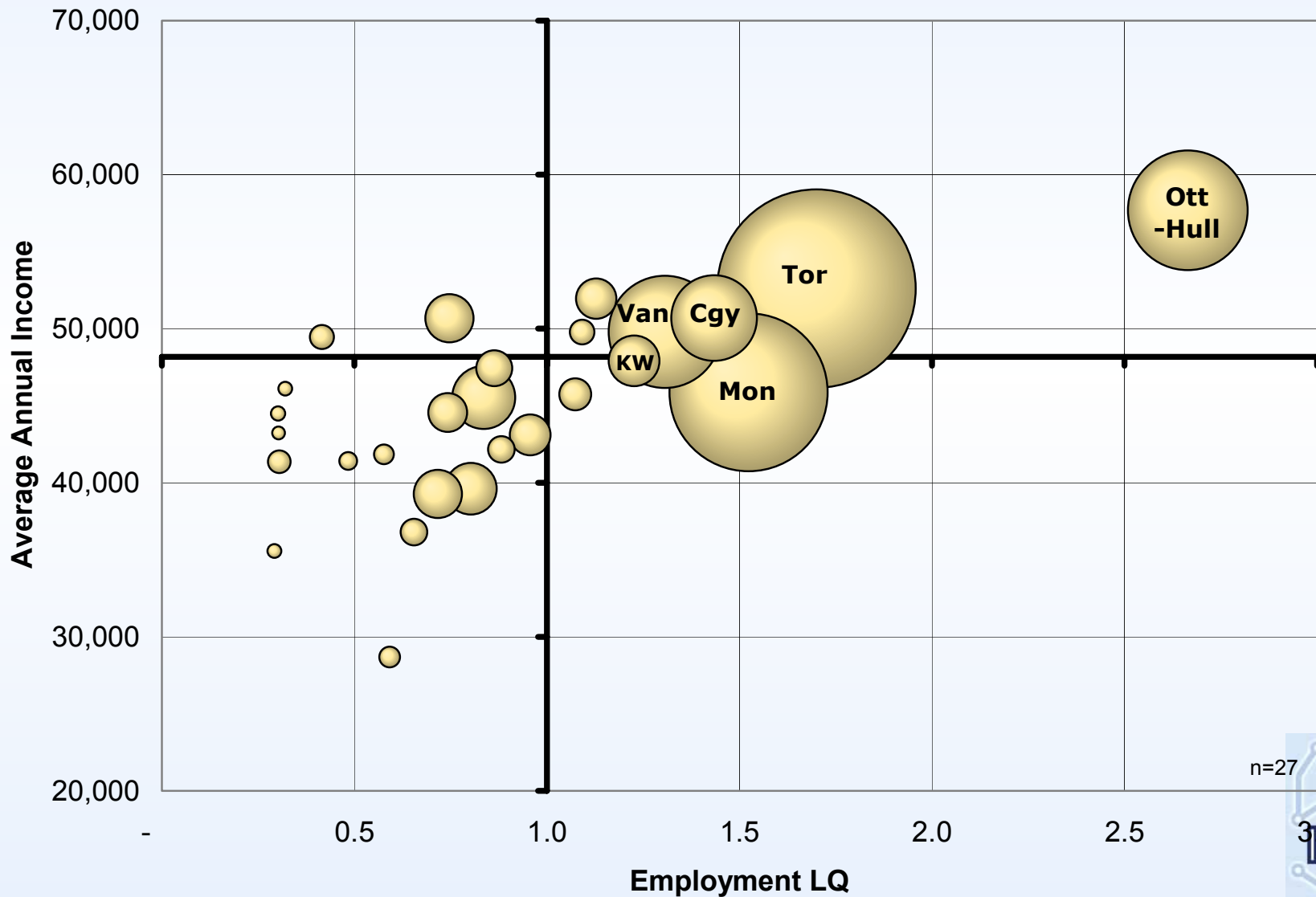
Canadian ICT Clusters



Critical Mass and Growth (ICT)



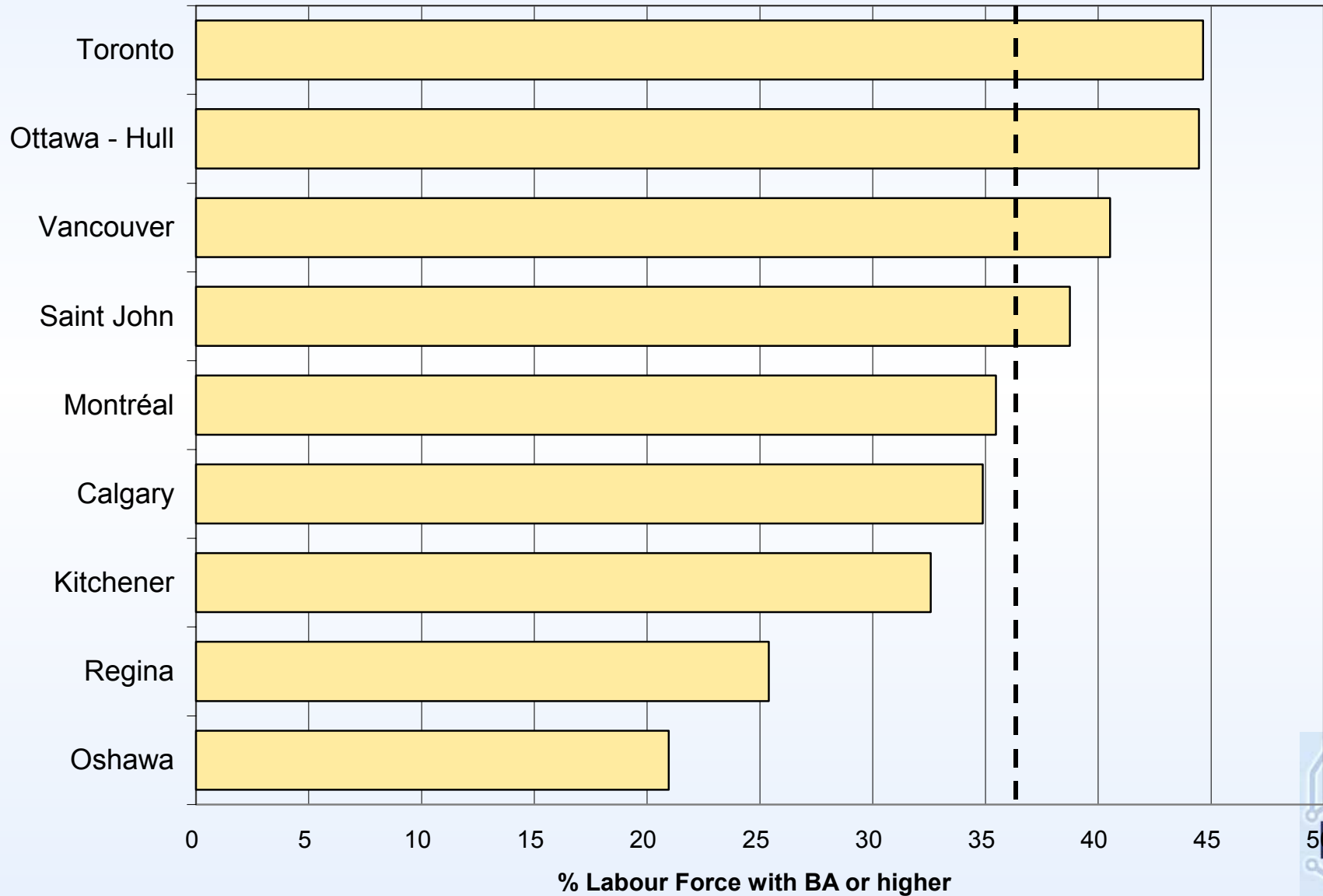
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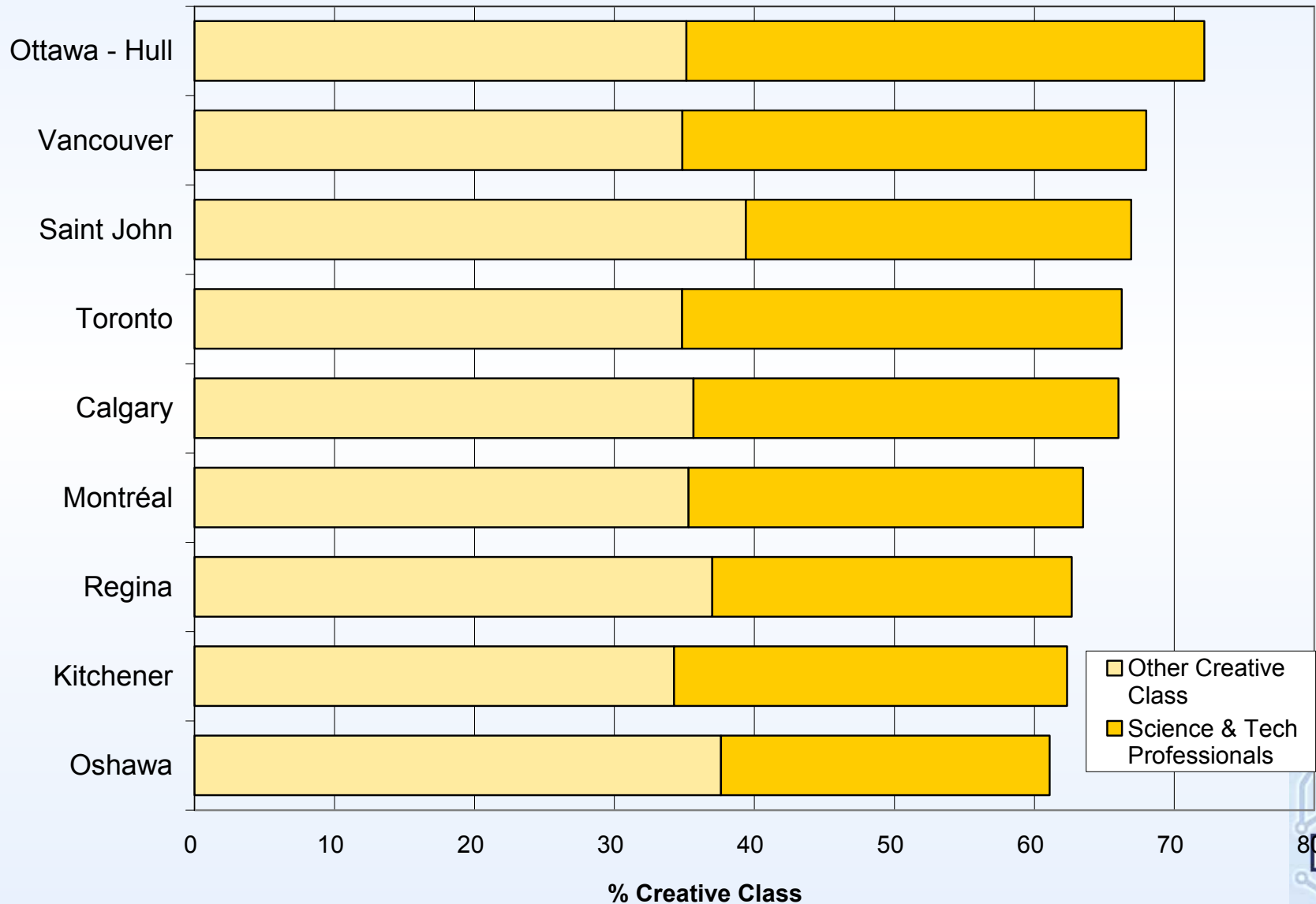
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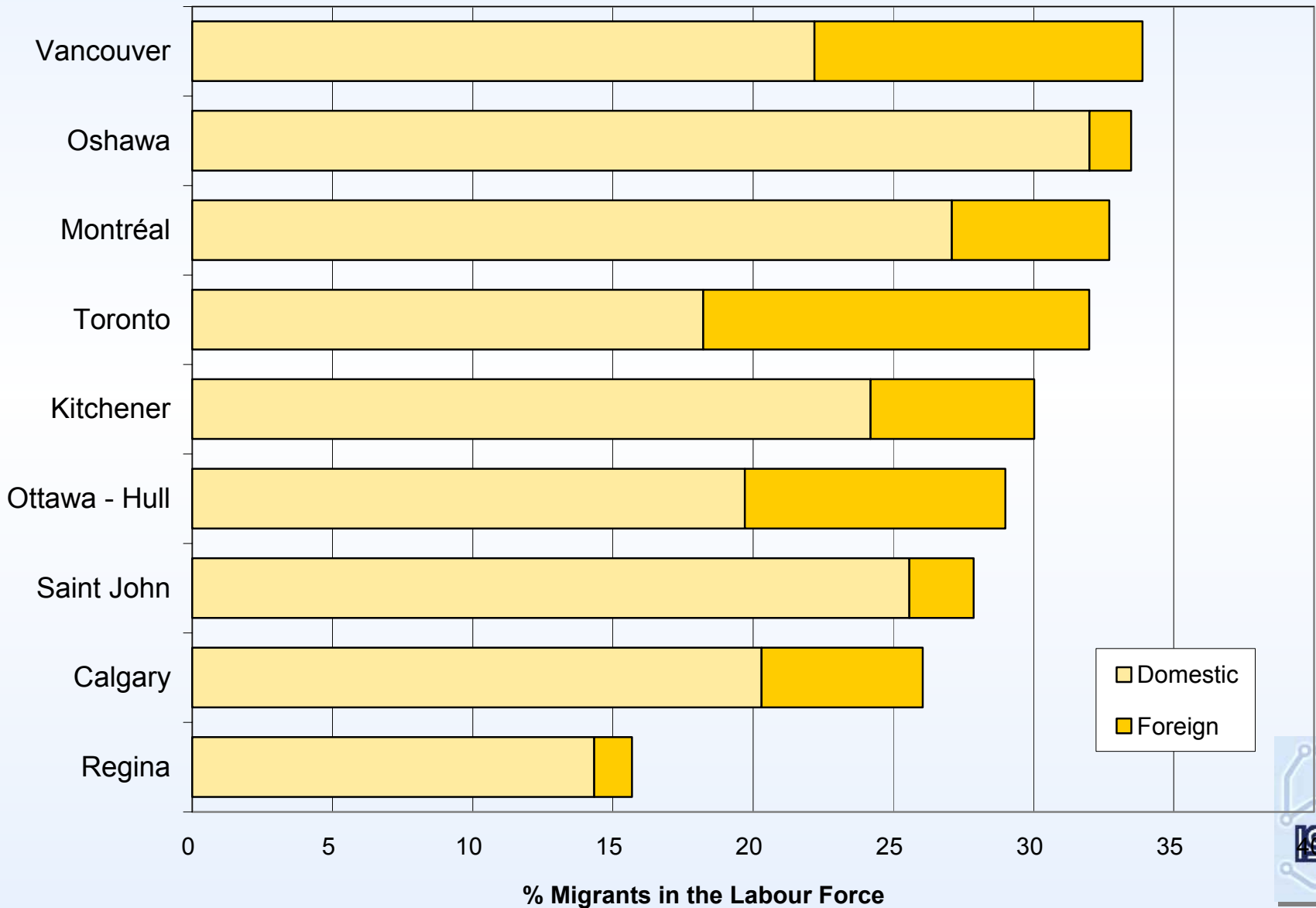
Degree Holders (ICT)



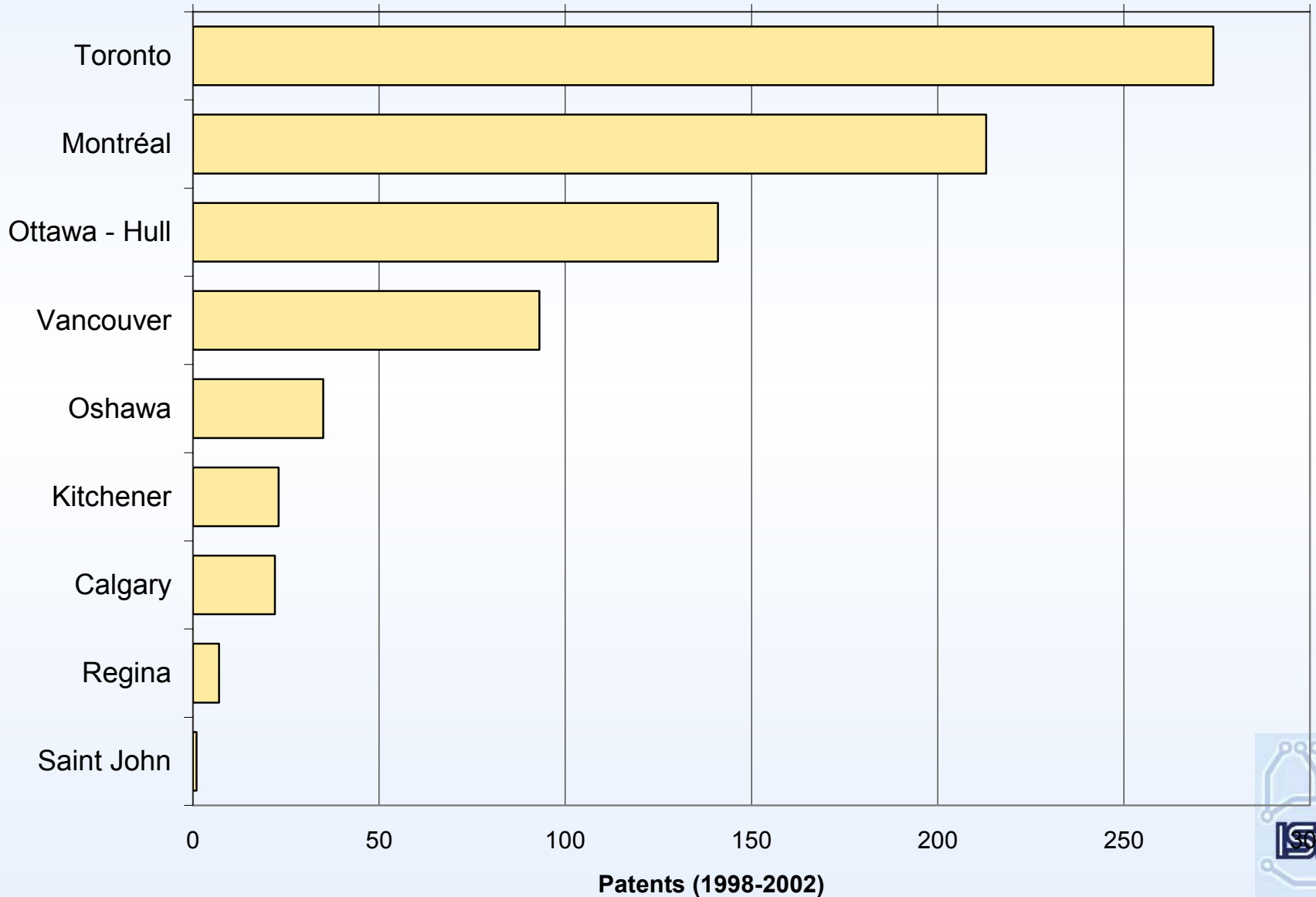
Creative Class (ICT)



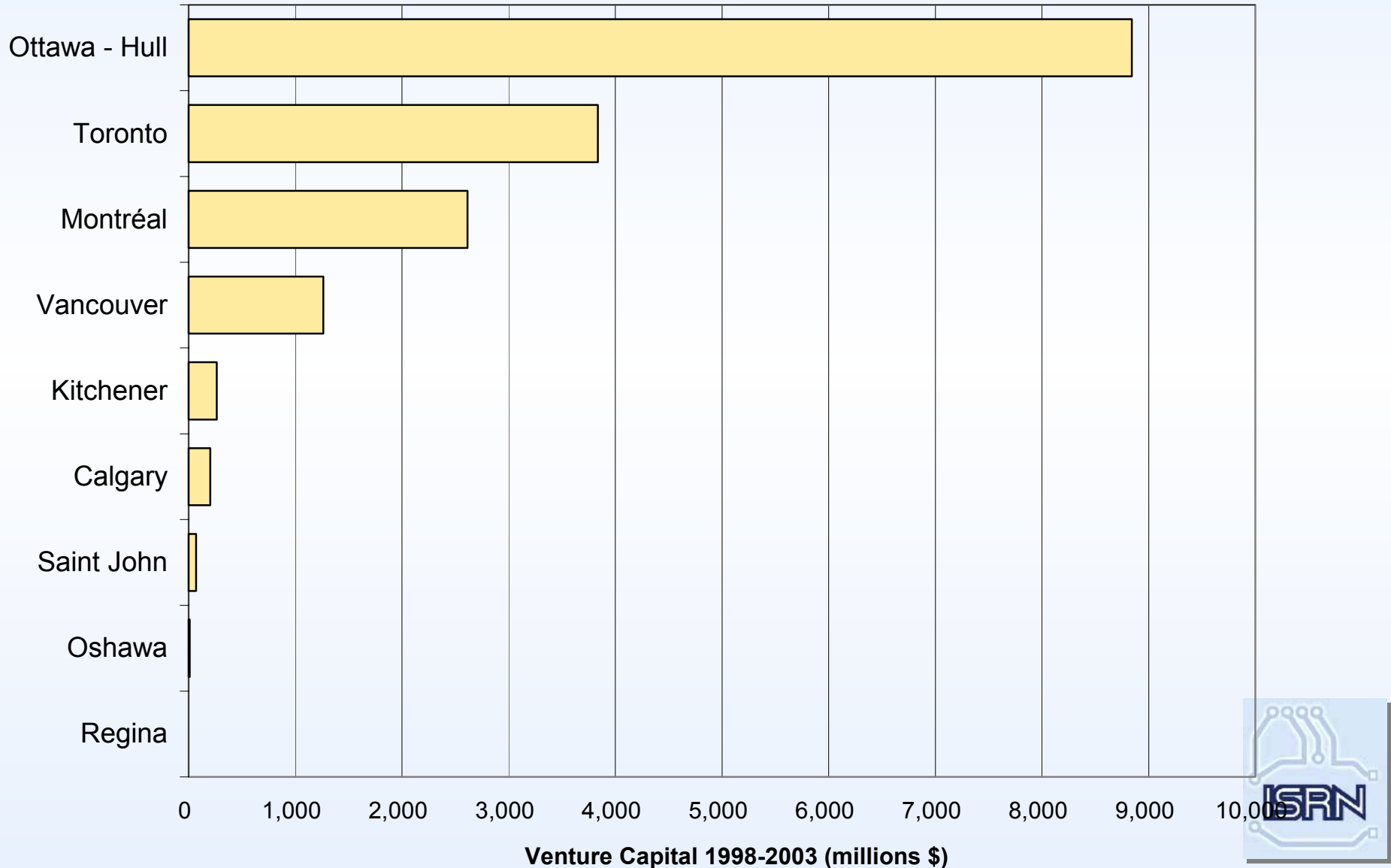
Mobility: Attraction of Workers (ICT)



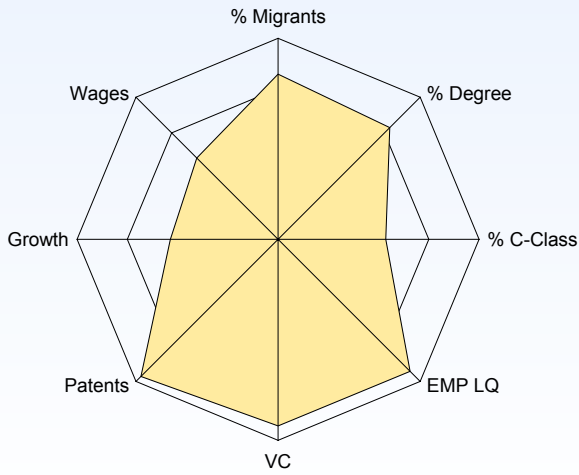
Patents, 1998-2002 (ICT)



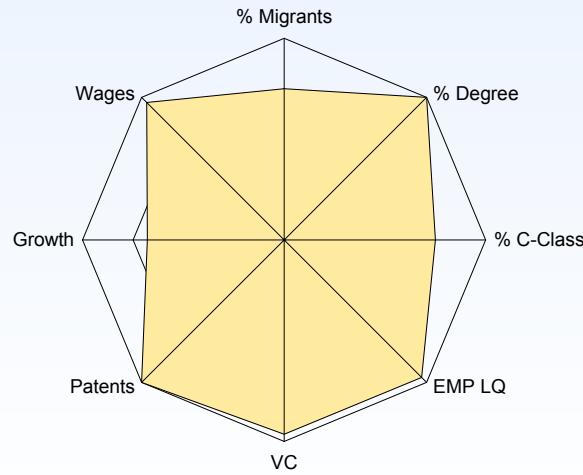
Venture Capital, 1998-2003 (ICT)



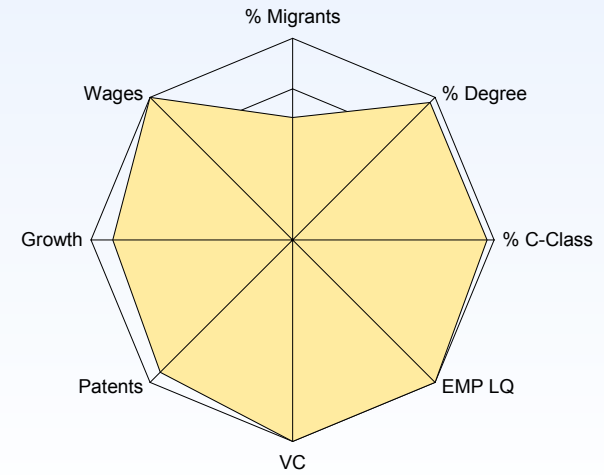
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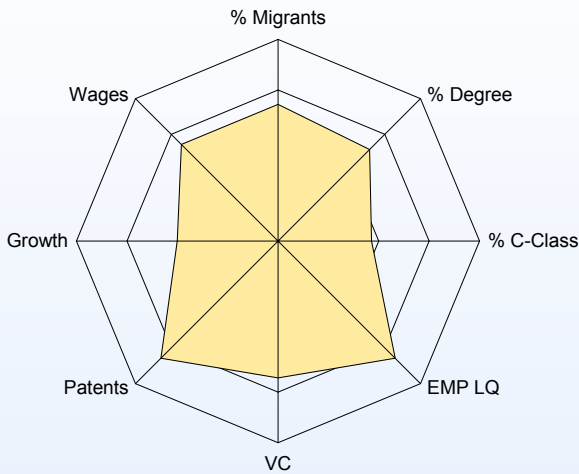
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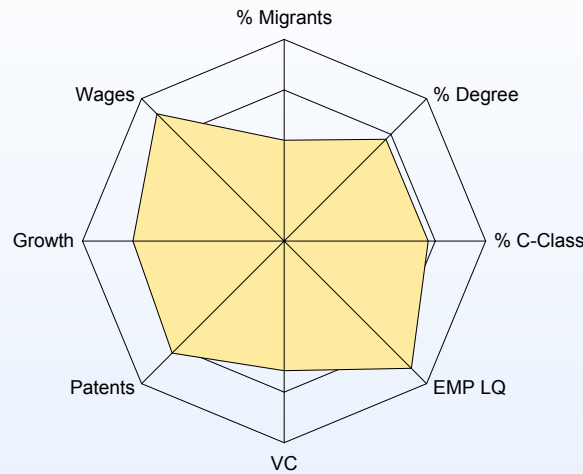
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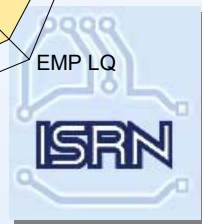
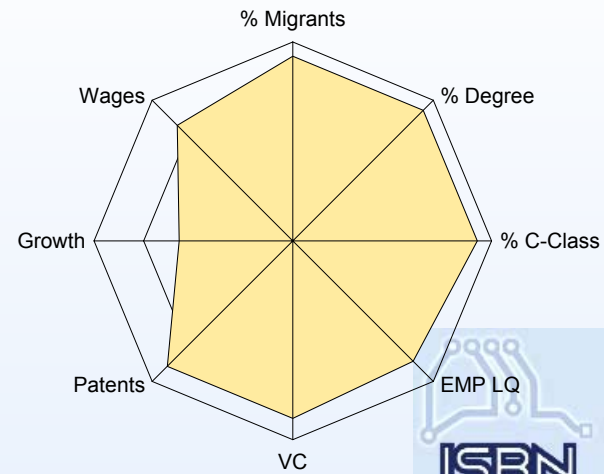
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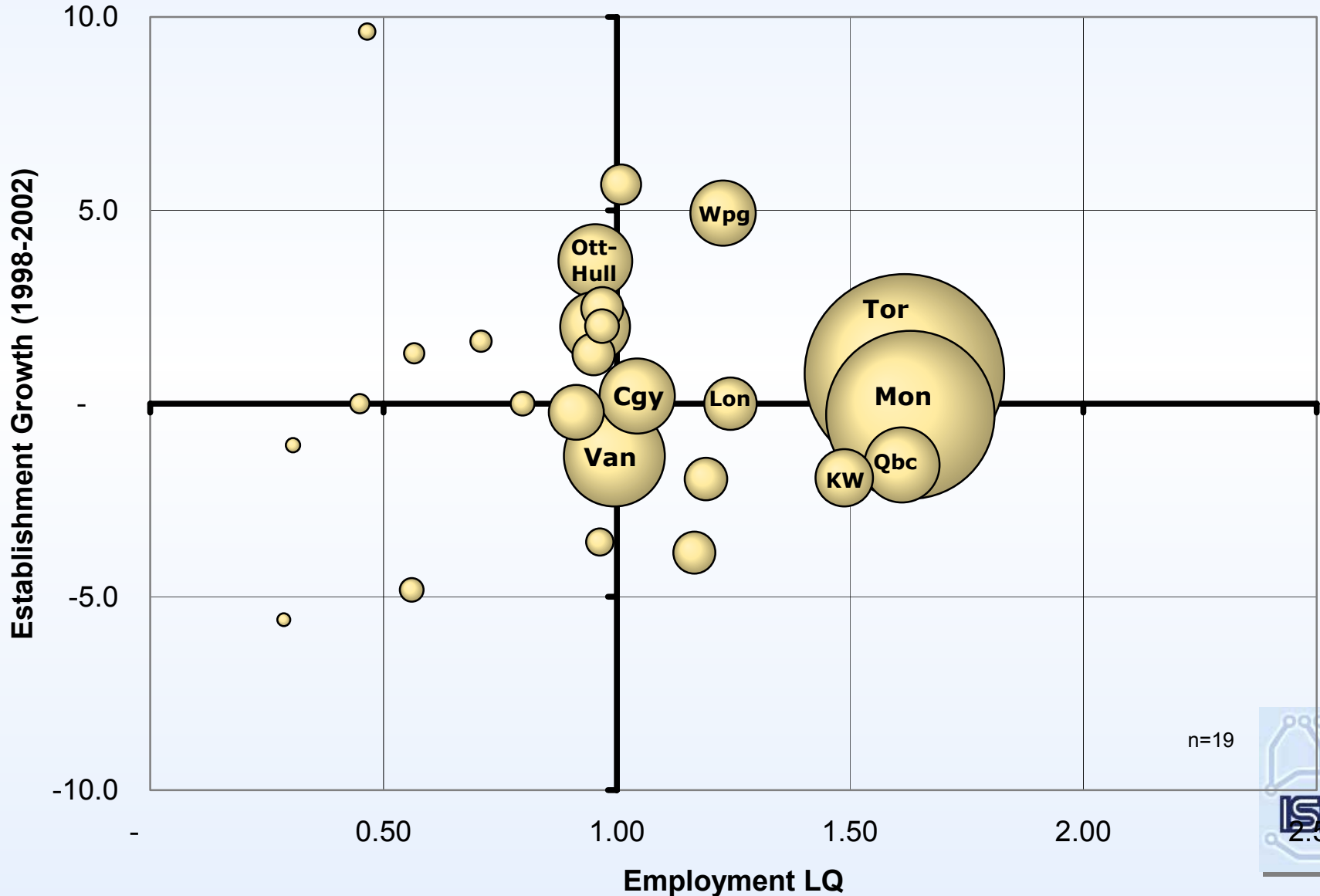
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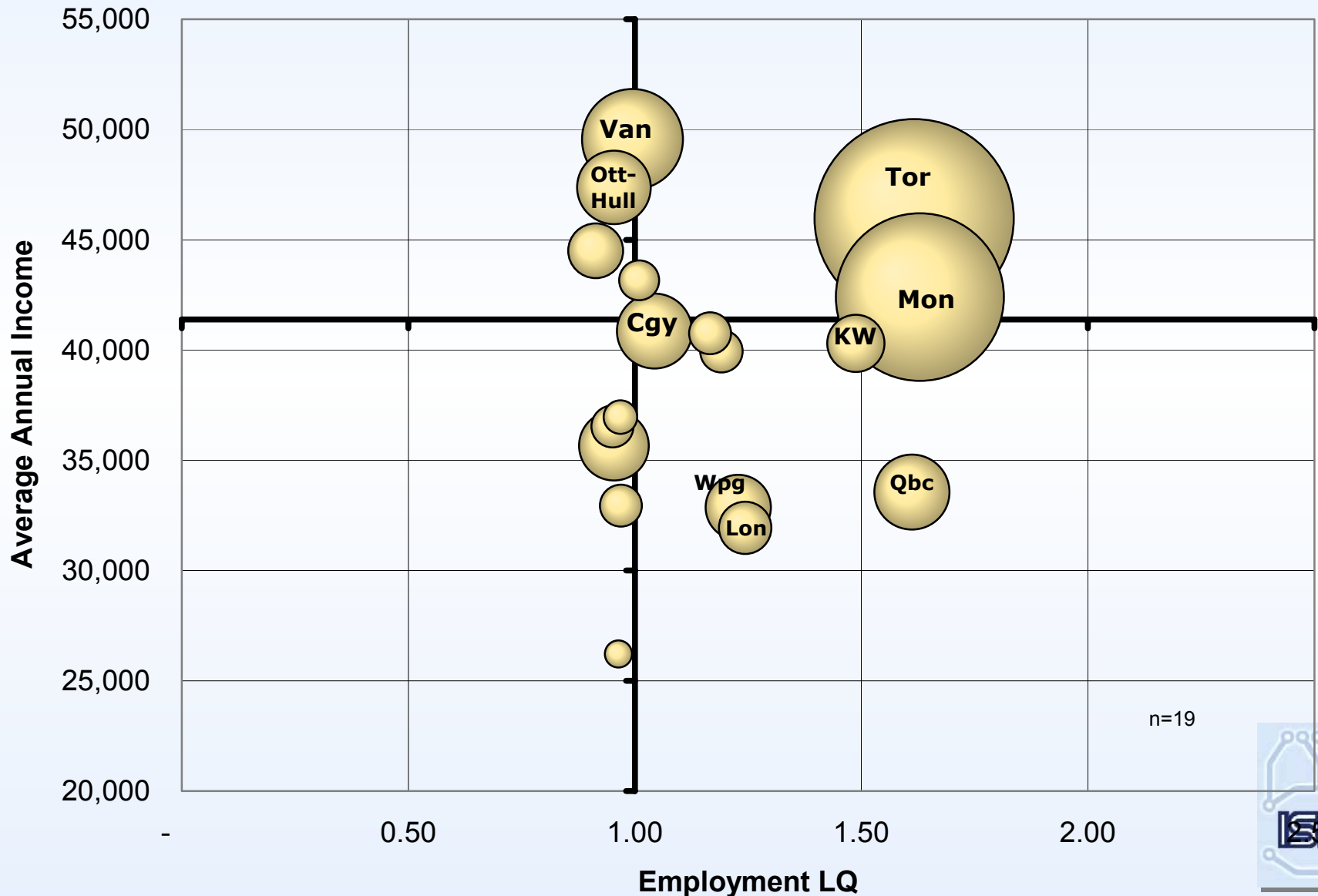
Canadian BioMedical Clusters



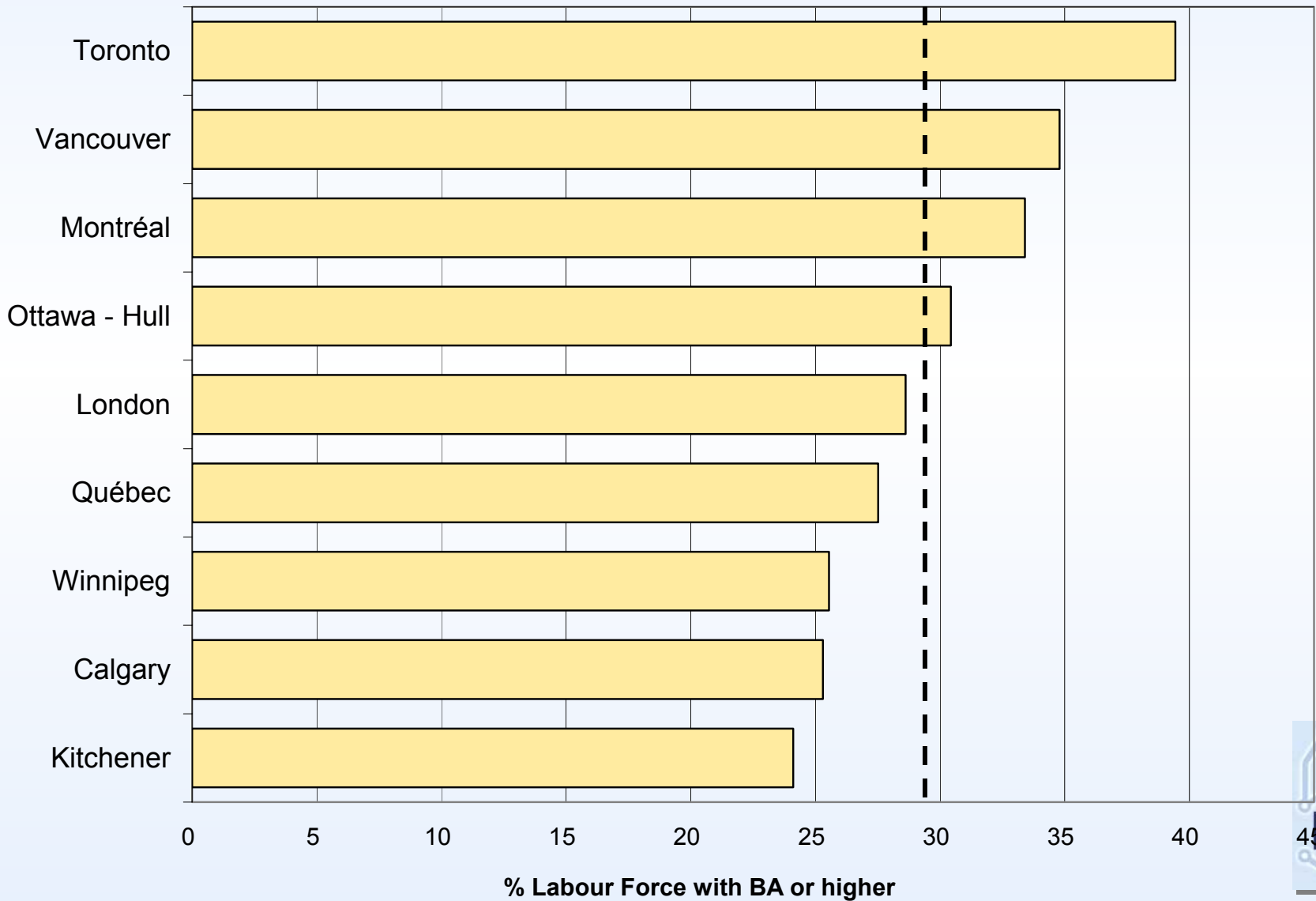
Critical Mass and Growth (BioM)



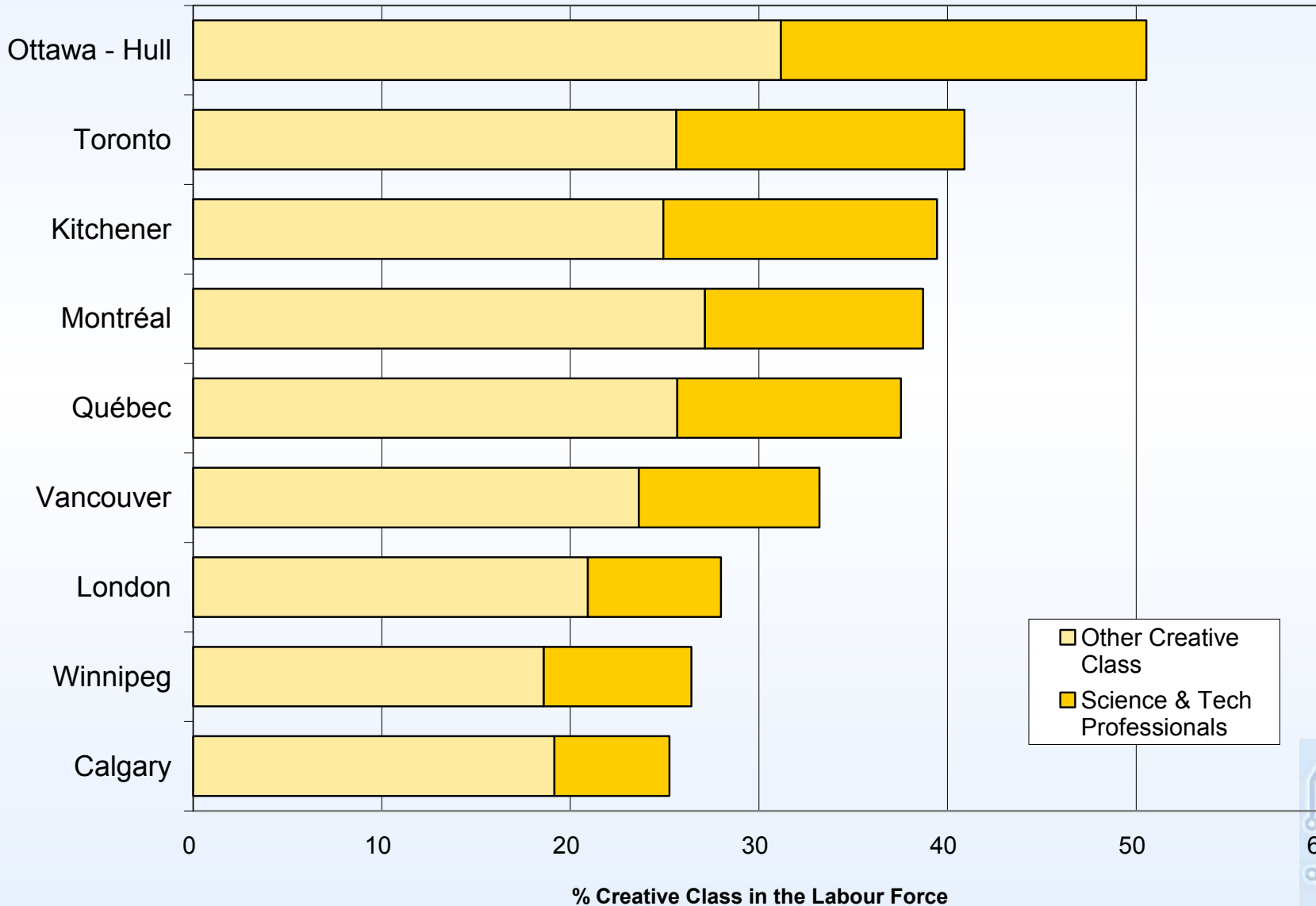
Critical Mass and Income (BioM)



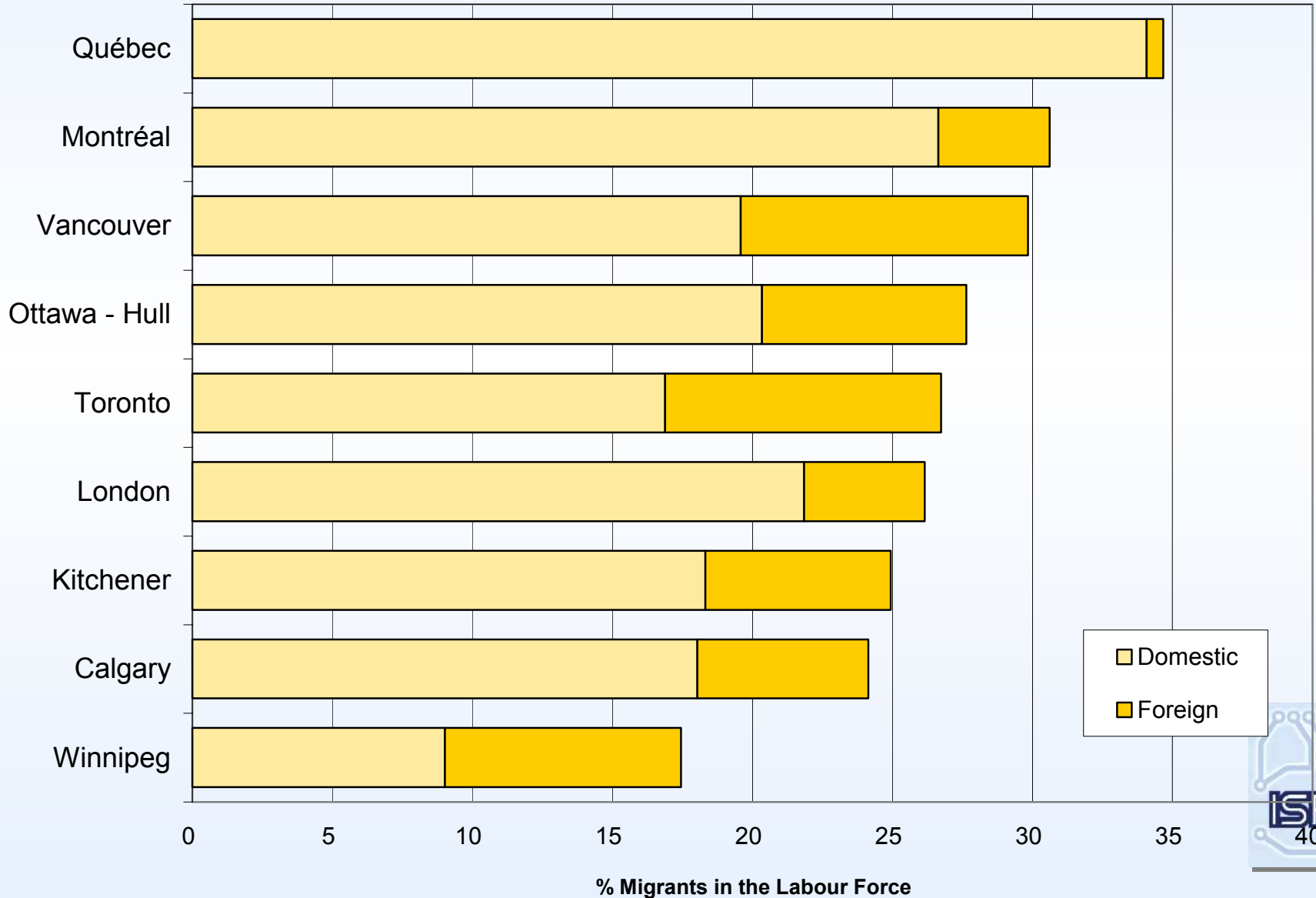
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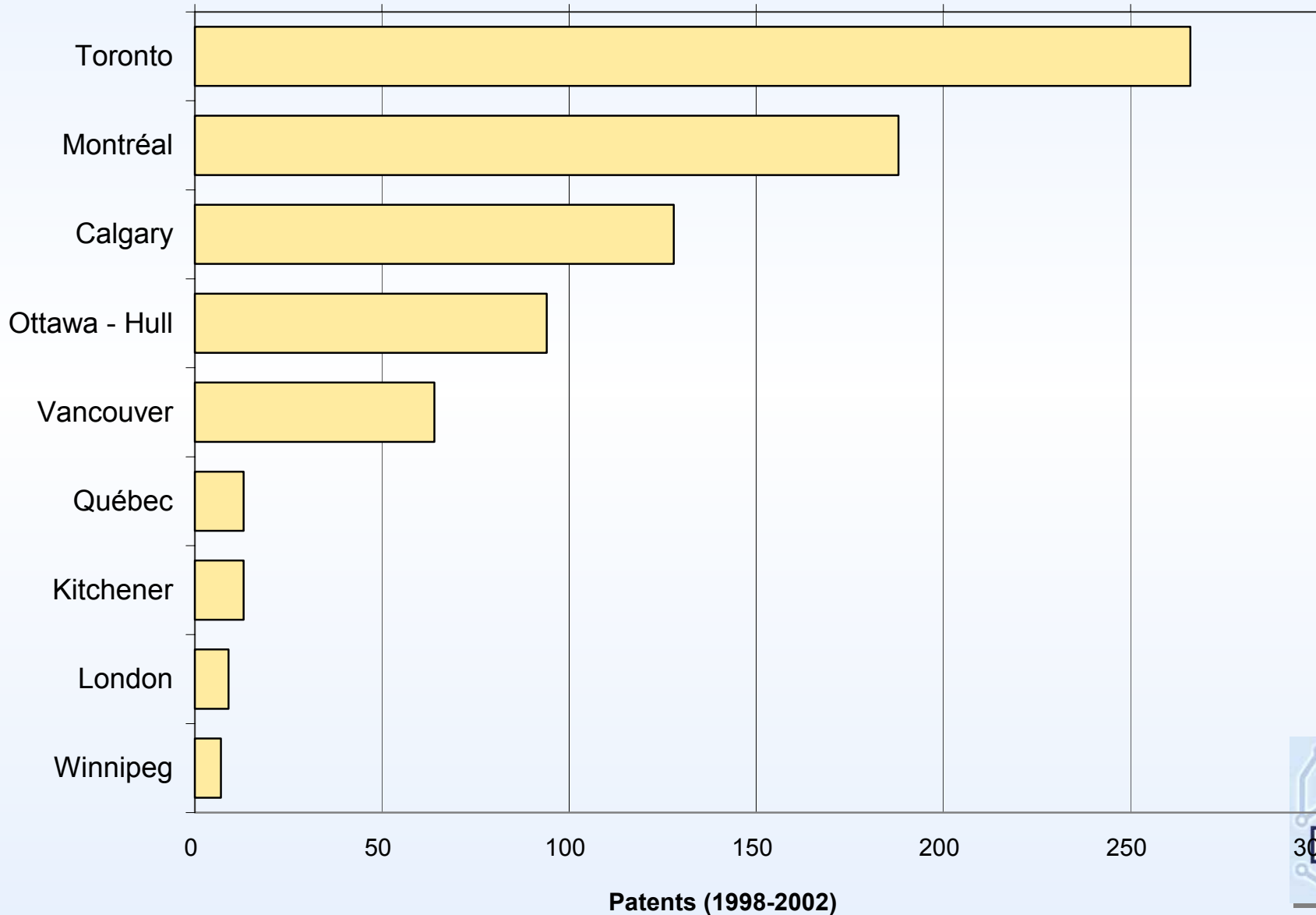
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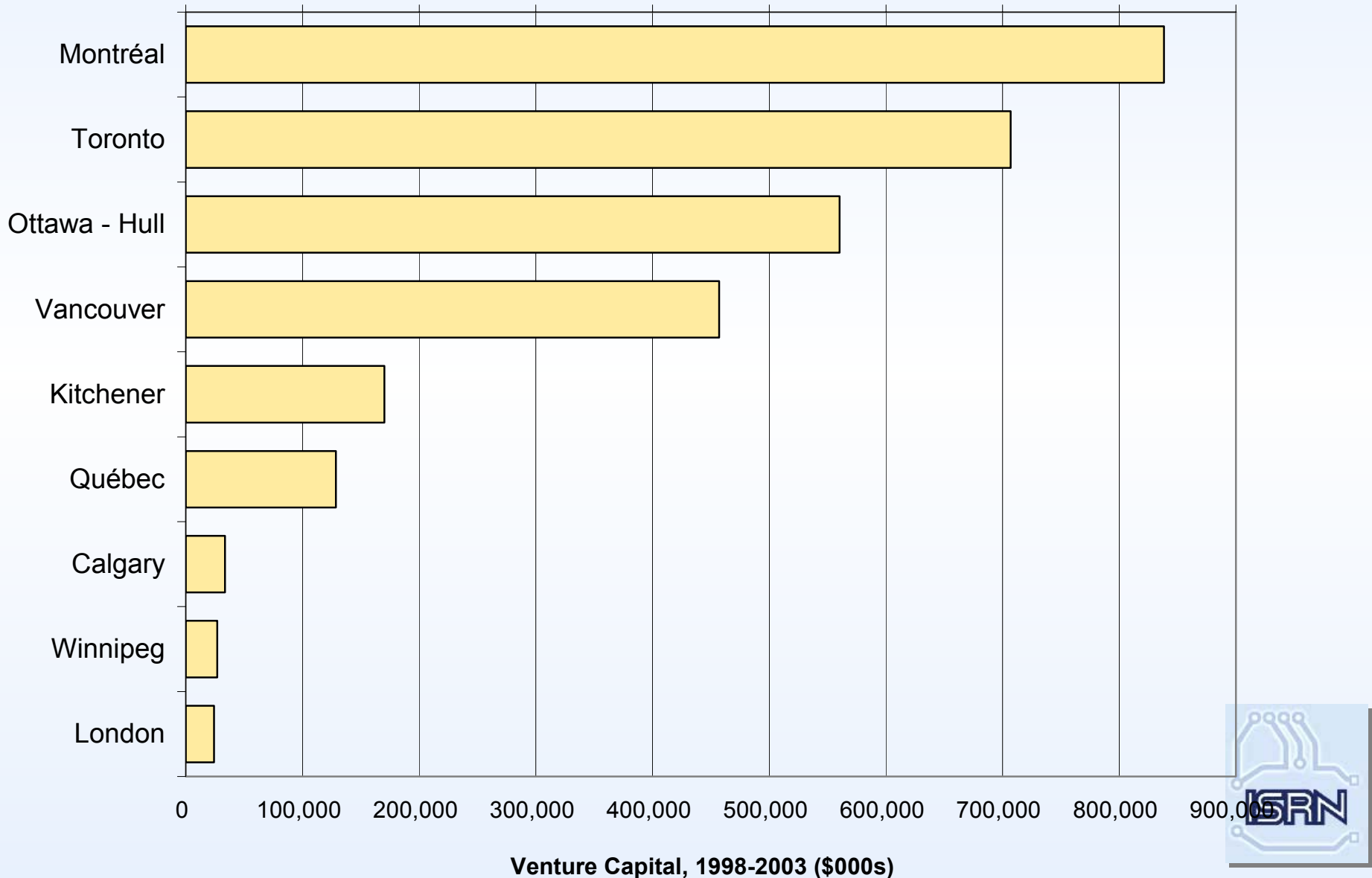
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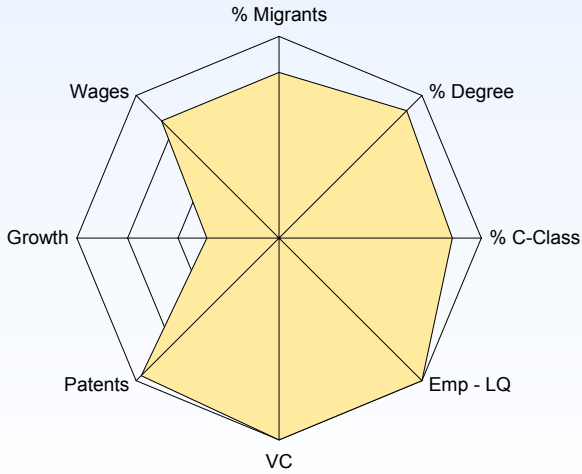
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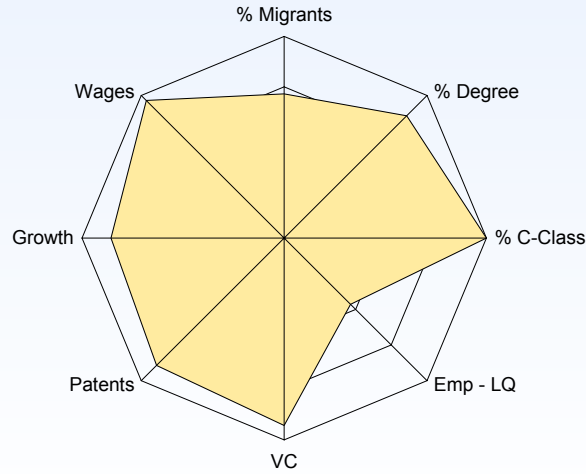
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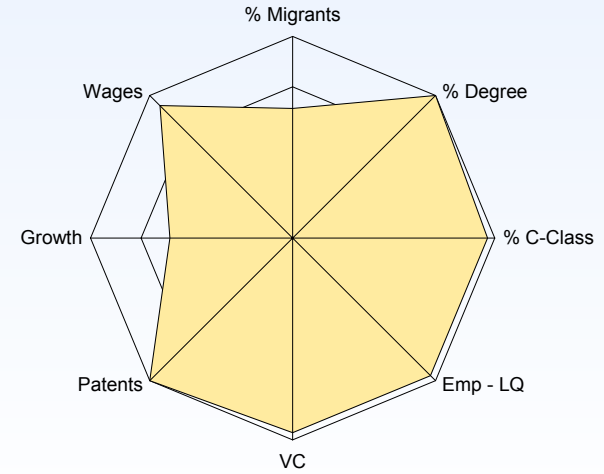
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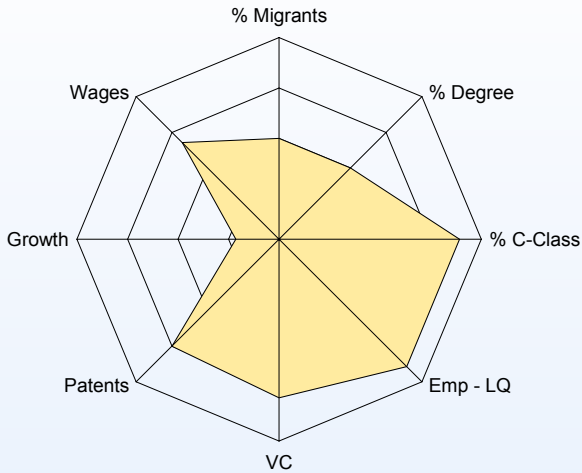
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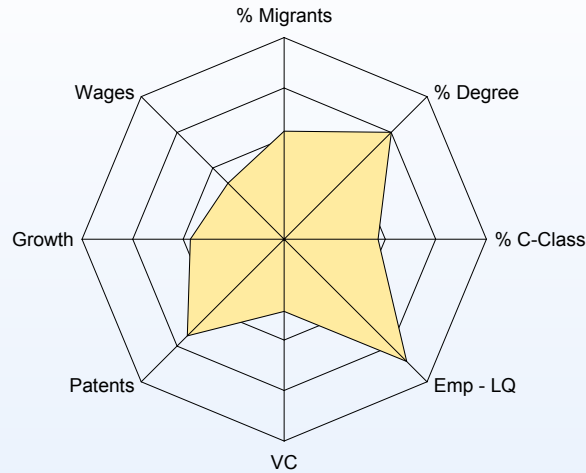
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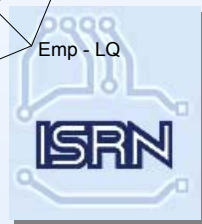
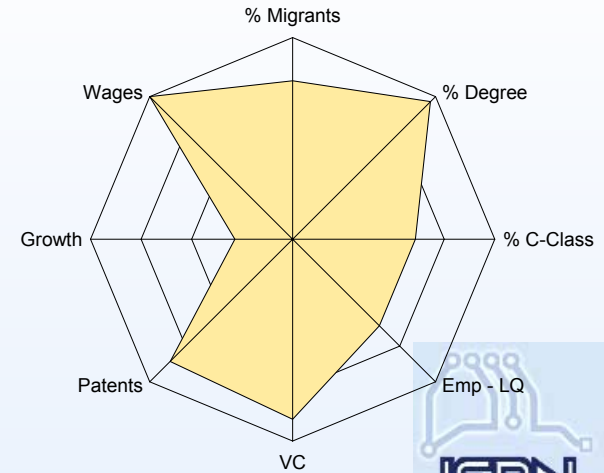
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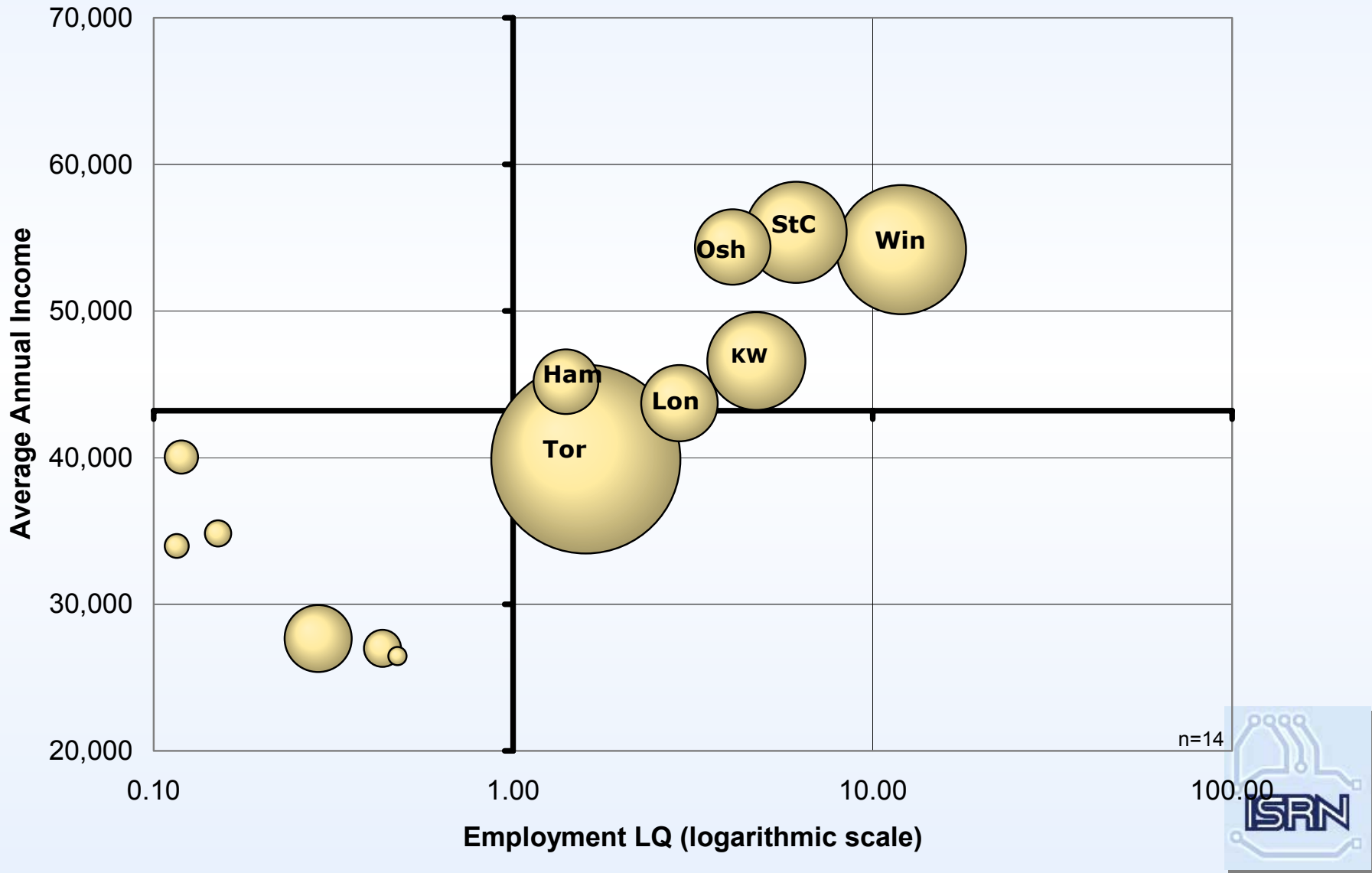
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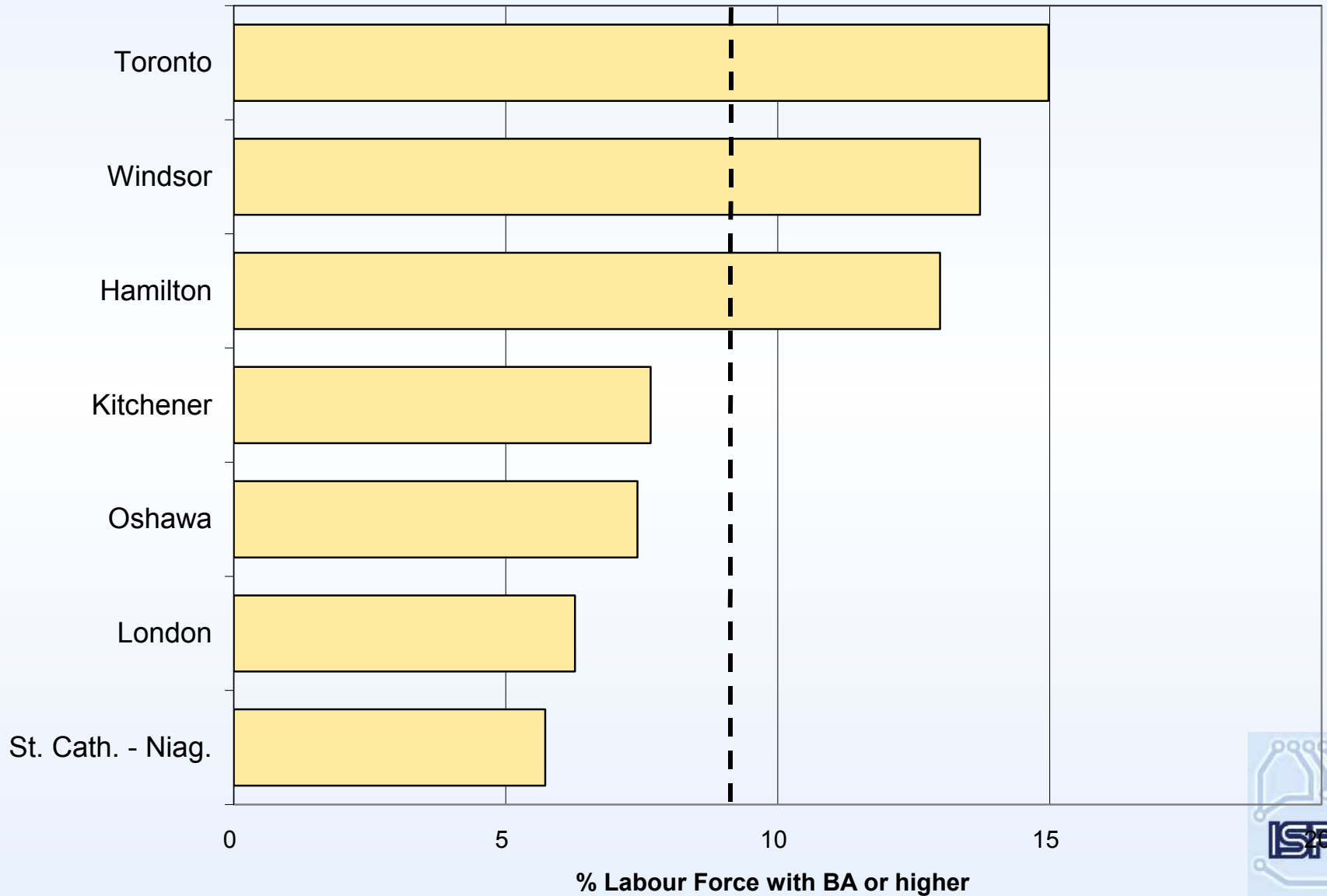
Canadian Automotive Parts Clusters



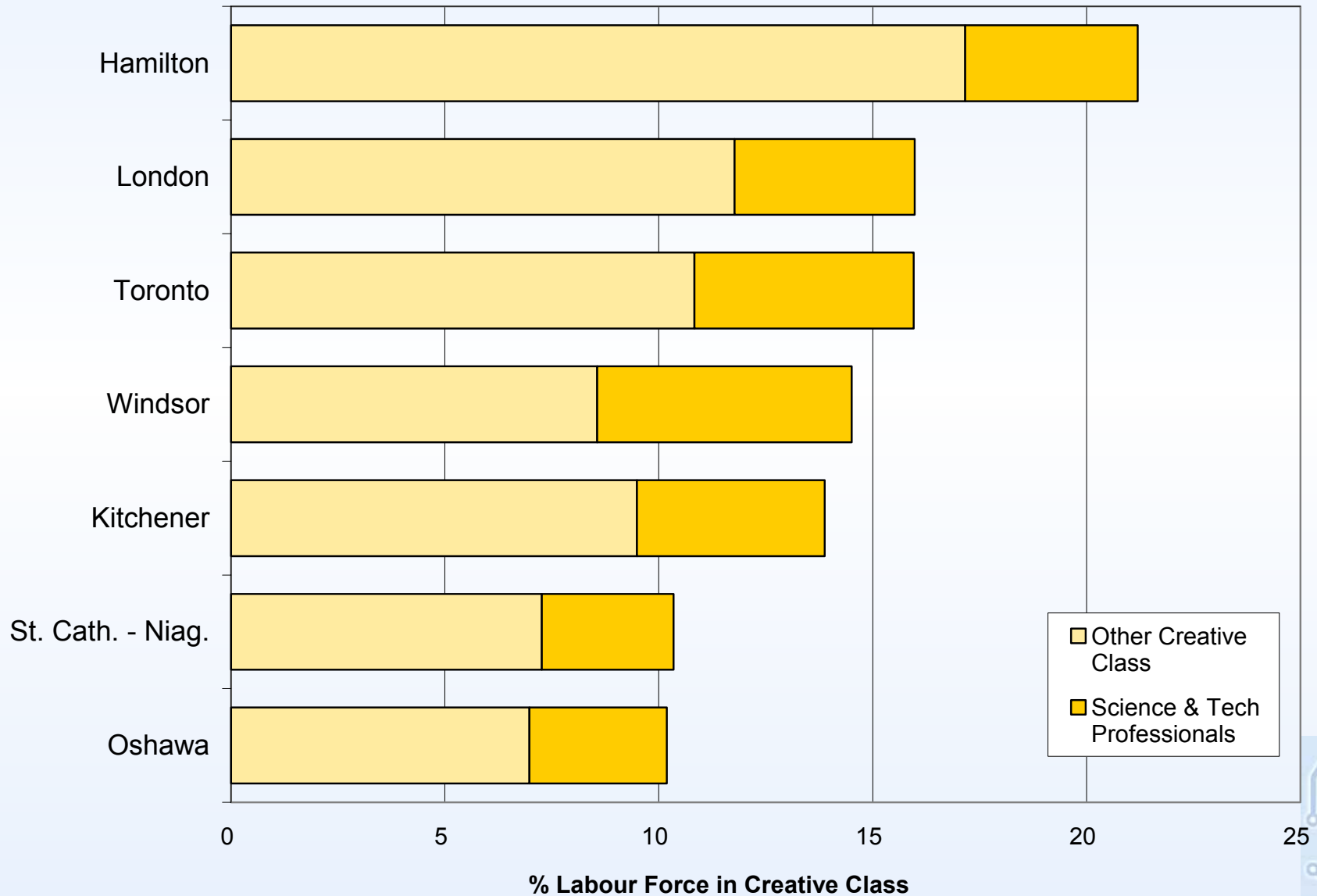
Critical Mass and Income (Auto)



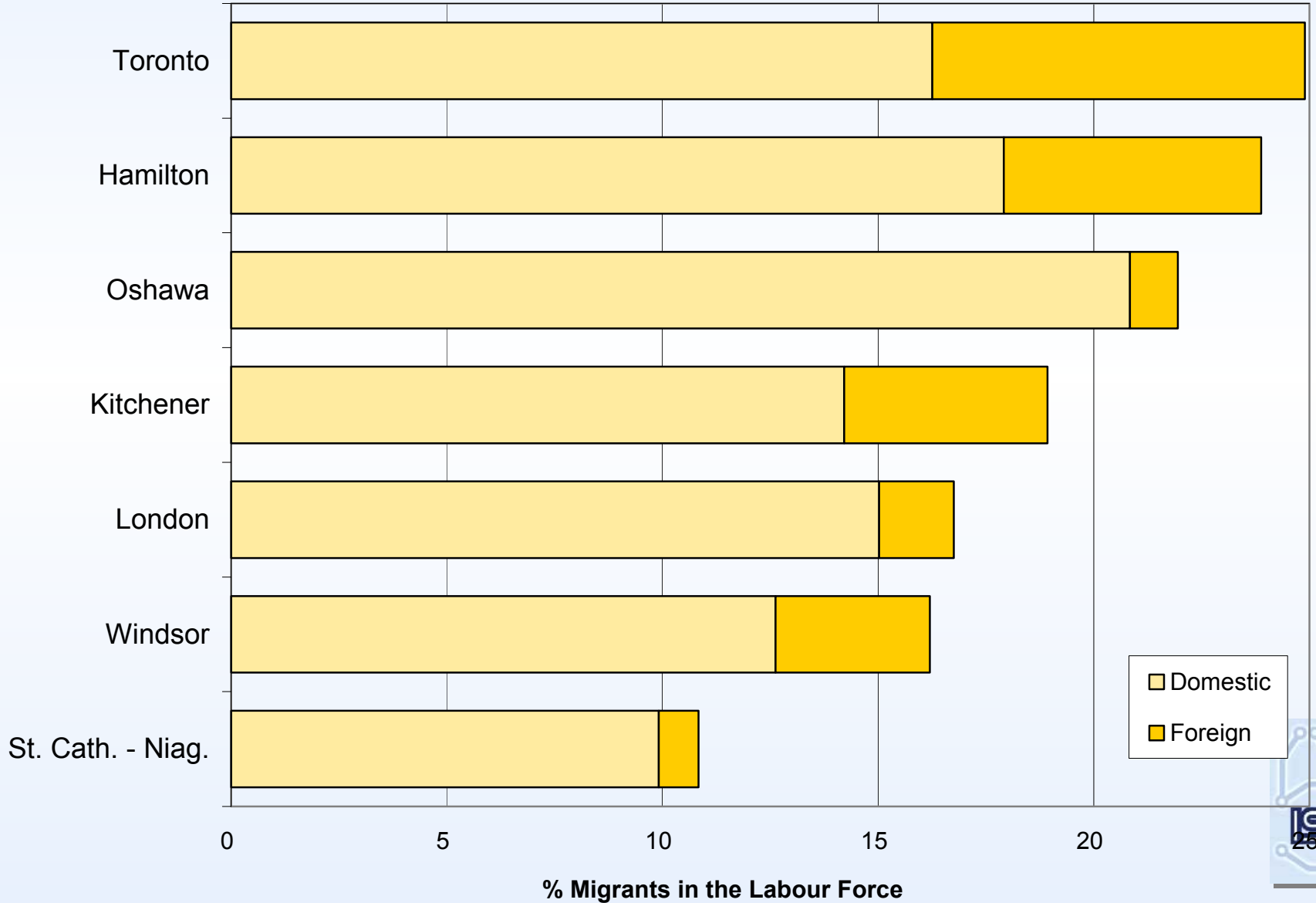
Degree Holders (Auto)



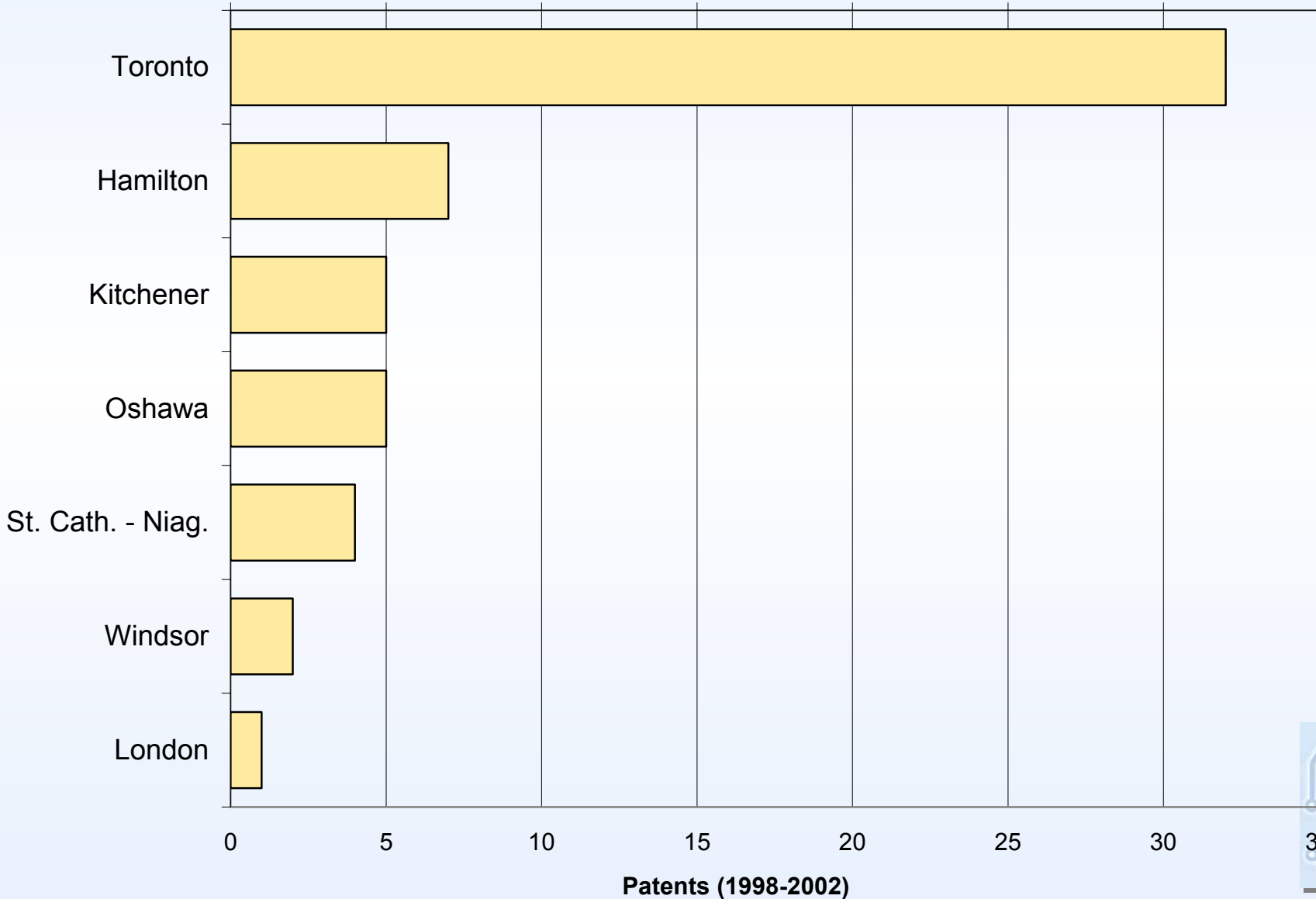
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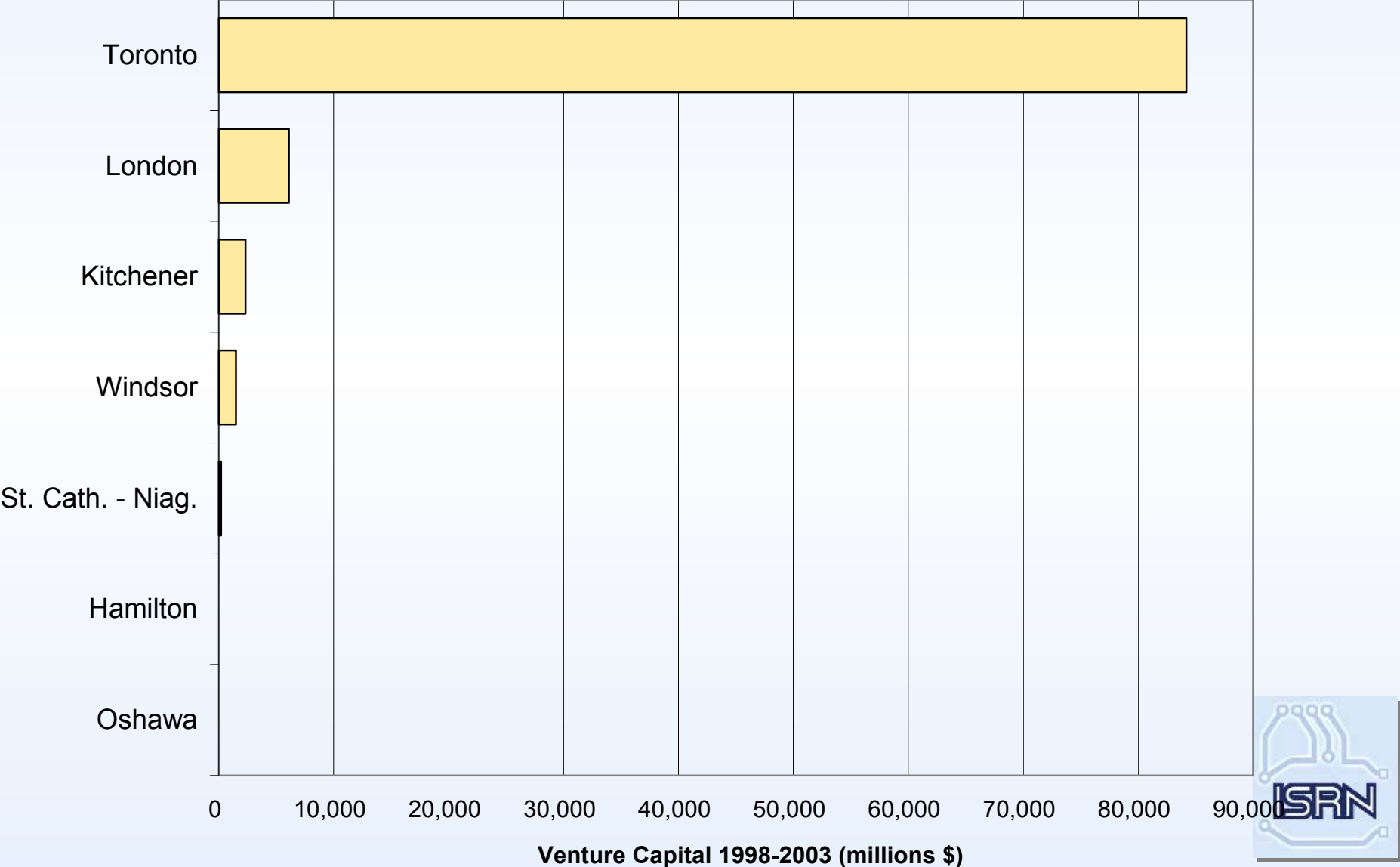
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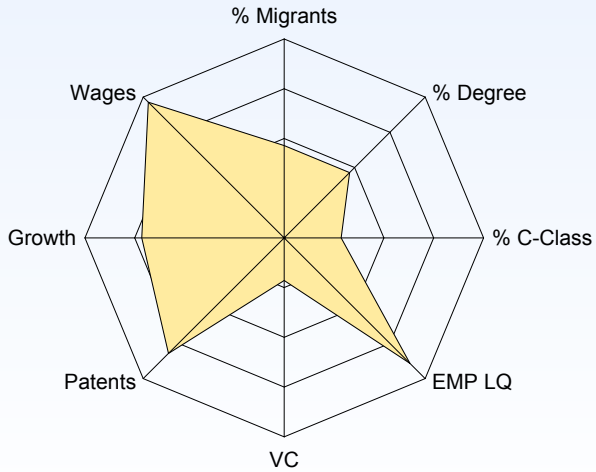
Patents, 1998-2002 (Auto)



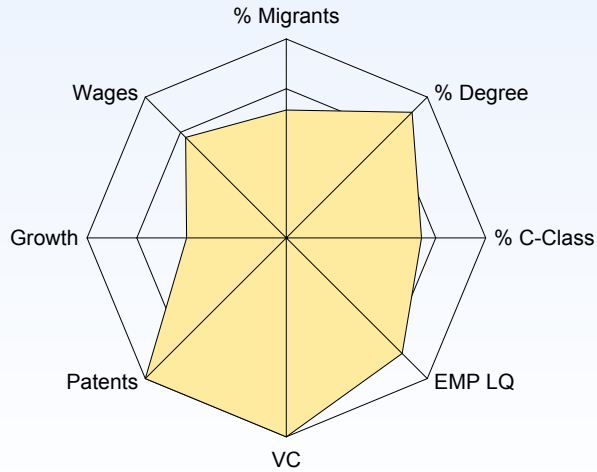
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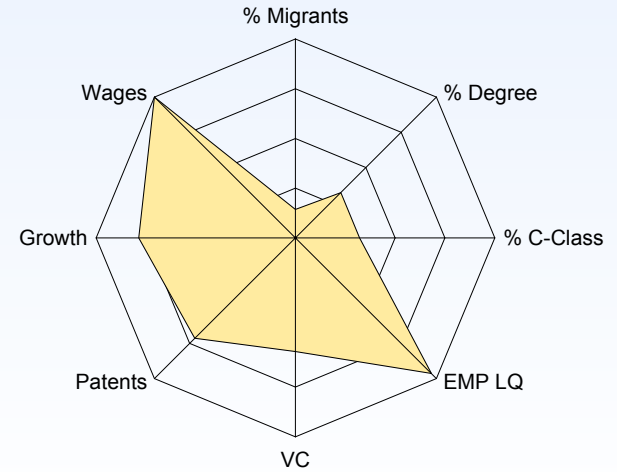
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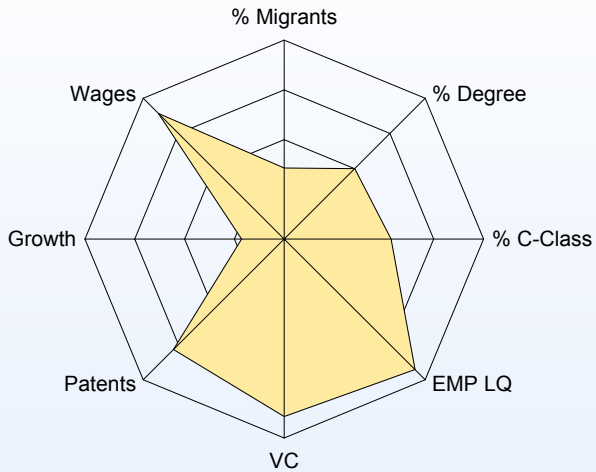
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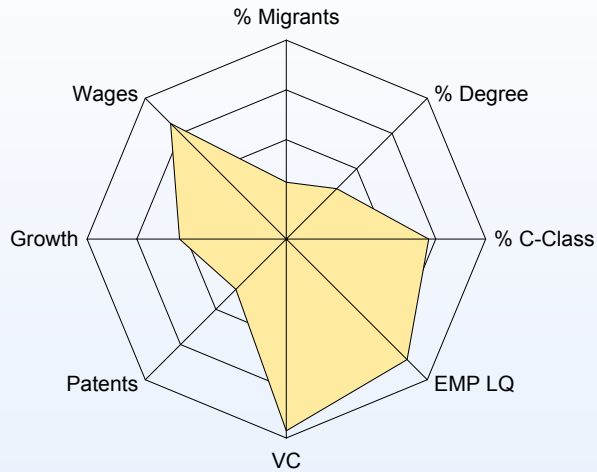
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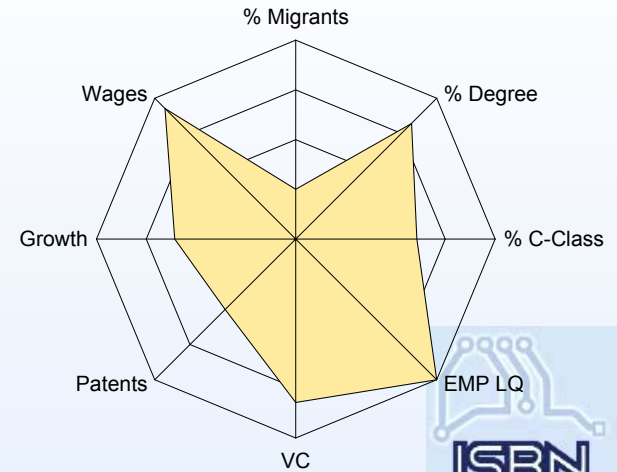
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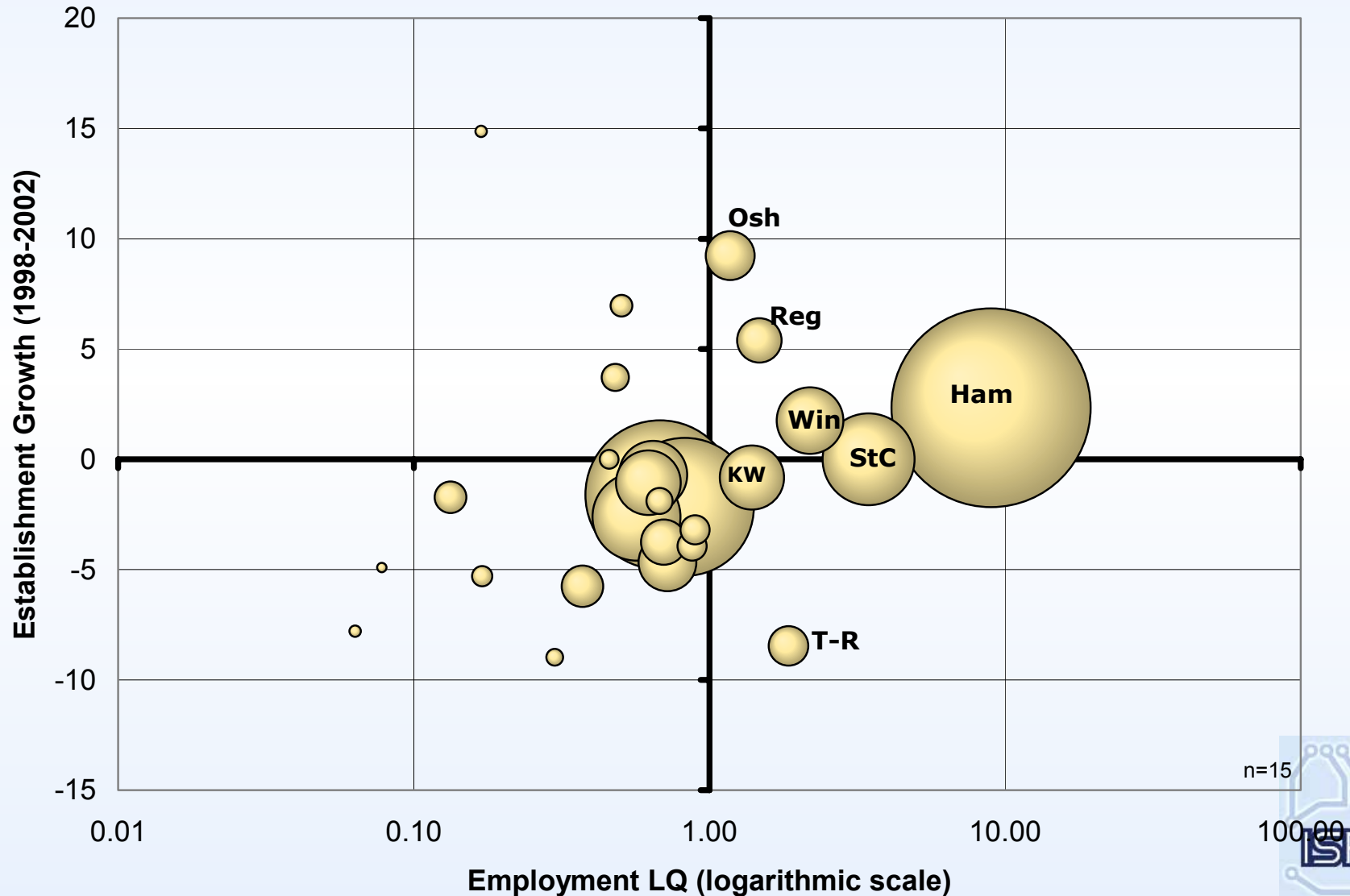
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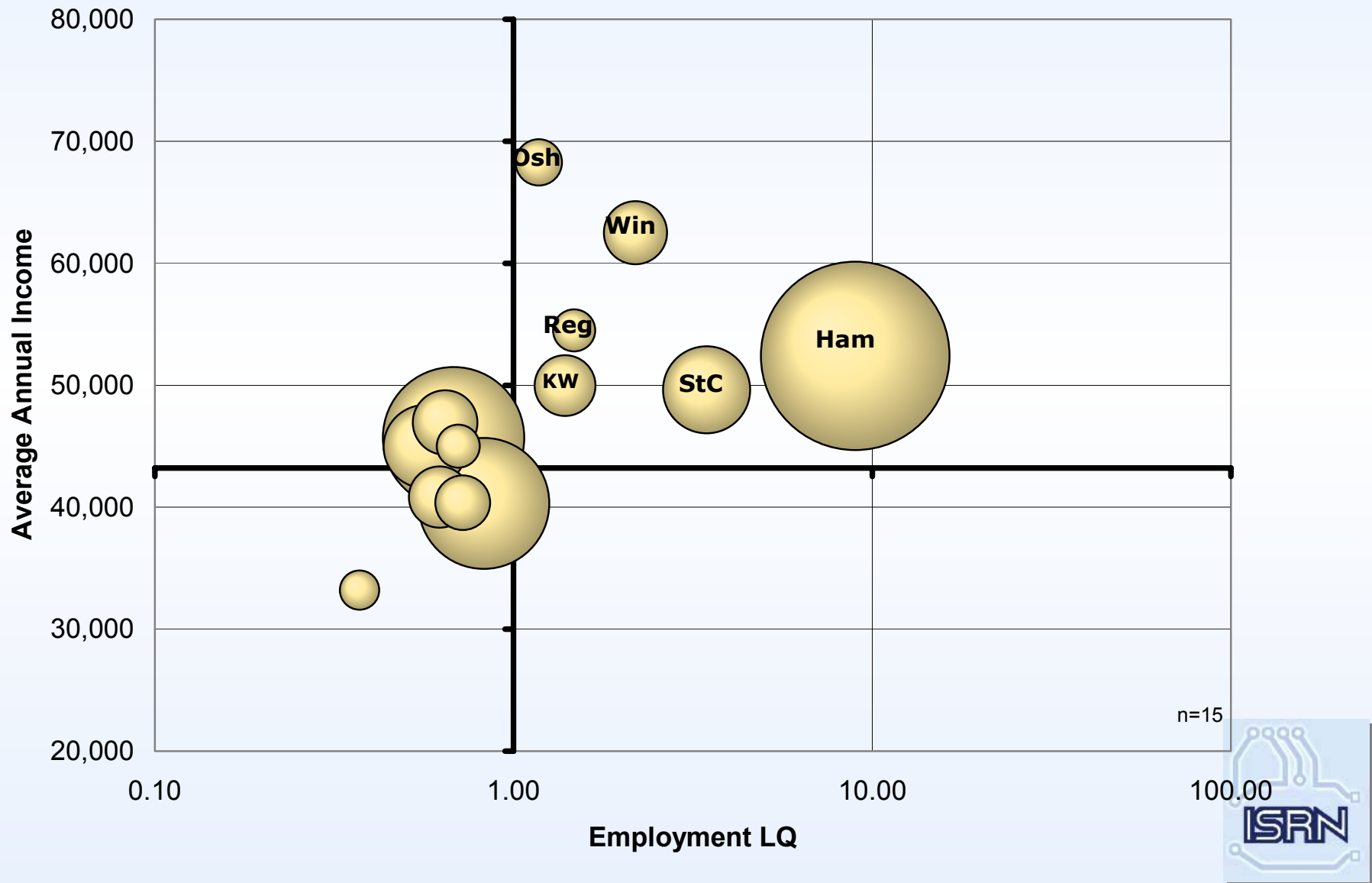
Canadian Steel Clusters



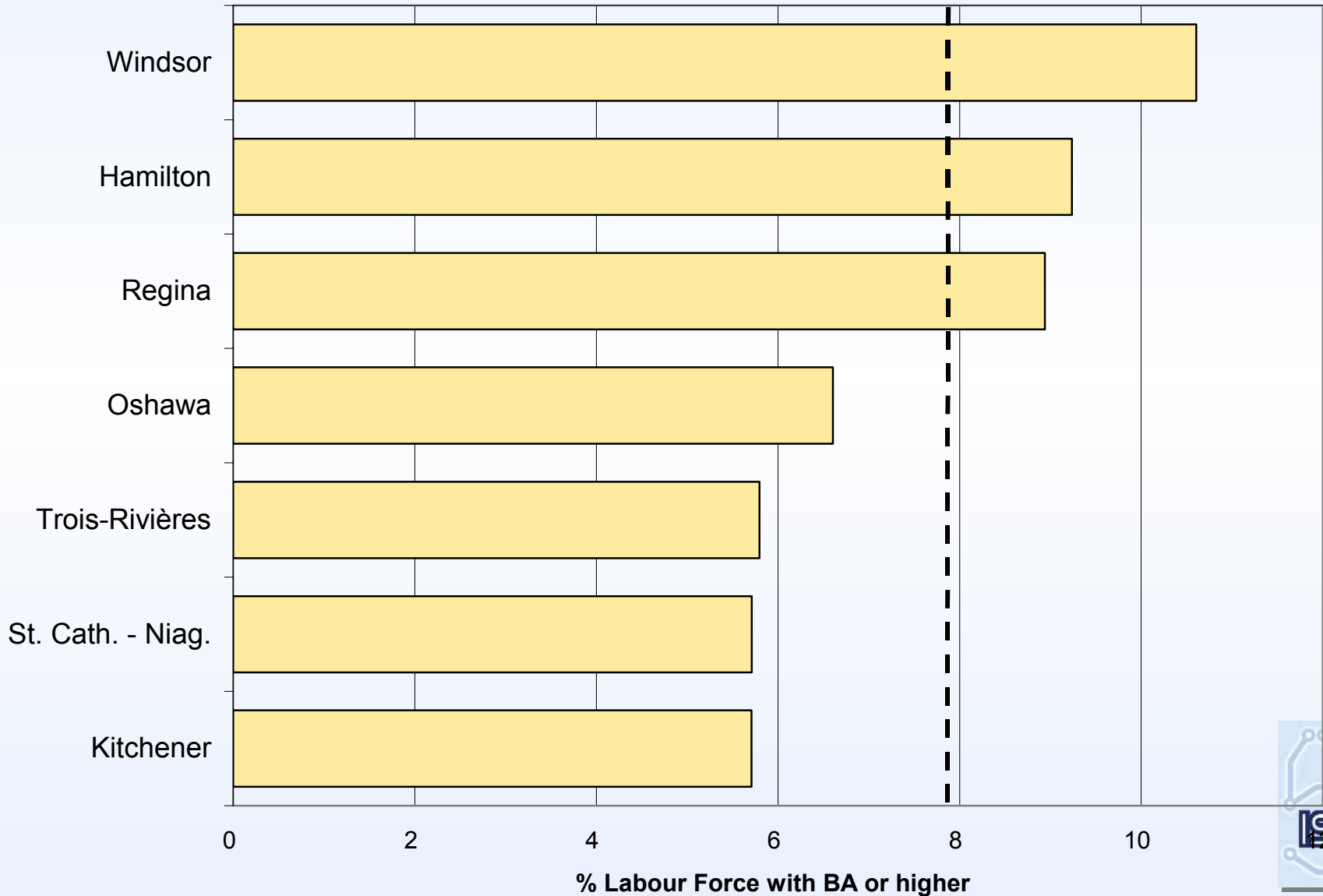
Critical Mass and Growth (Steel)



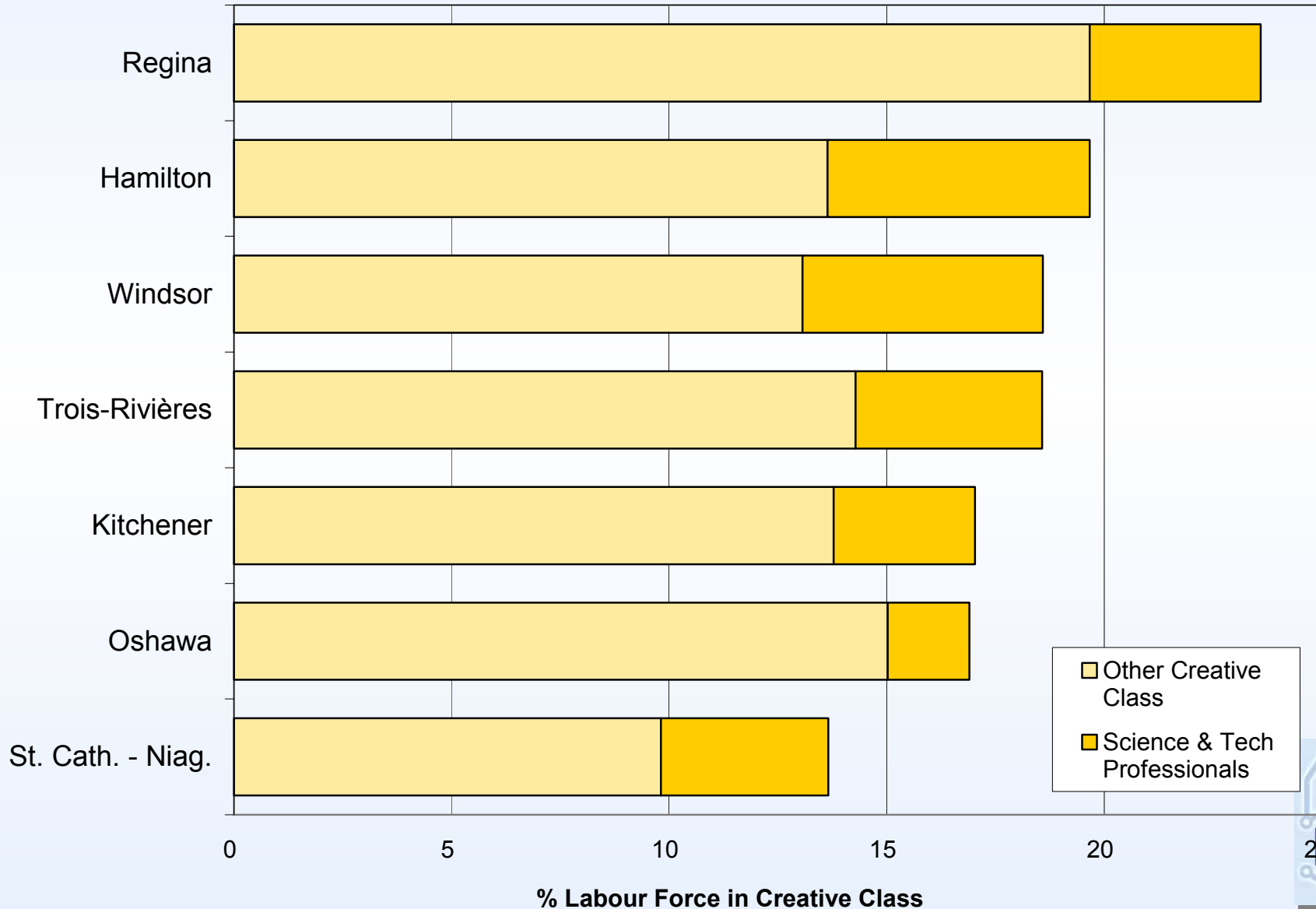
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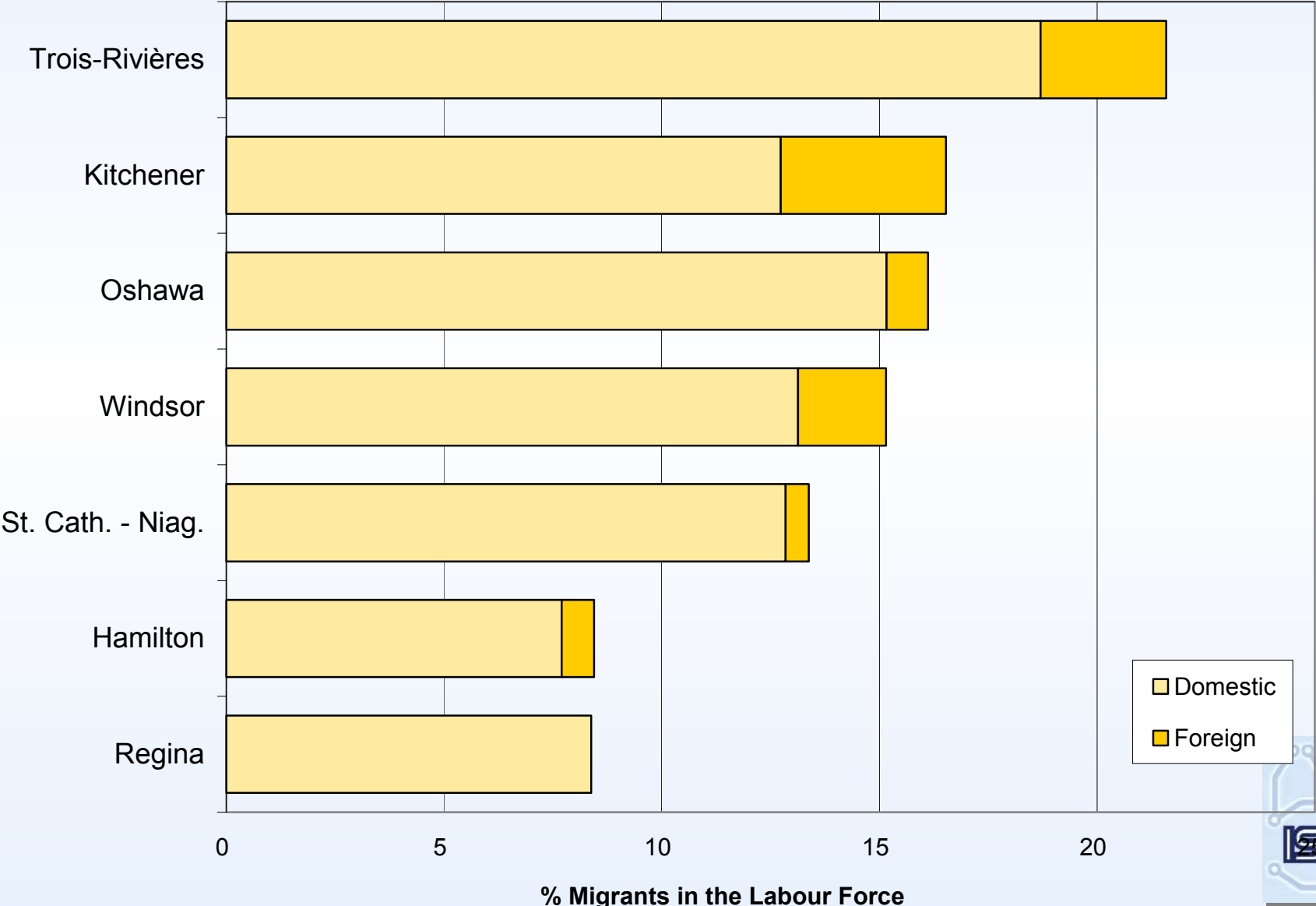
Degree Holders (Steel)



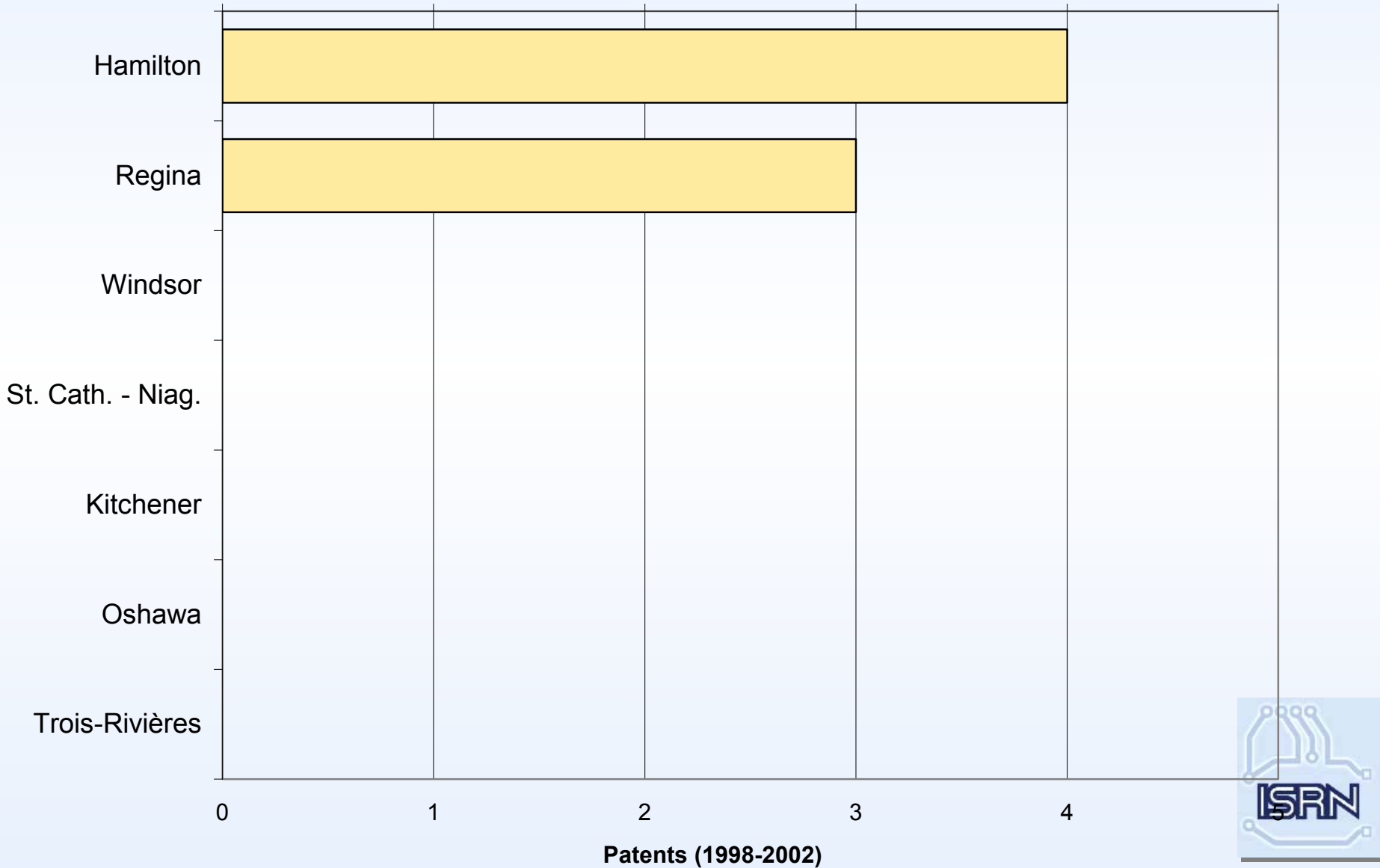
Creative Class (Steel)



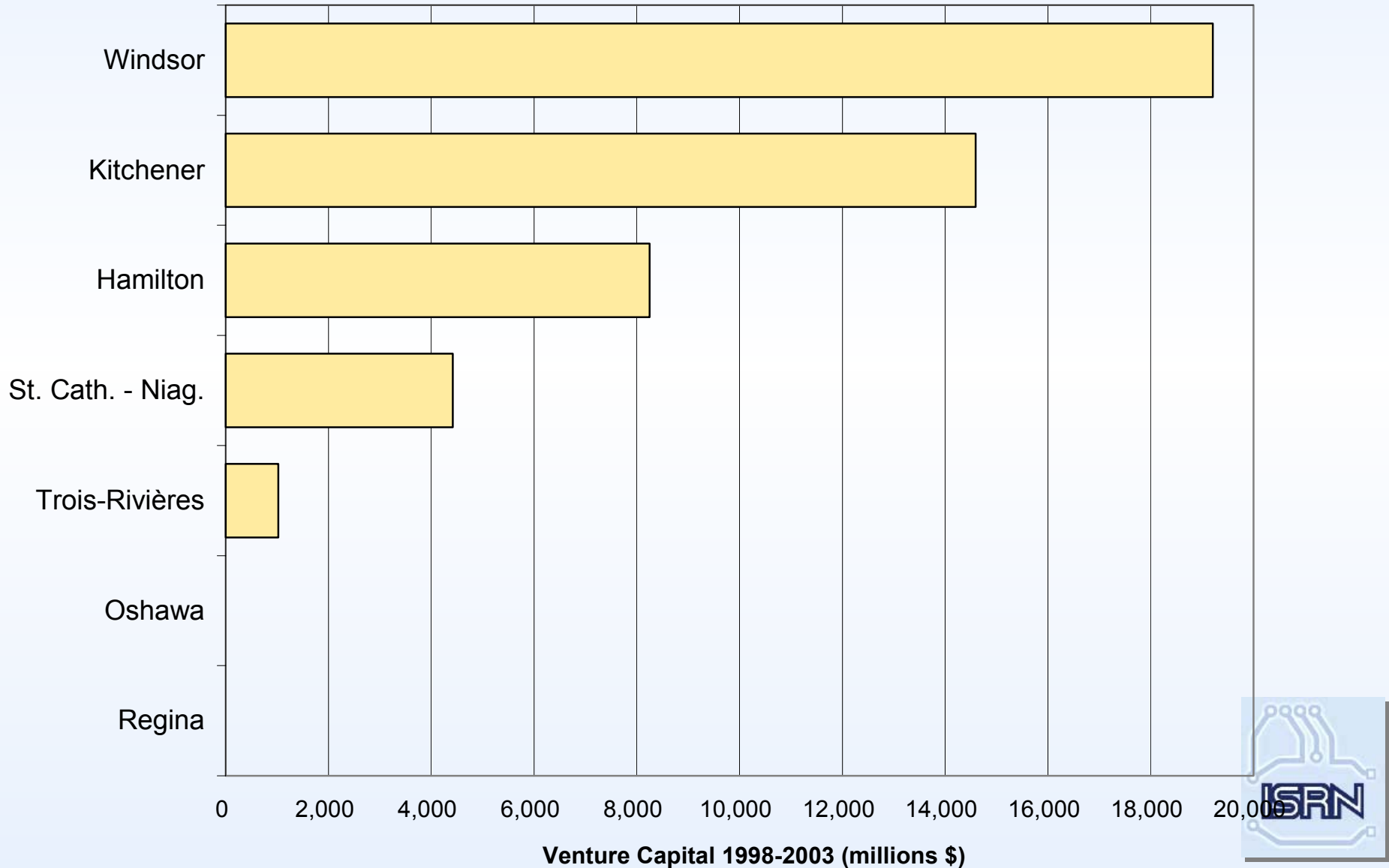
Mobility: Attraction of Workers (Steel)



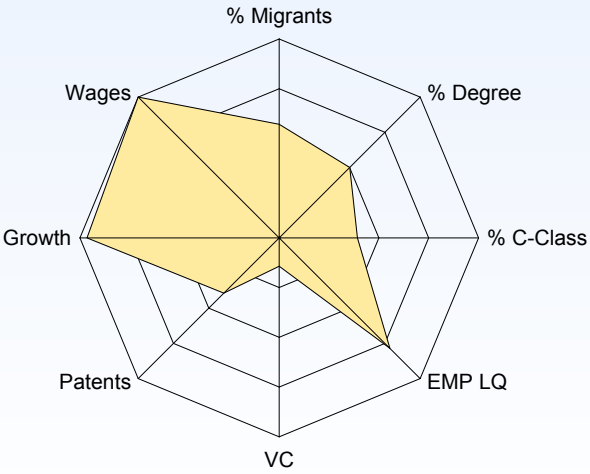
Patents, 1998-2002 (Steel)



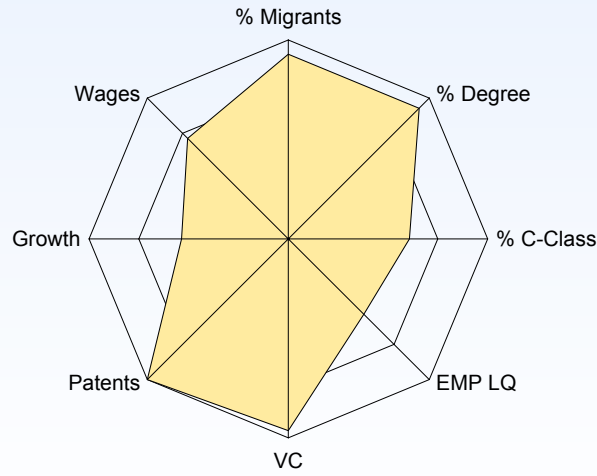
Venture Capital, 1998-2003 (Steel)



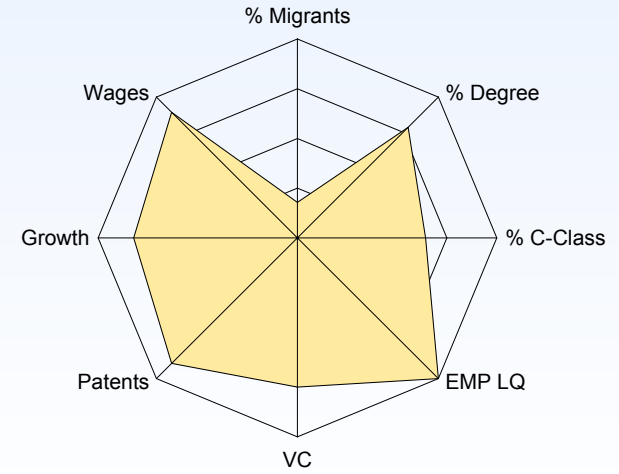
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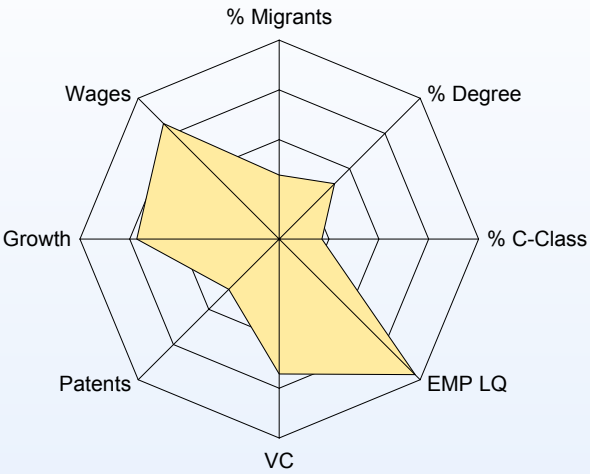
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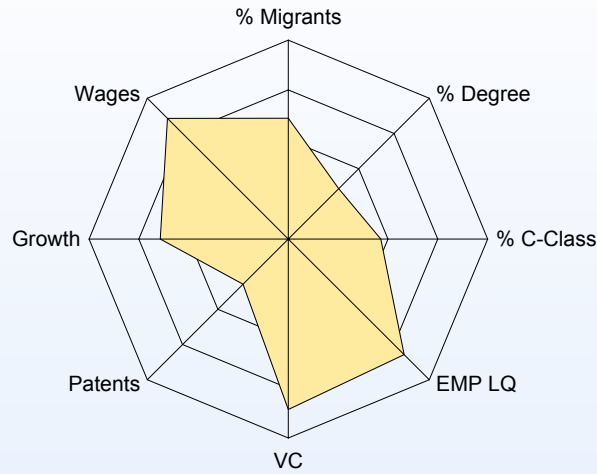
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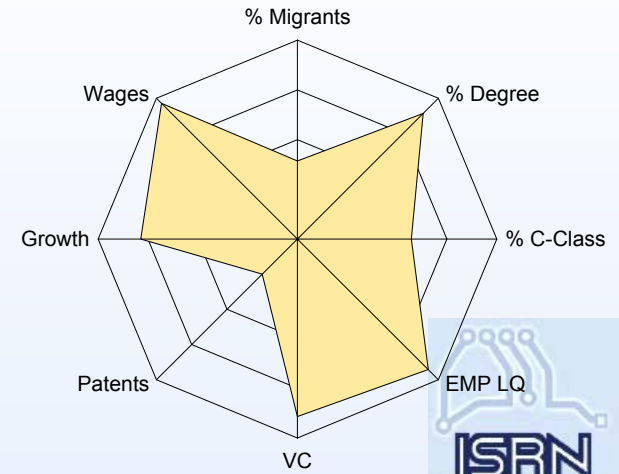
St. Catharines



Kitchener-Waterloo



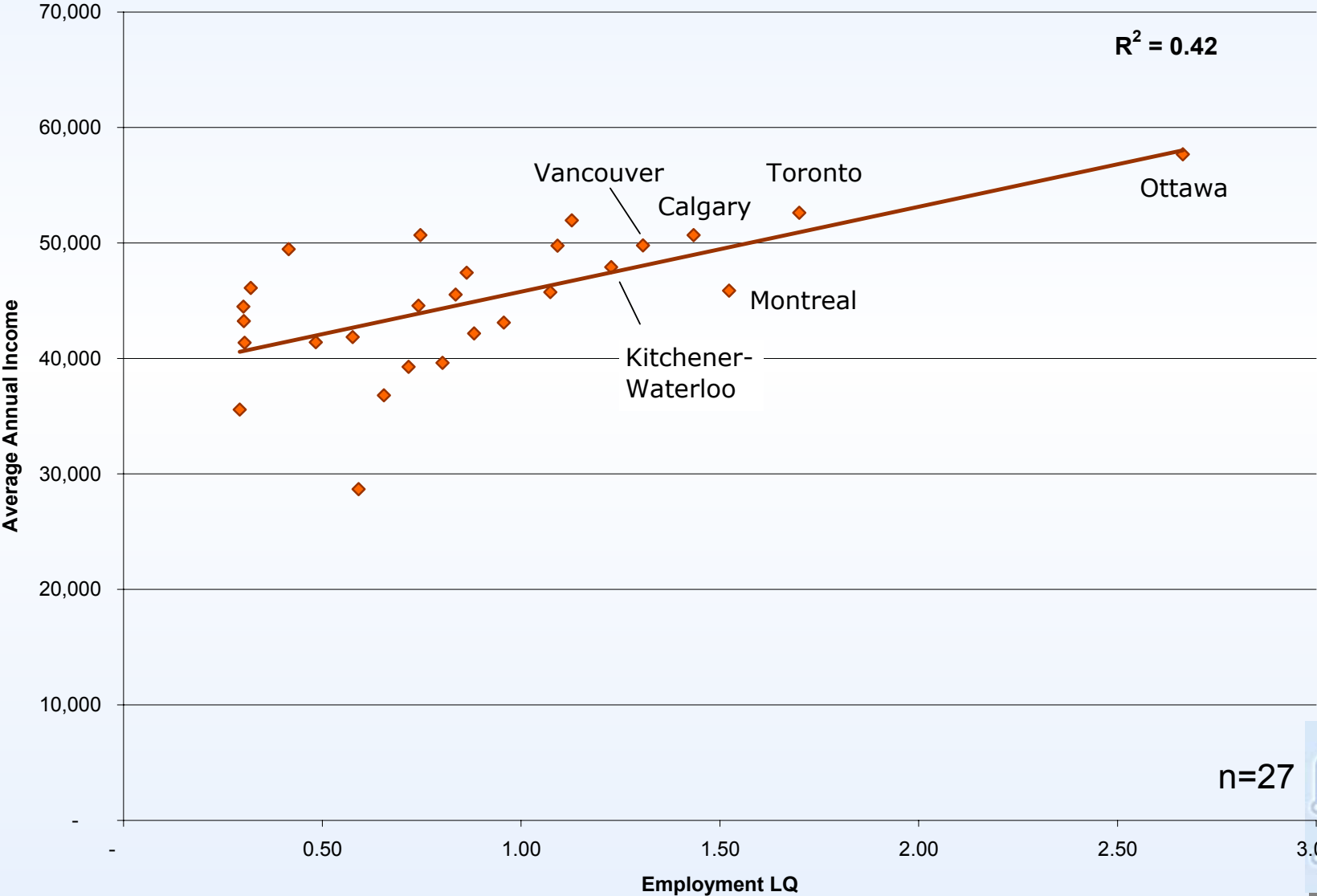
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Relationships between Cluster Indicators



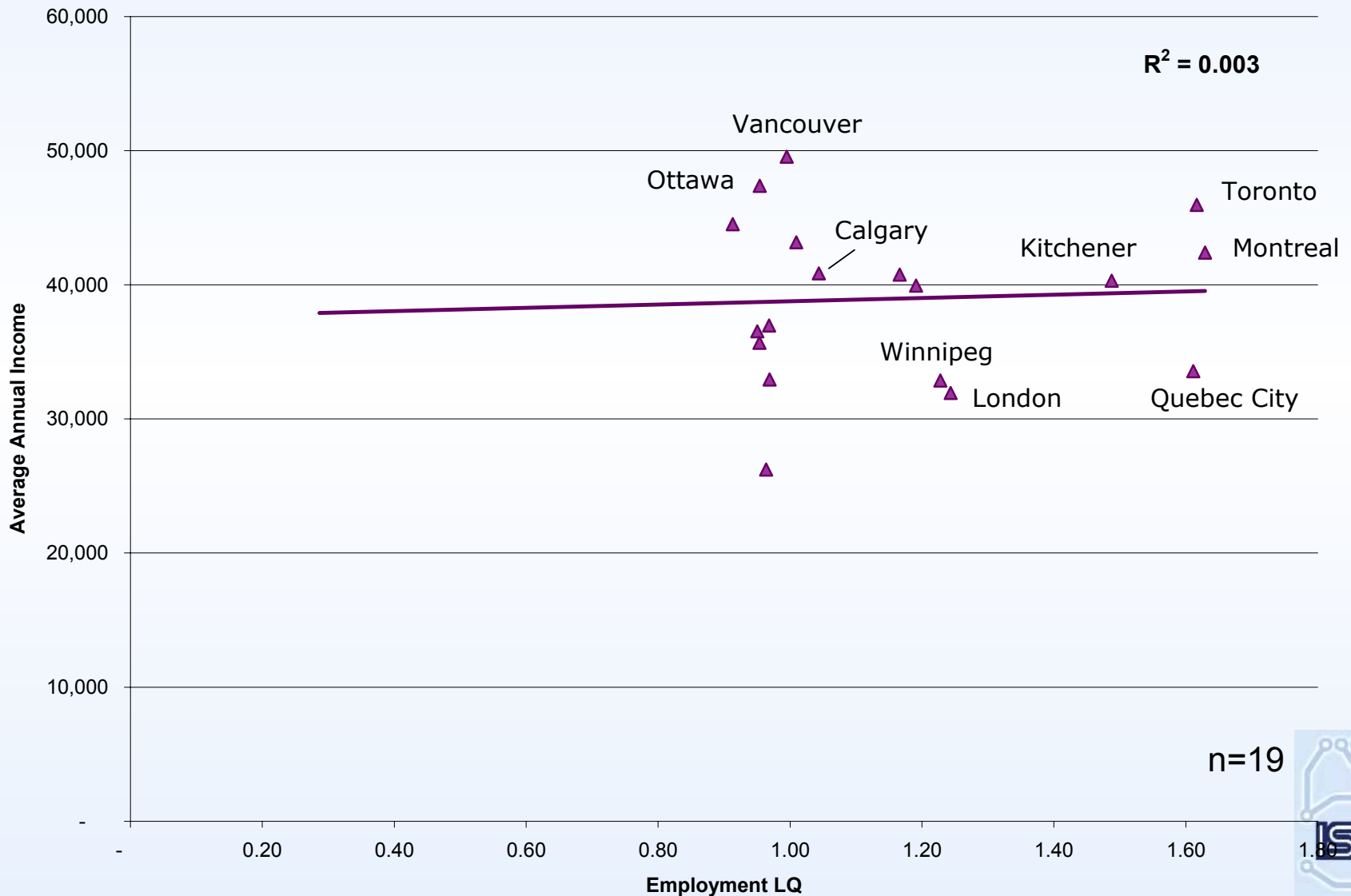
Specialization and Income (ICT)



n=27



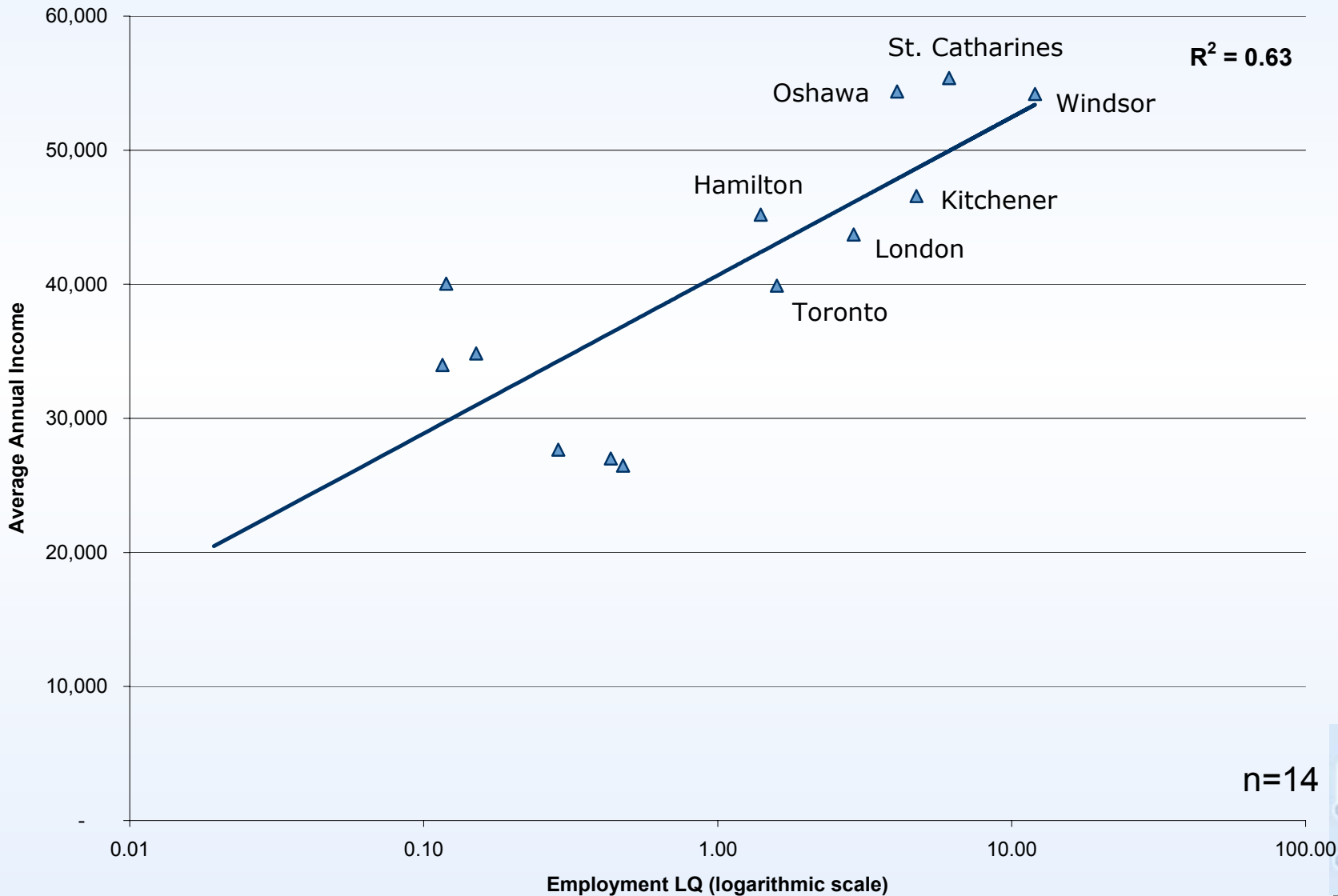
Specialization and Income (BioM)



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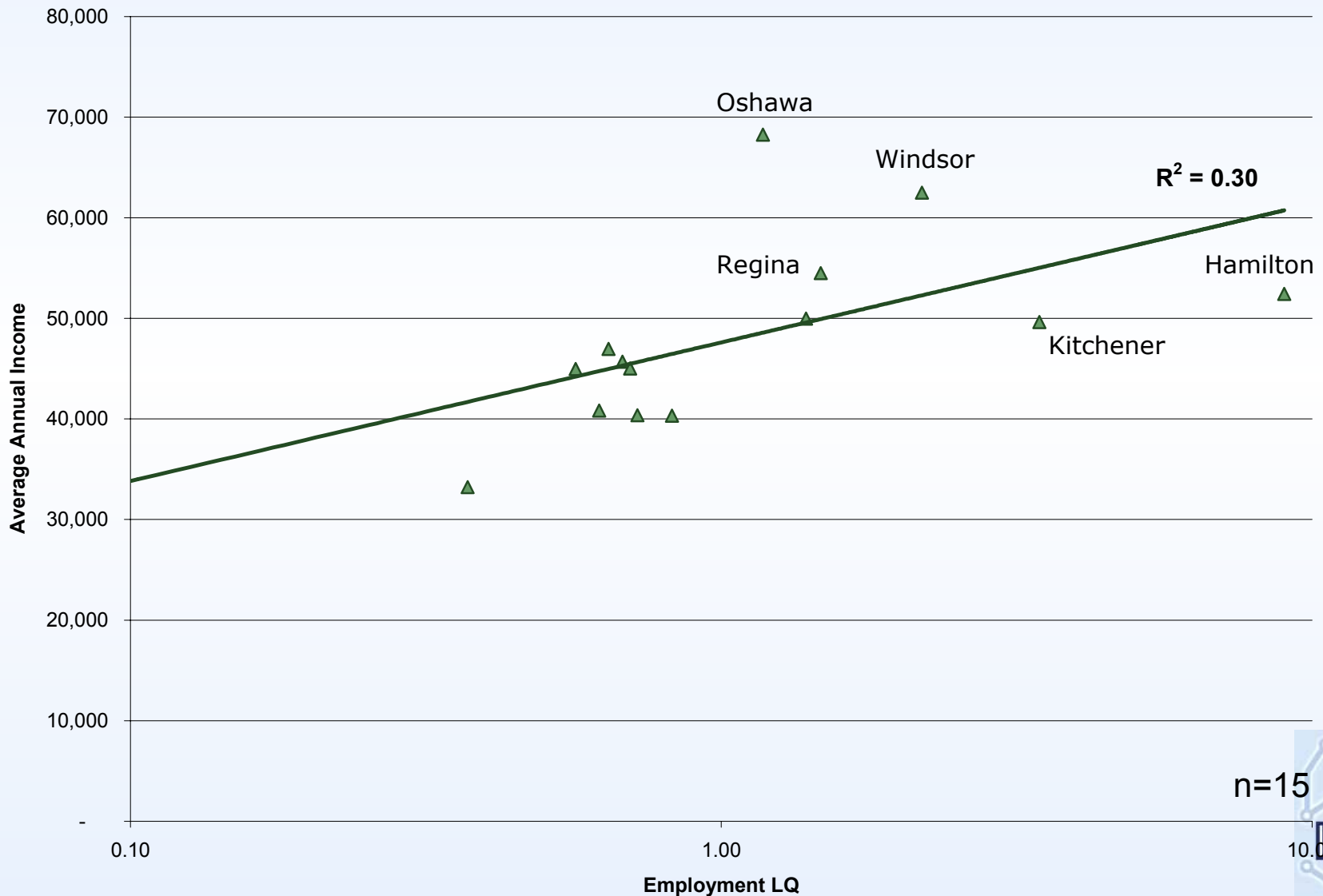
Specialization and Income (Auto)



n=14



Specialization and Income (Steel)



n=15



Correlations - Summary

| | Emp Size | Emp LQ | Growth |
|----------------|--|-------------------|---------------|
| Wages | ICT | ICT Auto Parts | Steel |
| Patents | ICT BioMedical Auto Parts Steel | ICT BioMedical | |
| VC | ICT BioMedical Auto Parts Steel | ICT BioMedical | |
| Degree | ICT BioMedical | ICT BioMedical | Auto Parts |

Key Findings & Implications

- Challenges in terms of identifying and measuring clusters
- Relationships between critical mass, knowledge-intensity, and dynamics / performance vary between ICT, biomedical, steel and automotive parts clusters
 - Income and employment have varying relationship across clusters
 - Consistently strong relationship between VC/patent activity and employment size (critical mass)
- Differences suggest different internal dynamics between clusters



Future Developments

- Incorporate additional data
 - R&D activity
 - Patent activity (US Patent Trademark Office)
 - Regional assets (e.g. university R&D)
 - Demographic characteristics
- Analytical dimensions
 - Is there a correlation between cluster-specific assets and regional assets?
 - Do regions with 'successful' clusters perform better than other regions?

