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Innovation, scaling-up, and local development  
in peripheral regions:  
Do establishments scale-up locally?



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## Abstract

A growing number of researchers, using high-level data or theoretical reasoning, suggest that there is no necessary connection between local firm-level innovation and local development. There are two connected strands to this argument: first, many analysts suggest that regional innovation should be understood as a social and institutional process, not just as a firm-level, science, or technology driven, endeavor: from this perspective, focusing on firms is too narrow. Second, empirical results show that although firms innovate in peripheral or laggard regions many of these regions are not developing: an apparent disconnection between local development and firm-level innovation is observed, but not explained. We consider this second argument, exploring the degree to which innovators in peripheral regions purchase local services and scale-up their operations locally – two mechanisms that should connect firm-level innovation to local development. We find that peripheral innovators are more likely to use non-local services; their external expansion is also more likely to occur non-locally. If these results, obtained from cross-sectional analysis of a small data-set, are indicative of persistent processes, then they provide clues to firm-level processes that shed light on why firm-level innovation is disconnected from regional development in peripheral regions.

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# Innovation, Scaling-Up, and Local Development in Peripheral Regions: Do Establishments Scale-up Locally?

## 1 Introduction

Since the 1980s regional development theories and policy have increasingly focussed upon innovation as key to explaining differences in regional economic trajectories (Landabaso 1997; Sternberg 2000; Cooke et al. 2011; OECD 2011; 2020; Government of Canada 2018). However, a growing number of researchers are questioning whether local innovation is sufficient to bring about local development (Marques and Morgan 2021; Shearmur and Bonnet 2011; Shearmur 2016; Iammarino et al. 2017): whilst innovation is necessary for development to occur, these writers suggest it is not sufficient.

The empirical questions addressed in this paper is situated within this debate. Whereas the reasons why local innovation is not necessarily connected to local development have been discussed from an institutional (Marques and Morgan 2021; Morgan 2019; Iammarino et al. 2017) and firm-level (Shearmur 2016) perspective, the evidence brought forward has been high-level. Marques and Morgan (2021) illustrate a disconnection between regional productivity and employment growth, Shearmur and Bonnet (2011) reveal that patenting is not directly connected to local employment or income growth, and Iammarino et al. (2017) discuss theoretical limitations of the idea that innovation and knowledge spillovers will necessarily lead to regional development.

In this paper we empirically examine a specific mechanism that could contribute to the disconnection between local firm-level innovation and local growth: the mobility of innovators. 'Mobility' is understood widely: an innovative establishment can move elsewhere, but it can also expand non-locally or can call upon non-local resources as it innovates (Shearmur 2015). In all these cases the locality benefits less from the establishment's innovation than if it remained local, expanded locally, or turned to local suppliers.

Our questions are as follows: do innovators in peripheral regions tend to use non-local service providers when they expand capacity? When these innovators increase their capacity beyond the confines of the establishment, does this occur outside the region? Whatever the processes thought to link local innovation with local development, these questions are important: if innovators in peripheral regions tend to collaborate more with external service partners when they are expanding, and if they tend to expand outside the region, this would limit their local development impact - in terms of services, jobs, local spending and milieu effects.

Our results, which draw upon a survey of 634 manufacturing establishments, reveal a significant reliance by innovators in the periphery on non-local services and a significant, though less robust, tendency for non-local capacity expansion. The nature of our results is important: the robustness issues, attributable to the small numbers of establishments which expand capacity (OECD 2021), may explain why this process has been overlooked in a research environment that consistently seeks out robustness and high p-values.

If the process exemplified by the small number of capacity expansions in this cross-sectional analysis is indicative of persistent long-term processes (as suggested by wider debates and high-level evidence), then these

results – consistent with theory – provide empirical clues, at the level of the firm, as to how local development can be disconnected from firm-level innovation in peripheral areas. In a context where innovation policy increasingly focuses on the scaling-up and growth of innovators (ISED 2019; OECD 2021) our results suggest that a more concerted effort is warranted to gather longitudinal data to examine the mechanisms linking local innovation, firm expansion, and local development.

## **2 Innovation-Led Local Development: Theory or Policy Objective?**

### **2.1 On What a Basis Is It Expected That Firm-Level Innovation and Local Development Are Linked?**

An assumption that underpins many local development policies (OECD 2011; 2020), especially in North America (Government of Canada 2018; OECD 2019), is that if local firms are innovative, they will capture new markets and grow, leading to development of the locality.

However, it is not always clear upon what conceptual basis the link between local firm-level innovation and local development is made. Endogenous growth theory (Romer 1994), which has gained wide acceptance, posits that within closed economic systems innovation – resulting from new collaborations, new combinations of ideas, processes and technologies - drives growth. However, regions are not closed systems: they are made up of multiple (mobile) actors, connections with external actors, as well as embedded institutions and cultures.

Two broad bodies of theory bridge the gap between endogenous growth theory and regional development. On the one hand, regions are approached as entities that are culturally and institutionally distinct. Some local cultures and institutions are more open to and supportive of innovation than others. The literature on regional innovation systems (RIS) describes how market-oriented (firm-level) and non-market (community-level) development inter-connect (Bathelt and Henn 2017; Cooke et al. 2011; Marques and Morgan 2018): even if firm-level innovation is key to local development and growth, a locality with well-developed institutional and social capacities will not only enable firms to innovate, but will also prime the region for capturing the benefits of this innovation.

On the other hand, local development is understood as the outcome of decisions taken by individual actors. Myrdal (1957) describes the link between regional growth and the location choices of mobile factors of production. As a region grows, agglomeration economies develop: these economies can be static (associated with the division of labour and economies of scale) or dynamic (associated with knowledge exchange, diversity and innovation - often referred to as Marshall-Arrow-Romer economies). Workers and firms are attracted to the more prosperous and innovative region, which continues to grow, and agglomeration economies get even stronger. More recently, Krugman (1991) formalised this type of process within the context of new economic geography (NEG).

These two approaches, one focussed on institutions and embeddedness, the other on location choices and mobility, describe processes whereby firm-level innovation and local development are linked (Iammarino et al. 2017). However, the RIS and NEG literatures are different. RIS focuses on culture, actors, and institutions within the region. In a well-functioning system these stimulate endogenous development and augment capacity to interact with actors beyond the region: it is local dynamics, including the capacity to marshal non-local networks and resources, that lead to local innovation, which then reinforce these local dynamics (Cooke et al. 2011;

Marques and Morgan 2018). NEG, to the contrary, treats actors and resources as essentially mobile and disembedded: firms and workers arbitrate between regions based on opportunities, which grow in a self-reinforcing way within agglomerations (Behrens and Nicoud 2011). For NEG, regional dynamics are the outcome of micro-level arbitrations rather than of wider cultural and institutional dynamics.

This points to the conceptual problem behind policies which assume local firm-level innovation leads to local development, especially in peripheral or laggard regions: given that regions are open and that development both attracts and feeds off mobile factors, how can the innovation performance of local actors be connected in a direct way to regional performance (Glückler et al. 2022)? It is only certain regions – either those institutionally primed (Morgan 2019; Coenen and Morgan 2020) or those where dynamic agglomeration economies occur (Krugman 1991; Behrens and Nicoud 2011) – that will benefit from the innovativeness of local firms.

Such a statement, derived from theory, should come as no surprise. At the national level, it is recognised that the connection between economic innovation and wealth or job creation is tenuous. A panel that recently explored innovation and R&D in Canada concludes that

*“Canada is a highly innovative nation, but significant barriers prevent the translation of innovation into wealth creation [...] Canada’s promising start-ups are often acquired and developed in other countries, leading to a loss of economic and commercial benefits”* (Council of Canadian Academies 2018: xxiii-xxiv).

NEG, which is premised upon the mobility of actors towards nodes that have generated agglomeration economies, rests upon a long tradition: Ravenstein (1885; 1889) sets out ‘laws’ of migration, positing that workers – especially the brightest and most capable (the most innovative?) - migrate towards places where there are more opportunities. Lipton (1977) shows how social structures, institutions and even terms of trade are structured to provide advantage to cities and their elites: according to him there is no lack of innovation or entrepreneurship in rural areas, but it differs from the type of innovation found in cities, is systematically undervalued (Lipton 1977), and does not lead to local development.

In short, the idea that local firm-level innovation is connected to local development may be valid in certain contexts. However, peripheral or laggard regions are less likely to develop, even if they house innovative firms, than larger, more central or more institutionally thick regions (Morgan 2019).

## **2.2 The Rise of Local Development Strategies Premised Upon Firm-Level Innovation**

Since there is no compelling theoretical reason to assume that local firm-level innovation will necessarily lead to local development, the question remains as to why this assumption is so often implicit in local development policy. This can be explained partly by their objective of linking local firm-level innovation with local development - an objective that has morphed into an expectation - and partly by the misapplication of endogenous growth theory to small open regional economies. We briefly trace these two intertwined possibilities below.

In the 1980s researchers such as Massey (1985) and Storper and Walker (1989) described the effects of growing globalisation and nascent financialization. Multi-establishment corporations were increasingly able to close specific establishments in a strategic fashion, effectively moving capital from region to region, or across national borders. This geographic arbitration was in part motivated by economic factors (lower costs, more collaborators,

proximity to markets...) of the type outlined by NEG but was also motivated by a desire to discipline workers. Certain types of local culture, notably workplace organisation, were perceived by owners of capital as an impediment to profit maximisation. Capital mobility, or sometimes just the threat of mobility, was a way to lower overall production costs and reduce disruption (Massey 1985).

In reaction to this, the embedding of economic activity, aligning productivity and innovation with local culture and institutions, was seen as a way to counter socially destructive capital flows (Cox 1995; Storper and Walker 1989). Thus, local endogenous development strategies should be distinguished from endogenous development theory: whereas endogenous strategies make political and policy sense if the objective is to stabilize and grow a local economy, such local growth is not predicted by endogenous development theory, which is only applicable to relatively autonomous or closed systems (Margarian 2011; Shearmur 2016). Indeed, local endogenous development strategies – such as those suggested in the RIS literature – are necessary precisely because micro-derived endogenous growth theory does not describe what happens at a local and regional level, particularly in smaller regions which do not possess the internal resources for such micro-driven innovation processes to take off (Morgan 2019).

One of the reasons that local policies focussing on entrepreneurship and firm-level innovation remain popular, particularly in North America, is that they are attractive to researchers, policy makers and politicians from across the political spectrum. From a more left-wing or communitarian perspective, encouraging local firms to innovate can be seen as an act of resistance vis-à-vis globalisation and capital mobility (Massey 1985), and also harks to social-anarchist ideas of localised decision-making and participation (Marshall 1991). From a more right-wing or neo-liberal perspective, encouraging localities and regions to support local entrepreneurs absolves central government from intervention, is market-oriented, and legitimises the idea of competitiveness, i.e., that regions are competing against one another (Eisinger 1988; Stimson et al. 2011) as opposed to being part of an interdependent geographic system of production (Coffey 1998).

Whereas the European Union (EU) proposes national and continental approaches to regional development that are not solely focussed on firm-level innovation (Marques and Morgan 2018), the absence of regional or local development policy frameworks in North America has encouraged a more fragmented, locally-driven and firm-focussed, approach (Vodden et al. 2019; OECD 2019). Entrepreneurship – the cultivation of innovative local small firms – is a keystone of many locally devised and implemented approaches to development both in the North America (Vodden et al. 2019; Malecki 2017) and Europe (Spigel 2016).

### **2.3 Firm-Level Innovation and Local Development: Processes, Evidence and Anecdotes**

Generating local systems rich enough to embed actors is challenging, particularly in low-density and remote regions (Morgan 2019; Glückler et al. 2022). Shearmur (2015) argues that innovators in such places will not necessarily remain local once they have innovated. He suggests that, once an innovation is introduced, innovators who wish to scale-up will tend to expand capacity (either by moving or by opening subsidiaries) into regions more conducive to the development and marketing of their innovation (a process similar to that identified by the Council of Canadian Academics (2018) at the international scale). Another way the impact of innovation would not be felt locally is if innovators turn to external services and suppliers when they expand (Shearmur 2015): a past generation of regional analysts would have said there are fewer local multiplier effects in sparse and peripheral regions (Archibald 1967).

There exists some correlation-based evidence of these processes, based on the analysis of local patents (Shearmur and Bonnet 2011) or local productivity (Marques and Morgan 2021) and their (dis)connection with local income and employment growth. However, there is so far no direct and systematic evidence of the firm-level processes suggested by Shearmur (2015). Rather, there is anecdotal evidence: but anecdotes work both ways and do not allow weak but persistent long-term trends to be discerned.

On the one hand, there are innovators such as Emil Gulbranson in Vanderhoof, British Columbia, a village of 4400 people 100 km west of Prince George, a town of 75 000, itself 800 km north of Vancouver. Vanderhoof and its region had a hay surplus: in the early 2010s the BC Forage council explored export markets, such as China (Dobb 2014). Gulbranson founded Agri Green Enterprises Inc. in 2017 to produce and market an innovative hay dryer (Jaynes 2018), which has found buyers in Europe, Africa and across the USA<sup>1</sup>. There is no evidence that this firm has expanded beyond the region: on the contrary, Vanderhoof seems to be developing endogenously as the agricultural sector innovates both in terms of technology and in terms of marketing. Agri Green still operates at a small scale: should it grow, it will be interesting to see if it can continue to operate locally.

On the other hand, there are innovators such as Suzanne Belisle and her colleagues in Chibougamau, a town of 7500 people, 700 km to the north of Montreal and 450 km from the closest larger town. These nurses observed that many children, particularly infants, were in considerable pain when catheters are inserted. Mme Belisle designed and developed a lightweight and flexible splint that holds the catheter in place whilst allowing babies to move freely and without pain: it has now been patented (Larochelle 2021). However, to market the product within the hospital network, and to obtain regulatory approval, the Chibougamau-based firm (Equipment FIX I/V) reached beyond Chibougamau, establishing a presence in Montreal via a specialised distributor, Dufort et Lavigne<sup>2</sup>.

Both these innovators contribute to the local development of their community, but their impact in terms of jobs and income is not necessarily local. Agri Green Enterprises, seems, for the time being, to be locally embedded by virtue of its raw material (hay), knowledge-base (agriculture) and small but active local milieu. Equipment FIX I/V, on the other hand, has no particular reason to remain rooted in Chibougamau: already its regulatory and distributional activities are feeding employment and income in Montreal because the city provides proximity to Québec markets, access to international markets, and access to regulators.

In this paper we explore whether innovators in peripheral regions (similar to Morgan's (2019) 'lagging' regions) have a stronger tendency than establishments located closer to (or within) metropolitan areas to scale-up their operations beyond their local area, and/or to use service providers outside their local area when they expand. Such geographies are difficult to track: unlike patent applicants - for which formal databases exist that geolocalise applicant firms as well as inventors - the locations of innovators' service-providers, new facilities, subsidiaries, or offices are not recorded. These data therefore need to be gathered by way of a survey: the data and method will be described in the next section.

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<sup>1</sup> <https://www.facebook.com/pg/haydryer/posts/>

<sup>2</sup> <https://www.dufortlavigne.com/pages/qui>

## 3 Data and Method

### 3.1 Data

The data analysed in this paper are from an original survey of 634<sup>3</sup> small and medium sized manufacturing establishments (SMEs) in the province of Québec, drawn from the population of Québec manufacturing establishments held, and updated on a rolling basis, by the CRIQ (Centre de Recherche Industrielle du Québec). These are establishment not firm level data. The 6798 establishments identified by CRIQ are first divided by location into metropolitan (establishments located within the Montreal and Québec urban agglomerations), central (those located within about 100km of Montreal and Québec cities) and peripheral. The sample is a stratified random sample: approximately equal representation of metropolitan, central and peripheral establishments was sought, but within these geographic categories sampling is random (see Table 1 for descriptive statistics).

Only establishments listed between 5 and 250 employees in the CRIQ database were approached, but because size fluctuates some respondents declare more than 250 employees, some fewer than 5 (Table 1). The survey was conducted from February to May 2020: 285 were contacted pre-Covid, 347 after. There are no discernable differences in response profile between pre- and post- Covid respondents, as expected because questions focus upon innovation during the three years preceding the survey and on concrete plans to augment capacity, i.e. concrete plans for capacity increase in the twelve months following the survey. In April and May 2020 no one expected Covid to last much more than a few months, so the latter question provides valid information about expansion plans, even though, given the circumstances, planned expansions may not have been realised.

Following Oslo Manual guidelines (OECD 2018), establishments are asked whether they have introduced four types of innovation over the three preceding years (i. product, ii. process, iii. organizational, iv. marketing and sales), and whether the innovation is first to market (i.e., radical) or first to the establishment (i.e., incremental). Establishments are also asked specific questions about five types of capacity expansion which broadly correspond to stages in the value-chain (i. R&D, ii. production, iii. logistics and distribution, iv. marketing and client relations, v. after-sales service). Finally, respondents are asked whether their establishment used external consultants (i.e., management, engineering, accounting, legal or other consultants) in connection with their capacity increases.

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<sup>3</sup> 634 responses were obtained. Two are dropped because no information is provided on expansion and service-use, and a further two are dropped because no geographic information is provided. Furthermore, not all establishments provide detailed enough geographic information for each dimension we analyse: the analyses run on 626 (service-use) and 630 (capacity expansion) observations.



**Table 1: Descriptive statistics**

	<i>Resource based</i>	<i>Labour Intensive</i>	<i>Scale Intensive</i>	<i>Specialised &amp; science</i>	<i>n</i>	<i>notes</i>
Pavitt sector	29%	39%	22%	11%	632	
	<i>10 or less</i>	<i>11 to 20</i>	<i>21 to 50</i>	<i>over 50</i>		
Size (employees)	33%	23%	27%	16%	632	min=1, max=300
	<i>Product</i>	<i>Process</i>	<i>Managt.</i>	<i>Marketing</i>		
First to market innovators	46%	33%	23%	20%	632	percentages do not sum to 100
	<i>Metro</i>	<i>Central</i>	<i>Peripheral</i>			Central= within 100km of a metro
Location of respondents	39%	34%	27%		632	Metro = city of over 800 000 people**
Internal capacity expansion	72%	74%	76%			% of establishments in each location
External capacity expansion	14%	11%	7%			% of establishments in each location
Service-use for expansion	40%	45%	46%			% of establishments in each location
Any first to market innovation*	59%	64%	58%			% of establishments in each location
Mean size (employees)	29	34	33			
% below 10 employees	34%	31%	35%			% of establishments in each location
% over 50 employees	14%	19%	17%			% of establishments in each location

\* The propensity to innovate does not differ by type of region:  $\chi^2=0.88$ ,  $p(\chi^2=0)=0.65$

\*\* Metro areas consist of Montreal and Québec census metropolitan agglomerations. The next largest cities in Québec are Saguenay and Sherbrooke Census Agglomerations (CAs), both about 150 000 people, followed by CAs such as Rimouski and Rouyn-Noranda, 50 000 and 30 000 respectively. We have deliberately not sampled establishments in the vicinity of Ottawa, and have ensured that sampled non-metropolitan establishments come from a variety of non-metro regions in Québec.

For each of these six items (five types of capacity increase as well as use of consultants), respondents are asked to specify where the increase in capacity occurred (or will occur), or, for consultants, where the principal service-provider is located. To cross-validate responses, this question is asked in two ways: the name of the municipality is requested as well as the approximate distance of this municipality from the responding establishment's location. Using the postal code of town-halls as the point of measurement, distances are calculated using GIS software and checked against estimates made by respondents. These estimates correlate strongly with calculated distances. Respondent estimates serve to disambiguate municipalities (for instance Sainte-Agathe-de-Lotbinière is a small municipality South-West of Québec-City, and Sainte-Agathe-des-Monts is north of Montréal: both can be referred to as Sainte-Agathe). On occasion respondents only provide the estimated distance, not the municipality. Ten respondents declare using out-of-province service providers, and eighteen declare that they are expanding outside the province: when a specific out-of-province location is mentioned it is a city, typically in the US or Canada, so these responses are classified as metropolitan.

### 3.2 Method

Only 68 establishments (i.e. 11%), whether innovators or not, have expanded<sup>4</sup> capacity beyond the confines of the current establishment (of which 54 report one type of expansion, 9 two, 4 three and 1 five); this is commensurate with low levels of SME scaling-up reported by the OECD (2021).

To understand the geography of these extra-establishment expansions, observations need to be separated across innovators and non-innovators, across location of the innovator (metro, central, peripheral) and across location

<sup>4</sup> To lighten the text the term 'have expanded' will be used: this also includes establishments with concrete expansion plans over the 12 months following the survey.

of the capacity expansion (local and non-local). Analysing 68 observations across 12 categories is problematic because the data are sparse.

Our approach has therefore been to use  $\chi^2$  analysis, applying it separately to innovators and non-innovators. In both cases, the question that the  $\chi^2$  is designed to answer is the following: is there a statistically significant difference in the location of capacity expansion for establishments located in metropolitan, central and peripheral milieux. The nature of these differences is identified by examining frequency tables. The problem is less acute for service providers who advise on capacity expansion since, of the 533 establishments which expanded capacity (whether within or beyond their establishment), 266 (42%) used such services.

This method is essentially descriptive: the research strategy is to first identify whether our data are compatible with the idea that innovative establishments in peripheral regions have a higher tendency than non-innovative establishments to use non-local services or to expand beyond the local region, and to then examine whether this tendency differs across peripheral, central and metropolitan regions. Explanations for these patterns, should they emerge from our data, cannot be empirically explored in this paper, but the processes suggested by Shearmur (2015) will have been partly corroborated.

After presenting results, we return to the issue of data sparseness, which is relevant for understanding why the connection between local innovation and local development is only now being questioned.

## 4 Results

Results are presented in three stages. First, the basic premise of this research, that the propensity of SMEs to innovate does not differ across the metropolitan, central and peripheral spectrum is verified. Second, the geography of capacity expansion is explored. Third, the geography of service-use related to these capacity increases is also explored.

### 4.1 The Geography of Innovation

There is no difference in the propensity to introduce first-to-market innovations across the metropolitan-periphery spectrum (Table 1): in keeping with other studies from Québec and elsewhere (as reviewed by Eder 2019), when survey data at the establishment level are used, and when a broader view of innovation than patents is adopted, differences between cities and peripheral areas are not evident. This does not mean that innovation processes are identical across different types of regions but shows that establishments across Québec are similarly intent on updating their products and processes, and on doing so before competitors.

### 4.2 The Geography of External Expansion

Although respondents are asked about five specific types of external expansion, given the small numbers these are aggregated. Each type of external expansion implies either setting-up a new facility or working with a sub-contractor: hence all have implications in terms of job creation, investment and income generation.

A large proportion of establishments declare expansion internal to the establishment (Table 1). We do not have specific information about the nature of such internal expansion: whilst it may involve investment in machinery, the conversion of spaces into R&D labs, investment in delivery trucks, and whilst it may also involve some hiring, we interpret internal expansion as being more modest and as generating fewer jobs and less income than external

capacity increase. This interpretation rests on the assumption that internal capacity expansion is simpler, can be very minor, and is the first type of expansion that most expanding firms will consider: it is only if this is not adequate that establishments will turn towards external expansion. External capacity expansion requires considerable coordination, contractual arrangements, organisation, and resources: it will rarely be minor, and typically will be undertaken by firms which envisage sizeable growth in parts of their business.

The results are divided into two parts (Table 2): part A examines the location of capacity expansion across the local / non-local dimension. A local expansion is one that occurs within 50km of the establishment: the results are almost identical if 100km is used. Part B examines the location of capacity expansion across the metropolitan / non-metropolitan dimension. For each part of the table, a separate  $\chi^2$  analysis is presented for non-innovators (Table 2, A1 and B1) and innovators (Table 2, A2 and B2).

**Table 2: The Location of SME Capacity Increases in Québec**

<b>A. Local / non-local capacity increase</b>					
	<i>Non-local (over 50km)</i>	<i>Local (within 50 km)</i>	<i>Internal</i>	<i>None</i>	<i>n</i>
<b>A1. Non-innovators:</b> $\chi^2=6.0$ , $p(\chi^2=0)=0.42$ , cells < 5= 6/12					
Metropolitan	3.0%	6.1%	58.6%	32.3%	99
Central	8.8%	2.5%	60.0%	28.8%	80
Peripheral	2.8%	2.8%	63.9%	30.6%	72
<b>A2. Innovators:</b> $\chi^2=16.3$ , $p(\chi^2=0)=0.012$ , cells < 5 = 0/12					
Metropolitan	8.3%	8.3%	80.7%	2.8%	145
Central	2.2%	8.2%	83.0%	6.7%	135
Peripheral	7.9%	0.0%	85.1%	6.9%	101
<b>B. Metropolitan / non-metropolitan capacity increase</b>					
	<i>Metro +</i>	<i>Non-metro</i>	<i>Internal</i>	<i>None</i>	
<b>B1. Non-innovators:</b> $\chi^2=2.73$ , $p(\chi^2=0)=0.84$ , cells < 5= 4/12					
Metropolitan	7.1%	2.0%	58.6%	32.3%	99
Central	8.8%	2.5%	60.0%	28.8%	80
Peripheral	2.8%	2.8%	63.9%	30.6%	72
<b>B2. Innovators:</b> $\chi^2=13.2$ , $p(\chi^2=0)=0.041$ , cells < 5 = 3/12					
Metropolitan	14.5%	2.1%	80.7%	2.8%	145
Central	5.3%	4.5%	82.8%	6.7%	134
Peripheral	6.9%	1.0%	85.1%	6.9%	101

Note: Panel A presents the key result of this analysis, showing that the geography of expansion differs for innovators, but not for non-innovators: in particular, peripheral innovators expand non-locally, whereas central and, especially, metropolitan innovators expand locally as well as non-locally. This result is confirmed, focusing only on external expansions, in the appendix. Panel B presents secondary results: its purpose is to determine towards what type of region establishment expand. We see that for peripheral establishments, "non-local" expansion is principally "metropolitan". For metropolitan establishments, "non-local" expansion is also principally "metropolitan", since there is virtually no expansion of metropolitan establishments into non-metropolitan areas.

The first item to note is that the  $\chi^2$  tests in Table 2, except for part A2, lack robustness: about a quarter of the cells have expected values below 5. We acknowledge this and will return to it in the discussion section.

However, there is stark contrast between innovators and non-innovators. For non-innovators, the geographic profile of capacity expansion does not differ significantly whatever the location of the expanding establishment. In all types of location about 30% of establishment are not expanding, about 60% are expanding internally, and 6 to 10% are expanding externally. In contrast, for innovators the geographic profile of capacity expansion differs significantly depending on where the establishment is located. Only 2.8% of innovators in metropolitan areas are not expanding their capacity, compared to about 6.8% elsewhere. 85% of innovators in peripheral regions are expanding internally, against 81% in metropolitan areas. Turning to external expansion, not a single establishment in peripheral areas is expanding locally, whereas 7.9% are expanding non-locally. In contrast about 8.3% of metropolitan and central innovators are expanding locally. It should be noted, however, that 8.3% of metropolitan innovators are also expanding non-locally, whereas few central ones are. If we focus only upon external expansions (Appendix), a similar pattern emerges: 100% of external expansions by peripheral innovators are non-local, whereas 50% are for metropolitan and 21% are for central. These differences are significant, though they lack robustness. No differences are evident for non-innovators.

Even though the propensity of peripheral establishments to expand locally is nil, these first results do not rule out the possibility that some metropolitan and some central establishments are expanding into peripheral locations: this would compensate the lack of local spill-overs from local innovators in the periphery.

Part B of table 2 examines whether expansion is occurring towards metropolitan or towards non-metropolitan regions. The data are too sparse to subdivide non-metropolitan regions into centre and periphery. Fully 14.5% of metropolitan innovators are externally expanding their capacity within metropolitan areas. Only 2.1% of metropolitan innovators are externally expanding into non-metropolitan locations. In contrast, 6.9% of peripheral innovators are externally expanding into metropolitan areas, and only 1% are doing so into non-metropolitan areas. Innovators in central locations are evenly balanced between external expansion into metropolitan and non-metropolitan areas. Metropolitan areas therefore benefit in the same proportion from expansion of their own innovators as they do from expansion of peripheral innovators, attracting 87.5% of external expansions from their own and from peripheral innovators (Appendix). It is innovators in central areas whose external expansions tend less towards metropolitan areas (53.9%).

When parts A and B of Table 2 are analysed jointly, two important patterns are revealed. First, even though innovative metropolitan establishments do not necessarily externally expand locally, they almost always expand into metropolitan environments. Thus, in Québec, although 8.3% of metropolitan innovators expand non-locally, most of this expansion occurs into other metro areas. Although we have not measured this, it is feasible that Québec's metropolitan areas receive some of the expansion from metropolitan areas outside the province, in the same way that they receive some of the expansion from central, and almost all of it from peripheral, areas. Our data do not provide evidence of a drain from metropolitan areas writ large, though specific metro areas may be losing out (Council of Canadian Academics 2018) to other metropolitan areas: as a group, metropolitan areas are receivers of expansion from other types of regions, most particularly from peripheral regions.

Second, and conversely, innovative peripheral establishment tend to expand internally (i.e., within the establishment) – which we interpret as more modest and less intensive expansion: when they do expand externally, it is invariably non-local and almost always into a metropolitan area. Thus, spill-overs – in terms of

activity generated by innovation-related expansion of establishments in the periphery - converge upon metropolitan areas.

Though these results are not all robust, and though the numbers are small, the pattern they reveal is clear and is consistent with the wider literature on rural to urban migration, on static agglomeration economies, and on the mobility of innovators as the innovation process moves from introduction to development and marketing (Shearmur 2015).

### 4.3 The Geography of Service-Use Connected to Capacity Expansion

When analysing the location of service-provision as it relates to capacity expansion we do not distinguish between internal and external: all service-providers are by definition external to the establishment (Table 3).

**Table 3: The Location of Service-Use Related to Capacity Increases in Québec**

<b>A. Local / non-local service use</b>				
	<i>Non-local (over 50km)</i>	<i>Local (within 50 km)</i>	<i>None</i>	<i>n</i>
<b>A1. Non-innovators:</b> $\chi^2=15.6$ , $p(\chi^2=0)=<0.004$ , cells < 5 = 0/9				
Metropolitan	4.0%	24.2%	71.7%	99
Central	13.8%	18.8%	67.5%	80
Peripheral	18.1%	6.9%	75.0%	72
<b>A2. Innovators:</b> $\chi^2=33.3$ , $p(\chi^2=0)=<0.0001$ , cells < 5 = 0/9				
Metropolitan	9.0%	37.2%	53.8%	145
Central	29.6%	21.5%	48.9%	135
Peripheral	37.6%	23.8%	38.6%	101
<b>B. Metropolitan / non-metropolitan service use</b>				
	<i>Metro +</i>	<i>Non-metro</i>	<i>None</i>	<i>n</i>
<b>B1. Non-innovators:</b> $\chi^2=32.4$ , $p(\chi^2=0)=<0.0001$ , cells < 5 = 0/9				
Metropolitan	27.6%	0.0%	72.4%	98
Central	10.0%	22.5%	67.5%	80
Peripheral	16.9%	7.0%	76.1%	71
<b>B2. Innovators:</b> $\chi^2=40.6$ , $p(\chi^2=0)=<0.0001$ , cells < 5 = 0/9				
Metropolitan	41.7%	4.2%	54.2%	144
Central	23.7%	27.4%	48.9%	135
Peripheral	28.0%	33.0%	39.0%	100

Note: Panel A presents the key result of this analysis, showing how the geography of expansion-related service differs between innovators and non-innovators, and across metropolitan, central and peripheral regions: all peripheral establishments tend to use non-local services, but peripheral innovators not only use more services than non-innovators, they use more non-local services. Panel B presents secondary results: its purpose is to determine from what type of regions establishments source their services: peripheral innovators, whilst they tend to use non-local services, are evenly split between using metropolitan and non-metropolitan services. Metropolitan innovators use almost no non-metropolitan services.

Many establishments that are expanding – whether internally or externally – use external service providers: there are therefore no robustness issues with the results in Table 3. Whilst both innovators and non-innovators use external services for capacity expansion, only 30% of non-innovators do so compared to 50% of innovators. The propensity to use external services amongst non-innovators is similar wherever establishments are located; in contrast, substantially more peripheral innovators use external services than do central or metropolitan innovators.

Whether innovators or not, peripheral establishments have a higher propensity to turn towards non-local service providers than do central or metropolitan establishments (Table 3, part A). Only 4.1 % (non-innovators) and 9.0% (innovators) of metropolitan establishments turn towards non-local service providers when they are expanding, against 18.1% and 37.6% of peripheral establishments. Metropolitan establishments have a far higher propensity to use local services than either central or peripheral establishments.

Although the patterns are similar for innovators and non-innovators, the proportion of service-users is higher for innovators: far more peripheral innovators than non-innovators use external services, and more of them use non-local services. Thus, leakages associated with service-provision (in terms of fees, of service employment, and of strengthening the service sector...) are higher for peripheral than for central or metropolitan areas: this is driven by innovators who not only use more services but use more non-local services.

Looking at these numbers a different way, the dominance of metropolitan areas in terms of service-provision becomes evident (Table 3, Part B): 42% of metropolitan innovators turn to metropolitan service-providers for advice on expansion, 24% of central ones, and 28% of peripheral ones. Conversely, only 4.2% of metropolitan innovators turn to service-providers outside a metropolitan area, whereas 28% and 33% of central and peripheral innovators do so respectively. Only 7% of peripheral non-innovators turn to non-metropolitan service providers, whereas 22.5% of central non-innovators do. Interestingly, a lower proportion of innovators in metropolitan areas consult no service providers for expansion purposes than in the periphery (46% v. 61%).

Metropolitan regions benefit from service-demand generated by central and peripheral establishments that are expanding, but there is no reciprocal benefit for non-metropolitan regions: they do not benefit from service-demand from expanding metropolitan establishments. This is not a surprise: business service providers tend to locate in metropolitan areas. Yet, considering that many policies encourage local innovation activities in view of generating local economic development, this result – unsurprising as it is – should give pause. It reveals that consulting and business services – major industries in metropolitan areas, that are high-wage and fast-growing – are partly fueled by the expansion of establishments, innovative ones in particular, located in non-metropolitan areas. Resources and knowledge generated by expanding establishments in the periphery are transferred towards metropolitan areas.

## 5 Discussion

The purpose of this paper is not to argue that value always flows from the periphery to the centre. Its focus is more specific: to the extent that many local development policies aim at stimulating firm-level innovation, the question addressed is whether, when innovators scale-up, they do so locally, thereby benefitting the local economy, or non-locally, thereby benefitting other localities and regions.

This line of questioning is motivated by some contradictions inherent in this approach to local development (Marques and Morgan 2021; Iammarino et al. 2017), and by increasing policy focus on the scaling-up of innovative SMEs (ISED 2019; OECD 2021). Our questions empirically probe Shearmur's (2015) suggestion that, in sparse and peripheral regions, establishments innovate but turn towards metropolitan areas when they scale-up, expand capacity, and market their innovations. They also explore Glückler et al.'s (2022) more general suggestion that innovative agents can strategically move between more central and more peripheral positions (and vice-versa) to leverage the advantages of both at different points along the innovation process.

Our data reveal that when innovators expand their capacity externally the geography of this expansion differs across the metropolitan to periphery spectrum for innovators, but not for non-innovators. Metropolitan innovators either expand locally, or expand into other metropolitan areas: they are embedded in metropolitan milieux. Peripheral innovators expand almost exclusively non-locally, into metropolitan areas: they are not embedded in peripheral milieux. The results for service-use (as it relates to capacity expansion) are similar: although peripheral establishments use some locally-sourced services they are more likely to use non-local services, with a high propensity to turn towards metropolitan-based service providers. This result, which holds for innovators and non-innovators alike, is stronger for innovators and concerns a higher proportion of them.

Results for establishments in central locations – for both expansion and service-use – lie between those for metropolitan establishments and those for peripheral establishments.

To the extent that local expansion and local expansion-related service-use contribute to endogenous development processes, our results confirm that endogenous processes occur within metropolitan areas, which is as expected since these regions generate agglomeration economies and tend to be institutionally thick. Metropolitan areas benefit from the dynamism of their own innovative establishments and from the dynamism of each others' innovative establishments: our results are compatible with the local buzz of large cities, and with connexions (pipelines?) between these cities (Bathelt et al. 2004).

In central regions there is evidence that innovators expand capacity into both non-metropolitan and metropolitan areas, with non-metropolitan expansion tending to be local. There is also a slightly lower tendency for central than for peripheral establishments to use expansion-related services based in metropolitan areas. Central regions occupy an intermediate position, with some evidence of local expansion by innovators, as well as some evidence of establishments turning towards metropolitan areas.

In peripheral regions, the evidence is overwhelming that external capacity expansion by innovators (to the extent it occurs), as well as service-use in aid of this expansion, are non-local. It is thus difficult to argue, at least based on these two indicators, that local innovators in peripheral areas set up virtuous local multiplier and spillover dynamics once they have innovated. Conversely, peripheral regions do not seem able to generate dynamics that would enable innovators to thrive locally (Morgan 2019).

Whilst our results pertaining to service-use are not surprising – they confirm that this holds true for service-use related to capacity expansion – those relating to the location of external capacity expansion are novel. However, the external expansion results, although fairly robust (Table 2, A2; Appendix A2), rest upon fairly sparse cross-sectional data. The data are sparse because, during the four-year period about which respondents are questioned, most capacity expansion happens within the confines of establishments. This type of minor expansion is common across establishments in all locations, and is more common for innovators.

When it comes to major expansion, involving extra capacity beyond the establishment, numbers are small. Over a four-year period only about 11% of establishments engage in it, 14% in cities and 7% in peripheral regions (Table 1). This, in itself, is interesting: metropolitan-based establishments have a higher propensity to expand beyond their confines. This is commensurate with establishment owners in peripheral areas being constrained by lack of local resources, or choosing – for lifestyle reasons – to limit growth (Dominici et al. 2019). It is also commensurate with process innovation – a type of innovation more common in peripheral areas – that expands production capacity in view of reducing costs and increasing productivity: this type of innovation, which is often labour saving, can lead to local economic decline if localities do not have the size and diversity to generate alternative uses for freed-up resources (Shearmur 2015). Creative destruction, occurring at an aggregate scale across the economy, may destroy in the periphery whilst creating towards the centre.

The small number of external expansions by peripheral establishments coupled with their geographic dispersal makes it difficult to systematically determine where such expansion occurs. Frenken and Boschma (2007), in their discussion of branching processes, observe that most spin-offs are local: however, unless spin-offs can be subdivided between those originating from metropolitan establishments and those originating from peripheral establishments, then the small number of observations drawn from peripheral areas in national databases will be overwhelmed by metropolitan observations, which, as our data confirm, tend to expand locally. It is for this reason that establishments in peripheral regions are oversampled in our study: this allows us – albeit tentatively – to identify differences in the location of capacity expansion according to the location of the innovating establishment.

Finally, our results only cover a four-year window. They reveal that the innovative peripheral establishments that expand beyond their confines do so into metropolitan areas (as well as revealing that expanding peripheral innovators tend to use non-local service-providers). Regional development, however, is a long-term process. Peripheral regions – except a few that benefit from specific resources or amenities – have been declining for at least 40 years in Canada (Polèse and Shearmur 2006). A weak or ambivalent process, if it endures over time, can lead to large disequilibria, in the manner of compound interest.

Since small but persistent long-term processes are not readily apparent, and since data are not gathered to measure them, many local development policies have overlooked the mechanism we highlight in this paper. Furthermore, if such processes are suspected, they can readily be ignored given the general consensus in favour of innovation-led local development and endogenous growth. This is maybe the most compelling reason to carefully consider the results presented here: the paper presents vital clues to a potentially important process, and corroborates recent theoretical discussions (Margarian 2011; Iammarino et al. 2017; Shearmur 2016; Morgan 2019; Glückler et al. 2022) and high-level data analysis (Marques and Morgan 2021; Shearmur and Bonnet 2011). They should draw the attention of researchers and policymakers to some fundamental questions that need to be asked about the connection (or lack of it, in peripheral regions) between local firm-level innovation and local economic development.

These points mirror and extend the conclusions of the OECD's (2021) pilot project on the scaling-up of SMEs: the OECD argues for better use of existing micro-data to explore scaling-up processes. We suggest that existing micro-data derived from innovation surveys, in-so-far as it is used to inform local development and innovation policy, should also be complemented.



## 6 Conclusion: The Conundrum of Policymaking Without Adequate Data

This paper empirically investigates whether innovators in peripheral regions generate local economic development processes. Two indicators are used: capacity expansion and service-use in aid of this expansion. Our results reveal that, whereas metropolitan innovators expand locally and use local services, this is not the case in peripheral regions. This suggests that firm-level innovation and policies that successfully encourage it have a relatively small impact upon the development of peripheral regions; it also provides evidence of specific firm-level processes that contribute to this outcome.

Our results – particularly when it comes to capacity expansion – are clear and consistent with theory. However, the data we rely on is sparse and cross-sectional. We suggest a number of reasons why these results should nevertheless be carefully considered: in particular, if the tendency for peripheral establishments to expand into metropolitan areas is indicative of a long-term process, then the data's sparseness merely reflects the lack of time-series data and/or the lack of larger scale studies. From both research and policy perspectives this presents a conundrum: it is difficult to obtain funding for data collection that explores a process that is not recognised, but the process will only be recognised if good data are available.

Such data can only be gathered by a large statistical agency, or by a well-funded research team. It is not collected in current innovation surveys, and gathering such data over the long-term – say over a ten-year period – may be prohibitively expensive.

Without data to conclusively establish whether innovative firms in the periphery tend to expand towards metropolitan areas, policymakers and analysts are left with two options. Either they accept the convention that local development is driven by local firm-level innovation – a convention backed by metropolitan-biased empirical evidence and which appears to be consistent with endogenous growth theory – or they consider some of the fundamental questions that have been raised about endogenous regional processes (Margarian 2011; Shearmur 2015; Iammarino et al. 2017; Marques and Morgan 2021; Glückler et al. 2022), as well as pay attention to strongly suggestive evidence such as presented in this paper.

Knowing more about these fundamental questions would help policy-makers better evaluate the regional processes at play and how they affect local development in peripheral regions. Indeed, if there is a link between firm-level innovation and expansion towards metropolitan regions, as our results show, then many policies – such as recent ones that focus upon the scaling-up of innovation (ISED 2019; OECD 2021) - should be spatially modulated to address the mobility of expanding innovators away from peripheral and laggard regions.

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## Appendix: The Location of SME External Capacity Increases in Québec

### A. Local / non-local external capacity increase

	<i>Non-local (over 50km)</i>	<i>Local (within 50 km)</i>	
<b>A1. Non-innovators:</b> $\chi^2=3.63$ , $p(\chi^2=0)=0.16$ , cells < 5= 6/6			
Metropolitan	33.3%	66.7%	9
Central	77.8%	22.2%	9
Peripheral	50.0%	50.0%	4
<b>A2. Innovators:</b> $\chi^2=12.6$ , $p(\chi^2=0)=0.002$ , cells < 5 = 2/6			
Metropolitan	50.0%	50.0%	24
Central	21.4%	78.6%	14
Peripheral	100.0%	0.0%	8

### B. Metropolitan / non-metropolitan external capacity increase

	<i>Metro +</i>	<i>Non-metro</i>	<i>n</i>
<b>B1. Non-innovators:</b> $\chi^2=1.27$ , $p(\chi^2=0)=0.53$ , cells < 5= 4/6			
Metropolitan	77.8%	22.2%	9
Central	77.8%	22.2%	9
Peripheral	50.0%	50.0%	4
<b>B2. Innovators:</b> $\chi^2=6.05$ , $p(\chi^2=0)=0.048$ , cells < 5 = 2/6			
Metropolitan	87.5%	12.5%	24
Central	53.9%	46.2%	13
Peripheral	87.5%	12.5%	8

Note: This table is identical to Table 2, but focuses exclusively on *external* capacity increases. Numbers are small, but this table confirms that the differences observed in Table 2 and interpreted in the article are not solely driven by differences in the propensity to expand internally or not at all. It is worth noting that the similarity between peripheral and metropolitan establishments that is revealed in Panel B2 above supports the argument made in this paper (peripheral establishments expand into metro areas in the same proportion as metro establishments expand into metro area), as does the difference that is revealed in panel A2 (peripheral establishments are more likely to non-locally than central or metropolitan establishments).