Theories of local economic growth (part 1): concepts, models, and measurement

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Abstract. Contemporary approaches to understanding the mechanisms determining local economic growth tend to be characterized by a dualism between 'hard' quantitative and mathematical models derived from economics and the 'soft' qualitative models of geographical theory. In this study, we contribute to a 'third way' of knowing that is based upon a theoretically informed econometric analysis of the 'soft' processes that are hypothesized to drive local economic growth. In this first of two papers, (part 1 of the study) we focus on questions of methodology and measurement. Specifically, six sets of theoretical propositions on the nature of the mechanisms that promote local economic performance are reviewed: the growth-pole, growth-centres model; the product-cycle model; the flexible-production model; the learning-regions model; the competitive-advantage model; and the enterprise-segmentation model. From this review, eight measurable dimensions are developed that cover the main propositions of these models. These dimensions are calibrated using data for Australia, divided into ninety-four regions, for the period 1984–92. We conclude by exploring the limitations of our mapping between theoretical concepts, measurable dimensions, and surrogate variables, and examine the implications of this mapping for testing the validity of 'soft' geographical theories. In a subsequent paper (part 2 of the study) we test the validity of these models of local growth in the Australian context.

1 Introduction
Understanding the processes and patterns of economic development is at the heart of economic geography. Explanations of these processes have become increasingly elaborate as the processes of internationalization and globalization have intensified the complexity of economic and social interrelationships and the arenas within which these interrelationships are played out (Dicken, 1998; Lee and Wills, 1997; Thrift, 1998; Yeung, 1998). The crisis in capitalism that became apparent in the late 1960s highlighted the limitations of Fordism and the weaknesses of the branch-plant economies it created. Those economies suffered from a lack of locally autonomous decisionmaking, increasingly narrowed occupational opportunities, and corporate sector enterprises that no longer provided industrial environments conducive to indigenous economic growth (Gillespie, 1983; Scott and Storper, 1992). Analytical attention has now shifted towards indigenous development and local capacities to generate self-sustaining economic growth.

In the past twenty years, a range of theoretical frameworks and empirical analyses has emerged in economic geography. They combine, in different ways at the local scale, processes associated with technology and knowledge, markets and competition, transaction structures, networks and interenterprise relations, labour markets, and culture and embeddedness to explain differences in local economic dynamics and in the

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capacities of places to cope with, and adapt to, change. The empirical analyses to support these elaborate and varied theoretical propositions are, however, much more limited in their scope, and are all too frequently inconsistent, ambiguous, and even contradictory [see, for example, the critiques in Gertler (1992), Sternberg (1996), and Taylor (1986)]. Too often, dynamic questions are addressed, of necessity, through static cross-sectional data from survivor surveys. As Blackburn and Jennings (1996) have commented when discussing the contribution of small and medium-sized enterprises to economic regeneration, “the problem gap between our level of empirical knowledge and general theories remains wide and much research and ingenuity are required to test the many assertions in the literature” (page 2).

There is now a second set of reasons why the assertions of the theoretical frameworks of economic geography on processes of local economic growth need to be reviewed. The increasingly elaborate theoretical frameworks in the discipline are coming under critical scrutiny both from within and from outside the field of economic geography. From within economic geography, they are currently being criticized on at least four grounds. First, they are criticized for selecting only empirical case studies—selecting on the dependent variable (Staber, 1996). Second, it is complained that they are neglecting or relegating imperatives and fundamentals of capitalist economies, especially the need for firms to make profits in order to stay in business (Hudson, 1999). Third, the frameworks are criticized for privileging trust and reciprocity in buyer–supplier relationships when those characteristics might in fact be transitory or even illusory (Pratt, 1997). Fourth, the realism they reckon to emphasize is criticized for neglecting the role of domination, subordination, and power in shaping business relationships (Taylor, 1999).

From outside economic geography, these ‘soft’ theoretical frameworks are viewed harshly by economists—especially Krugman (1995)—as ‘anticlarity’ (The Economist 1999). Ranged against the discursive frameworks of economic geography, which use the ‘close dialogue’ of in-depth interviews with business people as a chosen methodology, are the mathematical models of the economists’ ‘new economic geography’ based on ‘stylized facts’ (Clark, 1998). Here the argument is simple. Mathematical models have rigor, it is just that the stylized facts they employ [returns to scale, agglomeration, efficient markets, and so on (Northover, 1999)] are unrealistic and need unpacking (Martin, 1999). In contrast, the ‘soft’ theories of economic geography are possibly more realistic, but they are less rigorous and they are, as yet, untested in any rigorous way. However, an alternative ‘third’ way is emerging (compare Fingleton, 2000) that transcends the supposed dualism between the ‘hard’ quantitative models of economics and the ‘soft’ qualitative geographical ways of knowing (Plummer and Sheppard, 2000). There now exists an active research program in regional political economics which focuses on developing quantitative models that are critical of orthodox economic understandings of the processes of economic restructuring and regional growth (Fingleton, 1999; Martin, 1999; Webber and Rigby, 1996).

The purpose of this study is to contribute to this ‘third way’ of knowing by addressing, in a preliminary way, issues of empirical validation, the theory–empiricism gap, and the rigor of the ‘soft’ theories of economic geography, in the context of understanding and explaining uneven regional development. In this paper, we explore a range of theories of local economic development that have been used in economic geography, and attempt to develop from them measurable dimensions that can be incorporated into an econometric modeling framework. A scheme of measurement is developed to calibrate these dimensions, and Australian data for the 1980s and 1990s are used to develop preliminary empirical analyses of the processes and conditions that have been hypothesized as generating differential regional economic change.
In attempting these analyses we are confronting head-on a number of difficult and contentious issues that urgently need to be debated in economic geography. In particular, we choose to problematize the degree to which theories can be tested adequately using an econometric-based methodology, given the kinds of data that are typically available for regional economic analysis. This gap between theoretical concept and indicator is a longstanding methodological problem. The process of mapping between the 'soft' models of local economic growth and numeric (surrogate) variables raises fundamental questions about the adequacy, or even the appropriateness, of translating the dimensions postulated by the theories into measurable parameters, while remaining true and sensitive to the subtleties of those theories (King et al, 1994). Furthermore, there exists a pragmatic problem of appropriate proxy-variable selection, given the limited choice of variables that are typically available for this type of regional economic analysis.

These issues are compounded by the limitations of the theories to be tested. To a greater or lesser extent, all the theories reviewed in part 1 of this study suffer the obfuscation born of vagueness (King et al, 1994, page 20). They are not always straightforward to translate into testable propositions with observable implications, owing to the imprecision of the stylized facts, such as 'learning', 'knowledge', 'institutional thickness', and 'social capital', on which they are built. Consequently, the process of hypothesis generation attempted here confronts, at least in a preliminary way, a major issue that urgently needs to be addressed in economic geography.

As a way of addressing the issues surrounding the testing of the empirical validity of a range of local-development theories, this study is an attempt to produce a theoretically informed statistical analysis of dynamic regional change in Australia between 1984 and 1992, with the country divided into ninety-four regional units. This period in Australia's economic development was one of massive upheaval and change, not only brought about by boom and recession, but consciously engineered through economic deregulation and the ending of protectionism to more fully incorporate the country into the global economy. In many ways this period saw a remaking of Australia—economically, socially, and politically. It was very much 'the end of certainty' (Kelly, 1992; Fagan and Webber, 1994; O'Leary and Sharp, 1991; O'Neill, 1996; Taylor, 2000), as Australia, with trepidation, was launched into the global economy.

The analysis reported in this study is developed in two parts. Part 1, this paper, addresses issues of conceptualization and measurement. First, six theoretical frameworks are reviewed to explore the nature of local mechanisms and capacities that are hypothesized both to promote and cope with economic change, and to create and attract enterprise, investment, and jobs. Second, sets of measurable variables are developed for each of the essentially discursive models to try to encapsulate the processes they recognize as driving local growth. Within the limits of the data available for Australia, surrogates are developed to measure the variables drawn from the review of theories. Eight surrogates are developed in this initial, exploratory, analysis. Growth itself is treated straightforwardly and is calibrated in terms of employment and changing rates of unemployment between 1984 and 1992 in the ninety-four regions into which Australia is divided. In the subsequent paper, part 2, a set of econometric models are developed to explore the validity of the six sets of theoretical propositions in explaining the trajectories of regional economic change in Australia in the chosen time period.

2 Theories of local economic development
Six sets of interrelated 'soft' models, some much more fully developed and articulated than others, currently represent the range of approaches employed in economic geography to understanding regional economic performance:
(1) Perroux’s (1955) growth-pole and growth-centre theory;
(2) Vernon’s (1966) product-cycle model elaborated into models of profit cycles (Markusen, 1985), and models of regional cycles (Rees, 1979; Rees and Stafford, 1986);
(3) Scott and Storper’s (1992) flexible-production and flexible-specialization model (Scott, 1988);
(4) the closely related institutionalist approaches based on networks, embeddedness, innovative milieus, and ‘learning regions’ (Braczyk et al, 1998; Lundvall, 1992; Maillat, 1996; Maskell et al, 1998; OECD, 1996);
(5) Porter’s (1990) competitive-advantage model; and
(6) the enterprise-segmentation, unequal-power-relationships framework (Dicken and Thrift, 1992; Taylor and Thrift, 1982; 1983).

We contend that these theories identify sets of interrelated dimensions that either promote or constrain economic growth (of employment, enterprise, or investment) in communities and localities. The postulated dimensions are not, however, unique to each theory. Rather, each theory embraces a unique subset of a wider and more general set of dimensions. The purpose of this section is, therefore, to review the six theories of local economic development to identify the dimensions that they each combine. This is the first step in developing a scheme of measurement that can be applied in the Australian case study.

2.1 Growth poles and growth centres
Throughout the development of the concept of the growth pole, Perroux (1950; 1955; 1988) was concerned, in the first instance, to address the limitations of equilibrium modeling in economics. At the heart of this concept is a constellation of dynamic, innovating enterprises. Often, but not always, these enterprises are located in urban centres and generate propulsive effects (effets d'entraînement) upstream and downstream—positive spread effects and negative backwash effects (Higgins and Savoie, 1995, page 91). In this respect, Perroux’s work finds resonance in the later influential statements on regional economic development by Myrdal (1957) and Hirschman (1958), who respectively envisaged ‘backwash’ / ‘polarization’ concentrating growth in existing centres, and ‘spread’ / ‘trickle-down’ effects dispersing that growth impetus. The principal focus of Perroux’s model is “large economic units” (firms and industries) because they “...are the instruments of prosperity” (Perroux, 1950, page 103). Space is ambiguous in the model—simply a field of forces. However, space was made explicit by Boudeville (1966) as an urban centre that will induce “further development of economic activity throughout its zone of influence” (page 11). The propulsive industries that drive this dynamic concept are seen as having distinctive characteristics and developmental effects involving:
(1) a high degree of concentration;
(2) high income elasticity of demand for their products, which are sold to a national market;
(3) strong multiplier and polarization effects through input linkages;
(4) an advanced level of technology and managerial expertise promoting local diffusion through demonstration effects;
(5) promotion of a highly developed local infrastructure and service provision; and
(6) the spread of ‘growth-mindedness’ and dynamism through the zone of influence (Richardson, 1969, page 104–105).

Thus, Perroux-style growth poles and growth centres are sites of knowledge and information that are as a consequence sources and diffusers of new technology and innovation. In essence, local growth in this model is dependent on three sets of processes that are also measurable traits: large firms, knowledge creation and transfer,
and new technology. Large firms are interpreted as vehicles of dynamic change, fostering new technologies of production and organization, and initiating spread and demonstration effects in regional and national economies, and beyond into a globalized world.

2.2 The product-cycle model
As an explanatory framework for regional economic change, the product-cycle model began as a framework to explain patterns of international trade (Vernon, 1966) rather than as a model of differential regional growth. The central focus of the model is technological change in the context of multinational corporations and multinational capital, and the progressive maturing, standardization, and obsolescence of products. At the core of the model are technological change and the contention that, after the initial development of a product within an undefined business enterprise context,

1. market conditions and the structure of demand,
2. factor inputs (including capital intensity and critical human inputs),
3. the nature and intensity of competition, and
4. locational suitability,

change in a systematic way as the new technology ages. Ageing is reckoned to increase the need for more capital-intensive production, more specialised equipment, longer production runs and stable production techniques, more cheap, unskilled labour, and lesser inputs of managerial and technical skills. Simultaneously, the market shifts from a seller’s market to a buyer’s market, price elasticity increases, and competition becomes fiercer.

These changing conditions have spatial consequences. A locational element was central to the early formulations of the product-cycle model as it was applied in metropolitan areas, an aspect of the model that has been elaborated with great clarity by Webber (1972, pages 204 – 214). Fundamentally, although the availability of external economies of scale predisposed firms to locate centrally in metropolitan areas [or in the conurbations in the United Kingdom—see Florence (1948), and Beesley (1957)], the maturing of production and technology was accompanied by the relocation and ‘deconcentration’ of firms to suburban or more distant locations (Lichtenberg, 1960; Vernon, 1957; 1960). As Vernon (1957) explained, growth reduced a firm’s:

1. reliance on the indivisible inputs of labor and capital;
2. reliance on subcontractors as it is able to take on more ‘indivisible costs’; and
3. uncertainty in terms of space, inventory, and labor needs.

What is clear from these early analyses is that it is the large and expanding firm, and its propensity to shift production to less central locations, that is central to processes of differential regional growth. Vernon’s (1966) later elaboration of the product-cycle model extended the theory into the realm of international trade and international production. Technological maturity in this context was reckoned to reorient production and exports away from bases in developed countries towards new bases in developing countries (which, ambiguously, could be operated either by entirely new firms or by branch plants of developed-country transnational corporations).

The simplicity of the product-cycle model led to its uncritical incorporation into economic geography as an explanation of the location of R&D, hi-tech firms and new firms, analyses of capital markets, and locational shifts all at the subnational scale (Taylor, 1986). Simply put, technology and hi-tech industry originate in the ‘core’ and late-stage, low-wage production is shifted to the ‘periphery’ (Malecki, 1981; Norton and Rees, 1979). It is still used uncritically as an explanation of differential regional growth (Sternberg, 1996). The inadequately developed spatial dimension of the model [flagged by Thomas (1980) for example] is still ignored in economic geography, bolstering Vernon’s original technological determinism with spatial determinism. Even the
limitations recognised by Vernon (1966), such as the assumed need for cheap labour in the production function, continue to go unheeded (see Malecki, 1991). And “the disembodiment of technological processes from their enterprise context is perpetuated, despite the greater urgency and relevance of this context at the sub-national, regional and local scales with which geography has traditionally dealt....[S]patial process are given free rein with the effect that ‘regional life-cycles’ can be conjectured (Rees, 1979), unhampered by the awkward intrusion of the processes of investment decision-making in management coalitions” (Taylor, 1987, page 90).

Notwithstanding its spatial and enterprise ambiguities, the product-cycle model has been very influential in shaping views on the dynamics of local economies. In the context of the present study, the model emphasizes and can be summarized in terms of five key dimensions. At the heart of the model are technological change and the lead brokerage role played by large, powerful corporations in the spread of new technologies. The generation of those technologies in specific places is attributed to local skills and human resources coupled with locally available knowledge. Together with the extent and nature of local demand, these variables are seen in the product-cycle model as generating spatial variations in local economic growth.

2.3 Flexible production and flexible specialization

As a framework for explaining regional economic development, the flexible-production thesis (Scott, 1988; Scott and Storper, 1992; Storper, 1995) is an explicitly spatial approach to the issue of differential regional growth. It blends elements of regulation theory (Jessop, 1990), institutionalist economics (Hodgson, 1988; Veblen, 1904), evolutionary economics (Nelson and Winter, 1982), and transaction costs. The essential elements of this model derive from a characterization of capitalism best summarized by Scott and Storper (1992):

“Capitalism [is]...an arrangement in which commodity producers combine the physical means of production and labor in order to bring forth sellable outputs which generate profits. This general form, however, varies in its specific social configuration from time to time and from place to place; it emerges in practice as a series of historically and geographically specific technological-institutional systems...[which] involve:

a) an evolving technological and organizational structure of production;
b) labor markets and industrial relations, including industrial politics and mechanisms of the socialisation of labor;
c) managerial cultures and norms;
d) market structures and forms of competition;
e) regulatory institutions at sectoral, regional, national and international levels” (page 6).

Thus, the putting-out systems of early capitalism were replaced by the mills and small enterprises of the mid-nineteenth century that, in turn, gave way to Fordist mass production. Now Fordism, with its particular regulatory regime and characteristic large-scale urbanization, is said to be giving way to flexible production that is typified by strong vertical disintegration and the incorporation of producers into tight-knit networks in new industrial districts. Again, to quote Scott and Storper (1992):

“...groups of industrial establishments with especially dense interrelations tend to locate close to one another to facilitate exchanges of goods and information, and to take advantage of external economies in labor markets and infrastructure” (page 8). Reduced transaction costs lie at the heart of these external economies (Scott, 1988) but firms in these districts also have distinctive characteristics. According to Sternberg (1996, pages 525 – 527), they:
(1) produce essentially for the same end-market;
(2) are embedded in a common cultural milieu;
(3) are related through stable, informal, cooperative links based on trust and reciprocity;
(4) compete on quality rather than price;
(5) have broad and constantly changing product ranges;
(6) use the latest technologies;
(7) are supported by regional institutions that stimulate permanent innovation; and
(8) are highly specialized within an extreme division of labor.

According to the theory, the new technological–institutional system of flexible production makes new locational demands with the result that new industries create their own spaces away from established centres of production and agglomerations of old industries, which then experience entropic death. Indeed, three forms of reagglomeration are said to have been developed in this most recent transition within capitalism: (1) craft-based, design-intensive centres (most notable the Third Italy); (2) high technology centres (for example, Silicon Valley); and (3) advanced producer and financial service agglomerations (for example, London) (Scott and Storper, 1992). These industrial districts are, in turn, seen as being incorporated into a “global mosaic of regional economies” (Scott and Storper, 1992, page 11). Each regional production system is “its own dense system of intra-regional transactional arrangements and local labor market activities...[while being]...entwined in a worldwide web of interindustrial linkages, investment flows, and population migrations...[mediated]...by a number of crucial institutional arrangements...[involving]...the multinational enterprise, an emerging system of international subcontracting, interfirm strategic alliances, international agreements, and so on” (Scott and Storper, 1992, page 11).

Notwithstanding the criticisms that have been levelled against this model of regional development and differential economic growth (see, for example, Gertler, 1992; Sternberg, 1996), the fact remains that it combines four dimensions into a broad and far-reaching explanatory framework. As a model of local economic development the flexibility model is technologically driven and hinges on the local integration of firms through the exchange of goods and information. This integration affords local external economies of scale and scope, minimizing transaction costs (Scott, 1988). Within the framework, place-based technological leadership is driven by the trust and reciprocity involved in those buyer–supplier relationships, coupled with institutional support and the potentialities of the human resource base of the local labor market. This set of forces combines to mold, shape, and modify the Schumpeterian dynamic of creative destruction at the local scale.

2.4 Learning regions and innovative milieus
The concepts of ‘learning regions’ (Asheim, 1997; Lundvall, 1992; Maskell et al, 1998) and ‘innovative milieus’ (Maillat, 1995; 1996; Maillat and Lecoq, 1992) significantly extend and refine the flexible-production, flexible-specialization model. These researchers have used the concepts to propose and elaborate a mechanism for the place-specific creation of new economic activity that is more determined than the ‘arbitrary local event’ that it is reduced to in the flexible-production model (Asheim, 1997; Malmberg and Sölvell, 1997; Sternberg, 1996). Here the place-based roles of information, knowledge, and ‘learning’ are emphasized as promoters of local economic growth. The focus of the framework is on relatively immobile human capital, intensive interconnection between agents, and the shared cultural, psychological, and political backgrounds of network participants (Maillat, 1996). Technological change and leadership are still central to the framework but are seen more in terms of incremental innovation fostered by the local exchange of tacit knowledge (Asheim, 1997; Maskell and Malmberg, 1999).
The role of information and knowledge is, in a dynamic sense, pushed to the fore in the model by the process of ‘ubiquification’ in factor markets. At the core of the ubiquification argument is the contention that larger, more efficient, and less intensively competitive factor markets have made many factors of production increasingly geographically ubiquitous. They have, in consequence, ceased to act as forces of spatial uneven development. The availability of knowledge, especially tacit knowledge, is now seen as one of the strongest remaining spatially differentiated factors of production.

According to Malmberg and Sölvell (1997, page 11), “[a]n innovative milieu [is] a segment of territory that is characterized by a certain coherence based on common behavioural practices as well as a ‘technical culture’—a way to develop, store and disseminate knowledge, technical know-how, norms and values—linked to a certain type of economic activity”. Such milieus, they argue, have four basic characteristics:

1. A group of actors (firms and institutions) that are relatively autonomous in decision-making and strategy formulation;
2. A specific set of material, immaterial, and institutional elements combining firms, infrastructure, knowledge, know-how, authorities, and legal frameworks;
3. Interaction between actors based on cooperation; and
4. A self-regulating dynamic that leads to learning.

Localities and communities are, in these terms, environments that facilitate the evolution of institutions, common language, social bonds, norms, and values, which all add to the process of accumulated learning (see Morgan, 1996). They are localities of significant sectoral specialization, and specialize as much in low-tech as in high-tech activities (Maskell et al, 1998; Maskell and Malmberg, 1999). Pivotal to the success of such specialized milieus are long-term producer and buyer relationships (horizontal and oblique quasi-integration), repeated interaction and knowledge exchange (fluidity of knowledge), and trial-and-error problem solving (Leborgne and Lipietz, 1992). In essence, what is proposed in this approach to understanding spatially uneven economic growth is the social bonding of firms to create enterprise through learning (Braczyk et al, 1998; Maskell et al, 1998).

Thus, the Schumpeterian framework of the flexibility model, built on processes of local integration, technological leadership, institutional support, and local human resources, is extended by adding two key new dimensions—information and knowledge and local sectoral specialization. Combined with the local integration of firms, these features of local economies foster place-based learning, continuous innovation, and the constant refreshment and reinforcement of local competitive advantage.

2.5 Competitive advantage

Porter’s (1990; 1998) competitive-advantage model is a further interpretation of the processes operating in the globalizing political–economic environment that endow some regions, places, and nations with more success than others. It is very much a summative eclectic model but with particular emphasis on the business enterprise and managerial decisionmaking. Competitive success and local growth in this model is judged to hinge on processes that combine to enhance productivity, with “location... [affecting]... competitive advantage through its influence on productivity and especially on productivity growth” (Porter, 1998, page 209). The approach focuses on factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry, while placing less emphasis on the institutional, political, and cultural components of the commercial environment. The more recent elaboration of this model revolves around processes of ‘clustering’, and Porter (1998) draws quite explicitly, though superficially, on concepts from the flexibility and
learning regions models, and from work on agglomeration in economic geography in general (pages 206–208).

Factor conditions are seen more broadly than just physical resources; they are seen also as human resources (quantity, skills, cost), knowledge resources (technical, scientific, and market knowledge), capital resources (types, access, deployment), and infrastructure (physical and social). What is important about these factors of production is that they can be created. So, it is not the stock of factors which is important in understanding differential regional growth but the rate at which they are created. The nature of home demand is likewise interpreted as endowing places with dynamic advantage. Domestic buyer needs and sophistication can sensitize local producers and instil confidence. Dynamic home markets can allow firms to anticipate international demands and the size of local demand can act as a reinforcing advantage. Specialization is recognized as a source of potential competitive advantage. Complementing ideas on flexible production, innovative milieus, and learning regions, the competitive advantage afforded by related and supporting industries recognizes the external economies afforded by agglomeration and the less tangible benefits of ‘locational integration’ in terms of knowledge, learning, technology, and innovation. However, by recognizing that firm strategy, structure, and rivalry can create regional competitive advantage, Porter reinforces the nature of the business enterprise and its internal workings (managerial attitudes, motivation, and commitment) as a source of differential growth.

From Porter’s most recent analysis of ‘clustering’, productivity in a place can be enhanced, according to the competitive advantage model, by:

1. local specialization which affords reduced transaction costs in assembling inputs and human resources;
2. the strength of local demand which brings advantages in interregional trade;
3. greater access to information;
4. complementarities between firms that result from local or locational integration;
5. institutional support, both public and private, turning costly inputs into public and quasi-public goods; and
6. technological leadership built on the ease with which opportunities can be identified locally.

It is, then, the social capital that these processes create that has the potential to trigger productivity growth in a locality or economic cluster.

2.6 Enterprise segmentation and unequal power relations

In contrast with the notions of trust, cooperation, and reciprocity that underpin the flexible-production and learning-regions models, the enterprise-segmentation model first proposed by Taylor and Thrift (1982; 1983) offers a different interpretation of business enterprise interrelationships and their impact on regional dynamics. This approach begins with the proposition that relationships between business enterprises are normally asymmetric. They display elements of dominance and subordination. Power is ascribed to the control of resources (Pfeffer, 1981), with the most powerful firms acting as centres of control and of strategic decisionmaking, and this serves to draw other enterprises into functional networks (Cowling and Sugden, 1987; Taylor, 1995). As Dicken and Thrift (1992) put it:

“Production is organised primarily by business enterprises operating within extremely complex, dynamic networks of internalized and externalized transactional relationships of power and influence … co-ordinated and effectively controlled by ‘centres of strategic decision-making’…. Business organisations, therefore, organise production systems… but are themselves produced through a complex historical process of embedding” (page 287).
Taylor and Thrift (1983) elaborate a typology of business enterprise types and the nature of the positions they might occupy within a generalized network structure. What is suggested is that position within power networks endows enterprises (and thus the places within which they are embedded) with distinctive operational characteristics and growth potentials. Network peripherality is associated with: (1) local market exploitation and not export-oriented growth; (2) the provision of unskilled, ephemeral jobs and little labour training; (3) the slow or late acquisition of new technologies coupled with the loss of local inventions; and (4) a tendency towards geographical centralization (Taylor, 1987). Those same characteristics and potentials, in turn, affect local society—its local mode of social regulation—and its ability locally to generate and to attract further enterprise, investment, and employment. As such, there is a dialectical relationship between enterprise and place based on inequality and differential power that affects the dynamic of change in both business enterprises and localities.

Local growth in the segmentation model therefore arises from three principal variables. First, there is the local control of technology, endowing particular places with competitive advantage. Second, there is the impact of large corporations, diminishing growth in localities from which they extract surplus value while enhancing growth in those from which they exercise control. Third, there are the growth benefits that derive from the network relationships of the locational integration of smaller firms created by historical processes of embedding.

3 Assessing local economic capacities

Different as these theories of local and regional economic performance appear, it is argued here that each involves different permutations and combinations of eight dimensions that currently are thought likely to enhance local economic capacities to create growth and to cope with change. These dimensions are listed in table 1 and the ‘soft’ theories into which they are incorporated are listed in table 2. However, it is important to recognize that although these theories may share dimensions, those same dimensions are hypothesized to promote local growth in some theories and to retard it in others.

Table 1. Summary of surrogate variables for the theoretical dimensions.

| Variable | Theoretical dimension | Description of surrogate |
|----------|-----------------------|--------------------------|
| T        | Technological leadership at the enterprise level | Index of high technology industries (data from the late 1980s) |
| I        | Knowledge creation and access to information | Index of access to information (data from the late 1980s) |
| M        | Local integration of small firms | Percentage of establishments in multilocational enterprises (from 1992) |
| P        | Infrastructure support and institutional thickness | Effective protection rate (in 1990) |
| D        | Local human resource base | Percentage of working population without a degree (in 1991) |
| C        | Power of large corporations affecting structure and strategy | Index of corporate control (from 1992) |
| A        | Interregional trade and the extent and nature of local demand | Index of intermediate market accessibility (data from the late 1980s) |
| S        | Local sectoral specialization | Index of specialization (from 1990) |
All six theories focus on technological leadership at the enterprise level as a promoter of growth, with that leadership exercised both by large corporations and by small firms. Knowledge creation and access to information is central to four of the theories but not to either the flexible-production model or the segmentation framework. The locational integration of small firms figures in all but the growth-pole and product-cycle approaches as essential for local economic growth. This variable captures the importance for growth of closely linked small producers and service providers, cooperation based on trust and reciprocity, and the importance of competition based on quality as well as price. Infrastructure support and institutional thickness, including access to capital in useable forms, is of particular importance in enhancing local economic capacities in the flexibility, learning-regions, and competitive-advantage approaches. The local human resource base, encompassing issues of skills, education, participation, and low-wage locations, plays a prominent role in stimulating growth in four of the theoretical approaches, but it plays no central role in either the growth-pole or the segmentation framework. These same two frameworks emphasize the role and power of large corporations in shaping local economic growth, a feature they share with only the product-cycle model. Interregional trade is recognised as a particular driver of local economic growth in the product-cycle and the competitive-advantage theories, but not in the other four approaches. Finally, local sectoral specialization is an eighth dimension recognized only in the learning-regions and competitive-advantage theories as a central characteristic of local growth environments.

In performing the type of analysis attempted in this study a number of difficult questions arise. First, is it possible to reduce theories that have complex processes of interaction at their hearts to a small set of measurable dimensions? Indeed, is it possible adequately to retain the essence and spirit of those theories in these measures? The task of translating complex processes of interaction to measurable dimensions is certainly problematic, and some might say impossible. But, equally, it can be argued that not specifying measurable dimensions opens these ‘soft’ theories to charges of ‘anticlarity’, leaving them as no more than clever discourses. This is certainly a charge that can be levelled against the concept of ‘social capital’ as it is used to embrace the social bases of local growth in versions of the learning-regions and competitive-advantage models examined here (see Maskell, 2000).

Second, how should ill-defined theoretical concepts be treated when attempting to generate measurable dimensions? This is a particular problem in the present study. In the six ‘soft’ theories reviewed here, regional level ‘growth’, ‘development’, and ‘success’ remain largely undefined, except in the competitive-advantage model where they are...
defined in terms of productivity. Implicit in all the remaining ‘soft’ theories is the contention that ‘success’ involves job creation, new firm formation, output growth, investment, and technological leadership as a collectivity rather than as separate dimensions of change to be explained individually.

Third, is it possible adequately to construct numeric variables or to develop acceptable surrogates to calibrate dimensions of local growth? We have used specially constructed measures and unpublished small area statistics for Australia, but the issue of mismatch between theory and measurement is inescapable. It certainly limits the conclusions that can be drawn from the present study and it is an issue that warrants further consideration. Nevertheless, it is difficult to see how the practical limitations imposed by data availability and official data-collection methodologies can be easily overcome in constructing numeric variables to replicate the dimensions postulated in theories.

These theoretically established dimensions of local economic growth and decline mirror, with a few exceptions, the empirically determined characteristics of ‘enterprise environments’ that have been summarized by Bennett and McCoshan (1993). Their breadth reinforces the general conclusion that “... enterprise development is as much a social as a technological or financial phenomenon” (pages 98–99). Our ability to measure the dimensions that are hypothesized to generate differential economic growth is limited by the quality of information available. Based upon extensive regional research conducted in Australia by one of the authors, we are able to derive surrogate measures to represent each of the dimensions that are hypothesized to produce differential regional economic performance in our competing theoretical models. Specifically, we propose eight surrogate variables as measures of the dimensions underlying our theoretical construct and these are listed in table 1. There is a problem that the dimensions underlying our theoretical constructs are multifaceted, and any choice of variable is bound to be contentious. However, this is not so much a measurement problem as a theorizing problem and the need for greater clarity in theories of growth—an issue that is at the heart of our research project as reported here.

The local significance of R&D intensive industries \((T)\) is used as a surrogate for technological leadership at the enterprise level. The National Industry Rating for high technology identifies industries which have a significant technological component. High technology industries are those which are R&D intensive. A high technology industry is potentially more effective and efficient in a highly competitive market than an industry without such technology. The Australian Department of Industry, Technology and Commerce identifies the following Australian Standard Industrial Classification (ASIC) industry groups and classes as “Measures of science and innovation” (DITAC, 1987, pages 378–379) containing high technology components:

- 2733—Pharmaceutical and veterinary produce
- 3244—Aircraft manufacturing
- 344—Photographic, professional, and scientific equipment
- 6381—Data processing services
- 8561—Research and scientific institutions

These sectors have been thought to have the potential to create a closely knit R&D community capable of producing focused and effective inventions and innovations within a small economy such as that of Australia (page 255). The \(T\) measure is the proportion of employment in a region in these activities, taken from unpublished Australian Bureau of Statistics (ABS) Integrated Register Information System (IRIS) data for 1990. Knowledge creation and access to information \((I)\) is derived from the Office of Local Government (OLG) Working Paper “Accessibility and remoteness” (Taylor, 1992a). The measure is taken from a simple interaction model in which the
amount of information activity at a place is measured as employment in professional and managerial jobs, and the distance between places is measured as time—distance by the fastest means publicly available (mainly by air). It is an indirect index of information intensity at a place.

The local integration of small firms is measured negatively as the proportion of establishments in a region that belong to multilocational enterprises \((M)\) drawn directly from the unpublished ABS IRIS data for 1992. Data on the local incidence of establishments belonging to multilocational enterprises are used to isolate the importance of single plant firms in each region. Using this measure is an attempt to remove from a place the parts of enterprises with the weakest local affiliations. This measure is superior to a measure based on numbers of small establishments (with fewer than ten to fifty employees) in a region because many small establishments are part of larger multilocational and multistate enterprises in Australia. Infrastructure support and institutional thickness is calibrated as regional rates of effective protection \((P)\) derived from the OLG Working Paper “The regional impact of changing levels of protection in Australian industries” (Taylor, 1992b). Protection in this context is interpreted as an index of nonprivate sector support for the commercial activities of a region and reflects the historically significant involvement of governments at all levels in Australia in the promotion of economic growth.

The local human resource base of each region is measured as the proportion of the population without degrees \((D)\), drawn from the 1991 Census of Population. This is a surrogate not only for local skill levels but also for issues of income and, indirectly, for the local availability of capital (Bennett and McCoshan, 1993). The power of large corporations to enhance or retard local growth is measured as an index of corporate control \((C)\) for 1992. This surrogate has been developed from the Business Review Weekly’s annual listing of Australia’s largest 1000 businesses in 1992 (Business Review Weekly 1993). The employment for each business has been assigned to the head office region and expressed as a location quotient, the base of which is the total employment of the region developed from unpublished ABS IRIS data for 1990.

The interregional trade dimension of the growth theories \((A)\) is measured in terms of the accessibility of a region to intermediate markets within Australia. The measure is drawn from the OLG Working Paper “Accessibility and remoteness” (Taylor, 1992a). It is based on the output of a simple interaction model in which size is measured as employment in manufacturing and construction, and distance is measured as road distance. It is an index for each place of the magnitude of intermediate demand at a distance. Local sectoral specialization \((S)\) is measured directly as Isard’s (1960) specialization. The measure is developed from counts of business establishments in each region in 1992, with establishments having been assigned to ASIC divisions.

The conceptualization of ‘growth’ and ‘success’ in the competing theoretical models is unavoidably vague, suggesting differential economic performance in regional product or labor markets, or both. Conventional measures of ‘growth’ in economic capacity and competitiveness, such as output, output per capita, and new firm formation, are not currently available for our regionalization of the Australian economy. However, we do have available a comprehensive spatial time-series of information on the rates of unemployment and employment growth by ninety-four economic regions of Australia for the period 1984–92. This information is derived from the Federal Office of Local Government, where the regionalization was also created. The spatial series is short, but it does span one complete economic cycle.

Labor-market performance represents only a partial and imperfect indicator of the economic performance of a local economy. For the purposes of our empirical analysis, we assume that the performance of local labor markets can be taken as a measure of
the success of the local economy. We utilize the rate of unemployment, rather than the
growth rate in employment, as a dependent variable in a local economy. Those regions
with lower unemployment rates have higher employment rates and are imputed to have
better economic performance. The theories of local economic growth discussed in our
paper include dimensions that, at least potentially, affect both the supply and demand
conditions operating in a local labor market. Accordingly, measuring economic growth
in terms of employment growth alone has the danger of unduly restricting our view of
the determinants of growth to the demand side of the labor market. In contrast,
changes in the rate of unemployment are sensitive to changes both in the demand for
labor and in the supply of labor, as reflected in the growth of employment and growth
in the participating labor force. Accordingly, we define the economic performance of
region \( i \) at time \( t \) \( (R_{it}) \) in terms of its prevailing unemployment rate \( (U_{it}) \) relative to an
economy wide average \( (U_{at}) \). This last is defined as:

\[
U_{at} = \frac{\sum_i L_{it} U_{it}}{\sum_i L_{it}},
\]

where \( L_{it} \) represents the labor force in region \( i \) at time \( t \). So, regional unemployment
differentials at time \( t \) are defined as:

\[
R_{it} = \frac{U_{it}}{U_{at}}.
\]

This captures interregional unemployment disparities whilst controlling for changes in
the economy-wide level of unemployment.

4 Conclusions

Analyses of local economic growth are currently polarized between the ‘hard’ quanti-
tative and mathematical models of economics, based on a particular set of stylized
facts, and the ‘soft’ models of economic geography and other social sciences, based on
qualitative methodologies and a somewhat different set of stylized facts. The present
two-part study is an attempt to develop a third way based on theoretically informed
econometric analysis of ‘soft’ processes. In this, the first part of the study, six ‘soft’
theories have been reviewed, and we have begun to extract testable propositions and to
create measurable parameters that might be used as the foundation of an econometric
modeling exercise. Three analytical stages have been completed in a necessary process
of refinement to facilitate the econometric analysis:

1. the identification, through review, of the key processes and propositions that make
each of the ‘soft’ theories distinctive;
2. the conversion of those propositions into measurable parameters, through an
admittedly imprecise process of translation; and
3. the calibration of those parameters using empirical data on regional economic and
social change in Australia.

Through these successive stages of refinement, the study has been confronted by a
suite of methodological and measurement issues that are fundamental to improving
the power of economic geography to explain differential regional economic growth.
These first stages of analysis show that ‘soft’ theories of local growth do not readily
and easily lend themselves to translation into testable propositions and measurable
parameters. And a significant issue arises as to whether the calibrated measures
developed using Australian data fully capture the subtleties of the ‘soft’ theories
and remain ‘on message’.
This problem arises for two reasons. First, there is a lack of specificity and precision in the theories on the working of significant concepts, such as ‘learning’, ‘social capital’, ‘institutional thickness’, ‘power’, and ‘knowledge’, that are held to be central to local growth processes. Second, what is meant by local ‘growth’ and ‘development’ is itself unclear and ill specified. Is it job growth, investment growth, output growth, productivity growth, or escalating rates of new firm formation? In short, the refinement and translation processes attempted in this first part of the study suggest that both the dependent and independent components of ‘soft’ theories of local economic growth are quite distinctively hazy. There is an urgent need, therefore, to refine and more completely specify the mechanisms that underpin these ‘soft’ theories, otherwise they are in danger of becoming loose and indeterminate—suggesting everything and substantiating nothing.

Nevertheless, no matter how fully the mechanisms of local growth in ‘soft’ theories are specified, there will always be practical limitations, imposed by the availability of data and the methodologies used to collect official statistics, on the construction of numeric variables to calibrate the dimensions of those theories. The use of surrogates is inevitable, and just as inevitable is the controversy that will always surround their use. At best, quantitative testing must remain sympathetic to the subtleties of process postulated in theories, and sensitive to the shortcomings of the data it employs.

Against the backdrop of the methodological and measurement issues raised in this paper, and the caveats they impose on empirical analysis, part 2 of this study addresses issues surrounding econometric model design and empirical validation of the proposition derived from the six ‘soft’ theories reviewed here. The econometric modeling of Australian regional data is then used to reflect on the processes of local economic growth operating in that specific sociocultural context.

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