COMMUNITY STRENGTH, INNOVATION AND LEARNING: NEW EVIDENCE FROM VICTORIA

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Introduction
It has been almost twenty years since British Prime Minister Margaret Thatcher memorably claimed that ‘there is no such thing as society’ (Thatcher 1987). Thatcher was the figurehead for the neoliberal movement, which drew upon neoclassical economic principles to argue that the only relevant economic actors were individuals and firms acting in competition.

However, over the past twenty years we have come to understand that economic prosperity is indeed built on strong society, and even that capitalism is a collective undertaking that depends upon networks and trust (Fukuyama 1995).

In recent times further investigation is beginning to show that economic innovation too, is primarily a collective activity, built upon networks, governance and the process of collective learning. However, innovation theory is a fast evolving field and the literature contains multiple models of innovation that are often in disagreement.

In an attempt to unpack the theoretical puzzle, and to provide government with policy directions, this paper tests contemporary innovation theory in the context of regional Victoria, Australia. It finds that there is a strong and significant link between the strength of communities, and the level of innovation taking place within them.

Theoretical Framework

Introduction
Theoretical approaches to innovation generally fall into three categories. Neoclassical economics treats technological change as exogenous and hence is unconcerned with innovation. Other approaches see innovation as primarily a national policy concern driven by education and research & development policies. Finally, an emerging approach emphasises the role of places – and the way they are governed – in driving innovation. This paper is primarily concerned with the latter approach.

Innovation as national policy concern
Neoclassical economic models assume free movement (of goods, capital and labour) across regions and predict that in the long run, there will be therefore be convergence across regions. They argue that a region’s economic performance is directly related to the region’s endowments, and all relevant endowments are considered mobile. The efficient markets hypothesis posits that wages and prices will adjust, until equilibrium across regions is reached. Regional considerations are therefore not as important as national economic growth, and the key to this is ensuring market efficiency, and development of the nation’s endowments.

Technological change was classically treated as exogenous, and hence not something that could be influenced from within a region. However, in the 1980s, with Romer’s ideas driven ‘Endogenous Growth Theory’ (Romer 1986), technological change began to be treated endogenously.

This theory emphasises ideas and innovation as the driving force behind economic growth. In direct contrast with neoclassical economics, general equilibrium is seen as undesirable, and innovation is an important element stagnating. Endogenous Growth Theory contends that growth is driven by Research and Development, human capital and anything else that created human capital. The focus is therefore on the economy-wide knowledge stock and the size of the labour pool involved in Research and Development.

Innovation as local/regional policy concern
Increasingly, a body of research is emphasising the important role played by places – and the way places are governed – in driving innovation.

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This approach is based on an understanding that in a global marketplace, success is dependent on the need to respond quickly to the rapid pace of technological change. In this environment, innovation no longer takes place in hierarchical structures located within firms or laboratories, in secret from competitors. Rather, contemporary business understands that:

Change of any kind requires flexibility. And they understand that flexibility depends on cooperation; cooperation on trust; and trust, on those pledges of mutual aid that fuse bargaining parties into a community (Piore and Sabel 1984, p299).

Innovation is therefore a product of collective learning – often spatially concentrated – involving a complex mix of customers, producers, competitors, supporting institutions and government.

If innovation comes about ‘through the creation, diffusion and use of knowledge’ (OECD 2002, p3), then it becomes important to consider how best to organise this type of knowledge-intensive activity. Increasingly, ‘high-trust’ forms of governance based on collaboration and de-centralisation are seen as much better way of coordinating these types of knowledge intensive activities (Adler 2001) than either market-based or bureaucratic alternatives. These governance structures therefore form the focus of much contemporary work on innovation.

Clusters
Cluster theory emphasises the microeconomic underpinnings of innovation. In particular it contends that rather than residing in companies or industries, much competitive advantage resides in locations (Porter 1998, p198). Clusters are ‘geographic concentrations of interconnected companies, specialised suppliers, services providers, firms in related industries, and associated institutions in particular fields that compete but also cooperate’ (Porter pp197-198). Rather than Research & Development driving innovation, cluster theory posits that innovation-based domestic competition fuels investment in R&D.

The success of clusters depends on the availability and interconnectedness of vertically and horizontally-related industries. This generates positive externalities from knowledge spillovers, economies of scale and transactional efficiencies.

Theorists such as Porter emphasise that economic activities are embedded in social activities, that ‘social glue binds clusters together’ (Porter 1998, p225). This is because well-functioning clusters are ‘lattices of numerous overlapping and fluid connections among individuals, firms and institutions’ (Porter 1998, p226).

The role of cities
Geography matters too, as large, diversified cities act as magnets for innovative industries because of a complex set of self-reinforcing advantages. These include labour market advantages, information access and market access. The level of ‘institutional thickness’ is also a key factor – the networks of organisations and networks which support local firms (Amin and Thrift 1995, p103).

Ohmae (1993) argues that economies are increasingly becoming organised around ‘region states’ rather than nations. Region states are natural economic zones that are ‘small enough for its citizens to share certain economic and consumer interests but of adequate size to justify the infrastructure necessary to participate on a global scale.’ (Ohmae 78-87).

Florida (2003) further explores the labour market advantages faced by cities, and argues that cities that embrace difference and heterogeneity are more attractive to creative and innovative people. He contends that in a knowledge economy, investment, firms and high-value industrial activity will need to move to follow people, not vice versa. Regional development strategies therefore need to focus more on strategies to attract and retain smart people.

National Innovation Systems
Furman et al (2002) bring together the national approach of endogenous growth theory with cluster theory. In their approach, national innovative capacity depends on the strength of common national innovation infrastructure, the innovation environments present in industrial clusters, and the strength of
the linkages between this ‘innovation infrastructure’ and specific clusters. Differences in innovative capacity therefore reflect both the variation in economic geography and national innovation policy.

The common innovation infrastructure referred to by Furman et al includes ‘the overall science and technology policy environment, the mechanisms in place for supporting basic research and higher education, and the cumulative ‘stock’ of technological knowledge upon which new ideas are developed and commercialised’ (Furman 2002, p900). Although clusters depend on this infrastructure, the relationship between industrial clusters and common innovation infrastructure is reciprocal. This is because without strong linking mechanisms, scientific and technical activity could spill overseas more easily, rather than being taken up locally.

Learning regions
The notion of the ‘learning region’ draws Ohmae’s arguments together with Porter’s to re-emphasise the paradox that ‘the competitive advantages in a global economy are often heavily local’ (Porter 1998, p237). Learning regions ‘function as collectors and repositories of knowledge and ideas, and provide the underlying environment or infrastructure which facilitates the flow of knowledge, ideas and learning.’ (Florida 1995, p527). Ultimately, regions are increasingly being ‘defined by the same criteria which comprise a knowledge-intensive firm – continuous improvement, new ideas, knowledge creation and organisational learning’ (Florida 1995, p532).

Like Porter, proponents of learning regions emphasise the importance of factor conditions such as human resources and physical infrastructure. They also emphasise the importance of governance structures, that facilitate ‘co-dependent relations, network organisation, decentralised decision making, flexibility and a focus on customer needs and requirements’ (Florida 1995, p534).

However, unlike cluster theory, which tends to emphasise the importance of particular industry clusters, learning regions tend to focus on a region-wide perspective which emphasises the competitiveness of the region as a whole. This allows for a more holistic perspective which can incorporate a very broad range of considerations such as lifelong learning and social stability.

Local and regional economic development
Like learning regions, the Local and Regional Economic Development approach focuses on a whole-of-community approach to economic growth, giving particular emphasis to the governance issues driving or impeding economic growth. While the drivers of economic growth are relatively settled (factor inputs, microeconomic efficiency and social cohesion) there is still significant debate about how these drivers can best be fostered.

Effective governance is particularly important for driving innovation, developing skills, entrepreneurship and social cohesion. Like cluster theory it emphasises the importance to innovation of cooperation and coordination involving research, production, distribution and exploitation.

Overall, this approach emphasises the clear role for government in improving governance, as:

Coordination between policies and actions, adaptation of policies to local needs and conditions, and orientation of policies in partnership with business and civil society will be essential for the local level to have an impact on economic and employment development and growth driver performance (Guigère, p21).

This approach emphasises the need for economies to constantly reinvent themselves. To do so, it is important to involve all sectors of society in identifying the untapped potential and developing local development solutions. The focus is on innovation in its broadest sense (economic, social and environmental), and a strong emphasis is given to the need for collaboration between the private sector, community organisations and government agencies.

A local development approach helps to stimulate innovation, as new proposals for action and resources are generated by bringing local actors together. Furthermore, a local development approach helps to facilitate ‘joined up’ or integrated policy delivery, by providing a forum to combine and coordinate various government instrumentalities (OECD 1999 p 30).
A key trend that has emerged across OECD countries has been the application of partnership approaches to the development and delivery of local development programs. Unlike sectoral strategies and programs administered centrally, partnerships harness the synergies that arise from different actors working together and cooperating at the local level. Partnerships: provide a forum for consensus-building; facilitate co-ordination in action; facilitate integration across policy fields; promote innovation; and establish a greater sense of local identity and community (OECD 1999, p36).

Summary
There are several key themes in the contemporary innovation policy literature. Table 1 summarises the differences between old and new approaches to innovation. Firstly, it is apparent that increasing globalisation paradoxically means that local factors are becoming more important. National policies do matter, but place factors matter equally as much. As far as places go, bigger is invariably better. The most innovative places are generally large, high-density, diversified cities.

Innovation is an activity that involves the whole community. This is underpinned by informal governance structures that draw on established networks and relationships. However formal, organised governance structures are also important to build on and strengthen informal mechanisms.

In the following section, this theory is tested using data from regional Victoria.

Table 1 Old v new approaches to innovation policy

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<th>Old approach</th>
<th>New approach</th>
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<td>Key innovation drivers</td>
<td>National policies are most important</td>
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<td>Role of national policies</td>
<td>National policies are all that matter</td>
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<td>Role of place</td>
<td>Role of place is to minimise factor costs.</td>
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<td>Places that matter</td>
<td>Nations are the focus of innovation policy</td>
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<td>Decision-making</td>
<td>Hierarchies, contracts.</td>
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Methodology
Governance is about more than just ‘structures’. It is also about local behaviour, culture and dense interconnected networks. It is therefore be reasonable to expect than in communities with a strong culture of participation in networks (even if these are not directly related to production systems), all things being equal, there would be more economic innovation.

To test this theory, patent registrations are used as a proxy measure for innovations, and the ‘Indicators of Community Strength’ prepared by the Victorian government are used to measure the strength of networks. Other economic data sets, indicated by the various models of innovation are also analysed. These include: population density; education levels; socio economic status; and industrial diversity. Regression analysis is then used to build a model that attempts explain the innovation in regional and rural Victoria. Regression has the advantage of being able to assess the relationship between community networks and innovation, independent of the other variables.

Innovation overwhelmingly takes place in Melbourne, a large city of almost 4 million people. To gain a more nuanced perspective on innovation occurring in places outside of Melbourne, Melbourne-based Local Government Areas have been excluded from the data sets.

Patent registrations
Patent registrations are a widely used proxy measure for innovation. The OECD concludes that ‘patent statistics provide a measure of innovation output’ (OECD 2006, p8). IP Australia is the Commonwealth Government agency responsible for administering patents. IP Australia publishes data annually,
detailing patent registrations by postcode. To facilitate easy comparison with other data sets, the data has been converted to Local Government Areas. In some Local Government Areas there are very few patent registrations in some years, and the data is quite ‘lumpy’. To correct for this, the data has been averaged over four years (2002-2005). An annual patents per capita amount was then created (using population data from the Victorian Department of Sustainability and Environment), to correct for variations in population across the various Local Government Areas.

The limitation of this data is that it lists registrations by the postcode of the registering body. In the case of large companies, this will likely mean that registrations are listed under the address of head office, rather than the actual plant or location where the innovation substantively took place.

**Population density**

Theorists such as Ohmae (1993) and Florida (2003) contend that the size of cities and towns is important in understanding innovation, and so population density is an important data set. Population density by Local Government Area was assembled using population statistics from the Victorian Department of Sustainability and Environment.

**Indicators of community strength**

The Department for Victorian Communities provides data on elements of community strength. The Department has surveyed at least 300 individuals in each of the 79 Local Government Areas, and has collated data around 14 questions. These questions relate to community attitudes, participation and ability to get help when needed.

Questions related to community attitudes include whether the individual survey feels ‘safe walking down [their] street alone after dark’, whether they feel ‘valued by society’ and whether they ‘like the community [they] live in’.

Participation questions include: ‘Being a member of an organised group such as a sport, church, community or professional group’; ‘volunteering’ and ‘parental participation in schools’.

Questions that relate to the ability to get help when needed include the ‘ability to get help from friends, family and neighbours when needed’ and the ‘ability to raise $2000 in two days in an emergency’.

These indicators were selected because they had already undergone significant development and testing as part of the Victorian Population Health Survey conducted by the Department of Human Services, and because they ‘are linked to public policy objectives… are technically accurate and use publicly understood concepts’ (DVC 2005, p3). For the purposes of this paper, the indicators provide an excellent measure of the strength of networks, as the indicators cover close personal networks, associational and community networks together with governance networks (DVC 2006, p5).

**Tertiary Education**

Tertiary education is a key factor underpinning many theoretical models of innovation, including Ideas Driven Growth Theory, National Innovations Systems and Learning Regions. This is therefore an important factor to take into account in the modelling. To assess tertiary education level at the Local Government Level, 2001 Australian Census data has been assembled to provide an indicator of the percentage of the population aged 15 and over that has a bachelors degree or higher. This includes: bachelors degrees; graduate diplomas and graduate certificates; and postgraduate degrees.

**Other data sets**

Numerous other data sets were considered, analysed and sometimes discarded as part of the modelling exercise. Amongst others, these included: secondary school completion rates; country of birth not Australia; length of residence in the area; SEIFA (Socio-Economic Indexes for Areas); population age; birth rate; unemployment rate; female labour force participation; and industrial diversity.
**Results**

**Correlation**

Correlation indicates whether there is a linear relationship between two sets of variables.

Across non-metropolitan Victoria there are significant correlations (at the 95% level) between the patent rate and numerous individual data sets. In particular, the patent rate positively correlates with the tertiary education rate \((r=0.438)\) and population density \((r=0.419)\) across regional Victorian Local Government Areas. There is also a positive correlation between the patent rate and the ability to raise $2000 in an emergency \((r=0.369, 95\%)\).

Across regional Victoria, there are no significant negative correlations between the patent rates and any of the data sets.

**Regression**

Where multiple variables have explanatory power, regression provides a better tool for analysis than correlation. Regression examines the relation of a dependent variable (in this case, the patent rate) to multiple independent variables (e.g., the tertiary education rate, population density, community strength). Regression analysis also has the advantage of being able to assess the magnitude of any association, as well as its significance.

On its own, the percentage of the population with a bachelor degree or higher explains 23% of the variance in the patent rate across regional Victoria, \((R^2=0.229)\), and the addition of population density to this model does not enhance its explanatory power \((R^2=0.229)\).

Across regional Victoria, 56% \((R^2=0.556)\) of the variance in the patent rate can be explained by the combination of: tertiary education rates; population density; the percentage of the population who are members of organised groups; the percentage of parents involved in schools; the percentage of the population that feels safe on the streets at night; the percentage of the population that likes living in their local community; the percentage of the population that could raise $2000 from family and friends in an emergency; the percentage of the population who feel valued by society; the percentage of people who feel that multiculturalism makes their community a better place to live; and the percentage of the population who volunteer. The remaining 44% unexplained variation is made up of unknown lurking variables or random variation.

Independent of the other variables in the model, there is no statistically significant (at the 95% level) correlation between the patent rate and the tertiary education rate or population density. In other words, in regional Victoria, variance the tertiary education rate does not appear to have a significant power to explain variance in the patent rate.

Independent of population density, tertiary education rates and the other community strength indicators in the model, there are statistically significant (at the 95% level) positive correlations between the patent rate and: the percentage of the population who are members of organised groups \((p=0.047)\); the percentage of the population who feel safe on the streets at night \((p=0.011)\); and the percentage of the population who feel valued by society \((p=0.005)\).

There are also statistically significant negative correlations between the patent rate and: the percentage of the population who like living in their local community \((p=0.001)\); and the percentage of the population who volunteer \((p=0.005)\). It would seem that in innovative communities, people are less likely to like living there.

We can therefore conclude that in regional Victoria, the indicators of community strength contribute to an explanation of the variance in the patent rate. This broadly suggests that community strength is associated with innovation in non-metropolitan areas of Victoria.

**Analysis**

The hypothesis is proven in regional Victoria. The analysis shows that in communities with a strong culture of participation in networks, all things being equal, there is more economic innovation. This supports the argument that place has important role in facilitating innovation through extensive collaboration, competition and effective learning.
Although tertiary education rates contribute to the explanation of the variance in the patent rate along with other variables, independent of the other variables, tertiary education is not a significant factor. This suggests that in regional Victoria, participation in tertiary education is not as important as community strength. This may indicate that Endogenous Growth Theory, with its emphasis on human capital, is not as applicable to regional Victoria as alternative theories that emphasise the importance of local networks.

Similarly, population density does not possess any significant explanatory power in the regional Victorian context. Because the large metropolis of Melbourne is excluded from the analysis, it does not of itself discount the theory that large, diversified cities act as magnets for innovation. It does, however, indicate that in regional Victoria, community strength is more important than population density.

Interestingly, there is a clear negative correlation (independent of the other variables in the model) between the patent rate and the percentage of the population that like living in their local community. It is not clear why this is the case, although we can speculate that because innovation is a dynamic activity, innovation is not compatible with feeling too comfortable!

This analysis is a tentative toe in the murky water of innovation policy. However, we can begin to see that in regional and rural areas, community strength is at least as important as many of the other factors driving innovation. This points to the need for governments (local, regional and national) to give greater emphasis to policies facilitating network formation and maintenance, as well as local and regional governance structures.

Conclusion
This paper has attempted to examine the drivers of innovation in rural and regional Victoria, Australia. In so doing, it has sought to shed some light on the competing theories of innovation, and in particular to test the applicability in regional Victoria of theories of innovation that emphasise the role of places and the way they are governed.

It has found that independent of other variables, there is a strong positive relationship between the strength of communities and the level of innovation taking place within them. This provides support for the notion that place has an important role in supporting innovation through the facilitation of networks and relationships.

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