

Chapter 1

Introduction

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Metropolitan growth has been dramatic in the industrialized countries since the Second World War. Today, metropolitan regions are increasingly recognized as the national growth and development engines in a globalizing world (Jacobs 1984; Huggins 1997), and in particular as the driving forces in national as well as global innovation processes (Shefer and Frenkel 1998). In the industrialized countries, the metropolitan regions play a critical role not only as major generators of value added but also as major nodes for creativity, innovation and entrepreneurship as well as for communication and transportation. In line with Duranton and Puga (2005), one could claim that metropolitan regions are functionally specialized in the invention and creation on new products, i.e. innovation. Thus, since they are highly diversified and contain a broad range of different types of industries, local business services and firm sizes, they function as “incubator cities” (Chinitz 1961) or “nursery cities” (Duranton and Puga 2001), i.e. as superior ‘incubators’ for the development of innovations and for the development and growth of both new and small firms.

Traditionally, regional science research has shown that metropolitan regions provide agglomeration economies in the form of localization and urbanization economies to their economic actors. More recently, it has been stressed that they function as gateways to other regions, thus linking the economic actors in the region with economic actors in other regions nationally and abroad (Andersson and Andersson 2000, Eds.). These two aspects are critical not least for the innovative potential of metropolitan regions (Revilla Diez 2002). The innovative capacity of economic actors is not determined by their own R&D investments and capabilities only. Also the context matters, which implies that a region’s innovative capacity is

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determined by region-specific location factors (Falck and Heblich 2008; Glaeser and Kerr 2009). The options for cooperation during innovation processes with regional partners as well as with partners in other regions are important location factors that reduce risks and uncertainties and offer opportunities for collective learning within clusters (De Bresson and Amesse 1991; Lakshmanan and Okumura 1995; Malecki and Oinas 1998; Ejeremo and Karlsson 2006). The relevant partners include demanding customers, qualified suppliers, producer service companies, and competitors as well as research universities, and research institutes. Generally, innovation takes place in regions rich with knowledge-based location factors (Audretsch and Feldman 1996) and metropolitan regions are rich with such factors.

Due to their size, metropolitan regions offer a great variety and diversity of partners for innovative economic agents with a potential to ensure synergies in innovation processes. It should in this connection be observed that metropolitan regions are characterized by a high degree of openness. They are the major nodes in national and international transport and communication networks and as such they function, in particular, as import nodes for new ideas, new knowledge, and innovations (Jacobs 1969, 1984; Braudel 1979). They also host the majority of the economic actors that in particular benefit from this openness, namely the multinational companies, domestic as well as foreign, which operate ownership, innovation, input, production, and delivery networks that include many countries and regions including other metropolitan regions and sometimes are of global proportions. Multinational companies increasingly tend to use several home bases in different metropolitan regions instead of being confined to one headquarter location in one specific metropolitan region in order to exploit resources across a wider geographical extent (Michie 2003).

Empirical studies in various countries during the last 15 years of the spatial distribution of innovative activities have convincingly shown that metropolitan regions have a high innovation potential (Anselin et al. 1997; Varga 1998; Brouwer et al. 1999; Beise and Stahl 1999; Andersson et al. 2008). Metropolitan regions have been found to be the most important locations for innovations generating 96 % of all registered product innovations in the US (Audretsch and Feldman 1999). The empirical results also indicate that diversity as suggested by Jacobs (1969) stimulates innovation. Sectoral specialization on a small number of industries generally seems to have a negative effect on the regional innovation output level.¹ Metropolitan regions are generally characterized by a more diverse economic structure than other regions, which tend to generate proportionally higher innovation outputs (Audretsch and Feldman 1999). Thus, metropolitan regions tend to offer favorable conditions for innovative economic agents. Here, these economic agents normally find a diversified economic structure, a qualified labor force, qualified and competent co-operation partners in the form customers, suppliers, competitors, producer service firms, research institutes, research universities, etc. (Ewers and Wettman 1980; Howells 1983; Suarez-Villa and Fischer 1995).

¹ However, there are a few studies indicating that specialization fosters innovation (Acs et al. 2002).

Given the importance of metropolitan regions not least for innovation and growth it is critical to increase the understanding of

- How metropolitan regions function in terms of the simultaneous interactions between different metropolitan subsystems such as population, labor supply, housing, services, infrastructure, economy, workplaces, and metropolitan management, to provide a frugal seedbed for innovation,
- How the life cycles of metropolitan regions evolve over time,
- How metropolitan regions interact and compete with each other,
- How metropolitan regions interact with non-metropolitan regions,
- The factors determining differences among metropolitan regions in their capacity to nurture innovation and growth, and
- How metropolitan policies must be designed to secure the long-term vitality of metropolitan regions.

The purpose with this book is to contribute to an increased understanding of these three issues and the purpose of this introductory chapter is to lay a foundation to the contributions presented in this book.

1 Metropolitan Regions as Nodes in National and International Networks

Metropolitan regions may be perceived as large production and consumption systems based upon extensive information and knowledge processing. They are characterized by their agglomeration of economic activities and by their intra-regional transport infrastructure, facilitating very large movements of people, inputs and products within their interaction borders. One fundamental characteristic of a metropolitan region is the large integrated labor market with a much more intensive commuting as well as job search and search for labor within the region than between regions (Johansson 1997). The border of the integrated labor market region is a good approximation of the borders of a metropolitan region.²

In all industrialized countries the metropolitan regions are responsible for a major share of the economic activities. They are the major nodes in each country's inter-regional transport, communication and interaction networks and together they make up the major nodes in the same international networks. The role of metropolitan regions play in these networks has changed over time. When they started to develop they were normally locations for large scale industrial production. Today they are normally centers for decision making in business and government, negotiations, knowledge creation and other activities dependent upon face-to-face interaction but also for consumption and tourism.

² Fujita (1989) identifies an urban region by deriving increasing commuting costs from increasing distance to the city centre, which hosts the majority of all workplaces.

Metropolitan regions have developed out of smaller towns and cities that for extended periods have grown more rapidly than other towns and cities. However, their long term development not only include stages of fast growth but also stages of maturity, and in some cases stages of obsolescence and also decline (Jacobs 1961). Over time they have often developed specialized roles in the national and international systems (Noyelle and Stanback 1984) but at the same time they exhibit a degree of diversity not found in non-metropolitan regions. With technological and structural changes in the world economy the specialization of metropolitan regions may become obsolescent (Jacobs 1969) and rigidities develop due to that the specialization may delay the rejuvenation of their economies for extended periods. Some metropolitan regions may never be able to regain their previous position in the national and international systems since they lack locational attraction for expanding sectors in the international economy.

Urban regions develop at different speeds and in different directions in processes, which are interrelated with demographic processes. Migration and intra-urban relocation of households are not only reactions to the economic development of nations and urban regions but have their own dynamics due to different population cycles. Some of these phenomena are not only partly universal but also parallel among different industrialized nations and thus common to many urban and metropolitan regions, which may differ in many other aspects.

Urban and metropolitan regions are in many respects related. The development from a non-metropolitan to a metropolitan region is characterized by the expansion of population and economic activities and the construction of physical elements such as housing, industrial sites, office buildings, infrastructure and transportation facilities. Many attributes of these physical elements are shared by different metropolitan regions. The growth and expansion process of metropolitan regions has certain general effects, which are common for all metropolitan regions, such as more and more space becoming occupied by buildings, facilities, and other durable infrastructures and an increased density of economic activities in central locations.

Over time different rigidities are built into the metropolitan structure and the location of new economic activities becomes more demanding in terms of investments and relocation of more mature activities. Every metropolitan region develops from a young to an old structure, which may be very durable. However, the vitality may be preserved if enough resources are invested in renewal processes.

2 Market Potential and Metropolitan Regions

The concept of market potential can be used as a means to describe the economic concentration to and the opportunities of making contacts within and between metropolitan regions (Lakshmanan and Hansen 1965). There are strong reasons for making a precise distinction between the internal and the external market potentials of metropolitan regions. The geographic delineation of a metropolitan region is in a fundamental way related to the identification of its internal market

potentials. The internal market potentials are measures of the existing opportunities in various markets inside the borders of a metropolitan region.

Goods and services vary with respect the contact- and/or interaction-intensity associated with their input and/or output transactions (von Thünen 1826; Lösch 1943; Hirsch 1967). Little or no direct contact between buyer and seller is necessary for goods and services with standardized and routine transaction procedures. Moreover, when a pair of suppliers and customers repeats the delivery of a certain good or service, the interaction between these two actors can normally be routinised, and hence the contact intensity decreases and the transaction costs decline. On the other hand, many goods and services are traded under complex and contact-intensive conditions, which often involve transaction phenomena such as inspection, negotiations and contract discussions, technical and legal consultation, and documentation of agreements. Such goods and services may themselves be complex and have a rich set of attributes. However, the basic thing is that, from a transaction point of view, they are not standardized, and the interaction procedures are not routine. A special case of a contact-intensive transaction is when a good or a service is customized and designed according to specifications made by the customer during an often time-consuming process of supplier-customer interaction.

Interaction costs are normally much lower for transactions within a metropolitan region than between regions. This implies that contact-intensive goods and services have distance-sensitive transaction costs and that these geographic transaction costs rise sharply when transactions are made between regions (Johansson and Karlsson 2001). Of course, goods and services can also be distance-sensitive with respect to input transactions. As a result, the interaction-frequency associated with distance-sensitive goods and services supplied in a given metropolitan region can be assumed to decrease with increasing time distance from the centre of the region (Holmberg et al. 2003).³

For each type of good or service in any region it is possible to divide the total market potential into the internal (intraregional) and the external (interregional) market potential. Companies who want to supply distance-sensitive goods or services must find a sufficiently large demand for their sales within their location region. Since internal economies of scale normally prevail, the internal market potential must exceed a certain threshold if companies producing distance-sensitive goods and services shall be able to make a profit. This implies that “economic density” matters (Ciccone and Hall 1996; Karlsson and Pettersson 2005), which gives metropolitan regions special advantages when it comes to supplying distance-intensive goods and services.

The size of the internal market potential in a metropolitan region is among other things a function of the capacity and quality of its interaction infrastructure. Such infrastructure has the role of offering high density combined with low transaction costs, i.e. a high intraregional accessibility (Johansson 1996). A high intraregional

³ It is a general result from spatial interaction theory that the interaction intensity is a decreasing function of the time distance between origin and destination (Sen and Smith 1995).

accessibility implies that suppliers of distance-sensitive goods and services can reach a large number of potential customers and that producers can be reached by many suppliers offering distance-sensitive inputs as well as by many households supplying specialized labor inputs.

A rich infrastructure for interaction is a special characteristic of metropolitan regions. This infrastructure, which reduces interaction costs, primarily consists of the entire built environment with its various networks for transportation and communication and its many different arenas for meetings, negotiations, education, and so on (Batten et al. 1989; Kobayashi 1995). However, it also includes the links connecting the metropolitan region with other regions and the associated external market potential. The intra- and inter-regional infrastructure has two fundamental roles (Lakshmanan 1989): (1) it influences the consumption, production and innovation possibilities of regions, and (2) it is intrinsically a collective good in the sense that it is common to all economic agents in a region, households as well as companies. Thus, the infrastructure in a basic way will influence the internal and external market potential of a metropolitan region by (1) extending its spatial interaction links, and (2) determining the intra- and interregional accessibility of the region. Infrastructure also extends over time through its durability, which creates sustainable conditions for innovation, production and consumption for extended time periods.

The intra-regional infrastructure makes it possible to combine a high economic density with low interaction costs for all markets. High density and low geographic transaction costs in metropolitan regions imply ‘thick’ markets with large demand, many customers and suppliers and frequent transactions. Moreover, investments in the interaction infrastructure may also enlarge the markets of metropolitan regions in a complementary way by including more and more of surrounding geographic domains. In this case, extensions and/or improvements of transport infrastructure integrate new geographical areas with the metropolitan region by reducing the travel time distances to these areas. This form of enlargement also implies that the internal market potential of the metropolitan region grows.

3 Metropolitan Regions as Nodes of Knowledge Generation and Innovation

Earlier work have investigated metropolitan regions as innovation systems. Innovation systems consist of a number of actors that interact in generating, diffusing and using new knowledge. Such actors can be firms, organizations and institutions. Metropolitan (regional) innovation systems have been proposed to be more important than the national systems of innovation that were studied in the 1990s. (Fischer et al. 2001)

Metropolitan regions function as birth places for new technologies and innovations in the form of new products and/or new production methods. This implies that they attract economic agents specialized in innovation based upon specific external economies of scale, which arise at the regional level (Marshall 1920). There are two major groups of external economies: pecuniary externalities and knowledge

externalities (Krugman 1991; Ellison and Glaeser 1997). Pecuniary externalities emanate from natural regional advantages such as natural and/or man-made resource endowments, advantageous location and/or comparatively low labor costs (Ellison and Glaeser 1999).

Knowledge externalities, on the other hand, need not be related to natural regional advantages but to a milieu that attracts highly skilled people, whose knowledge and experiences, knowledge exchange and knowledge creation contribute to increase the regional knowledge stock. Even if we assume that this knowledge is non-rival, it doesn't imply that it is freely accessible to everyone. In particular, new knowledge is not only highly specialized but also "sticky" (von Hippel 1994), i.e. highly contextual and uncertain. This implies the persons who should evaluate and apply it must have the relevant training but also opportunities for frequent face-to-face interaction to fully interpret it. Obviously, metropolitan regions have large advantages here since they offer both a large and varied supply of highly skilled people and a well-developed intra-regional transportation infrastructure together with a large variety of different meeting places suitable for intense face-to-face communication. Metropolitan regions offer comparative advantages in the production of new knowledge (Henderson 2005), and the costs of innovation tend to be lower in such regions (Feldman 1994). Thus, the formative, innovative stages of product development are more likely to be located in regions with diverse economies and corresponding spillovers, both of which is conducive to the creation of new products (Duranton and Puga 2001). Empirical evidences also clearly indicate that newly developed knowledge codified in the form of patents, in particular, stimulate the development of further knowledge within the same region (Jaffe et al. 1993). This implies that there is a distance-decay in the diffusion of knowledge, since the critical knowledge tends to be tacit, i.e. embodied in people and thus at least in the short-run stuck to the region of origin (Audretsch and Feldman 1996).

Innovations, which are yet un-standardized goods and services, tend to a high extent to be brought into the market via the entry of new companies (Aghion et al. 2009). The driving force behind innovation and thus entry originates often outside the set of incumbent companies, i.e. from companies and/or basic research laboratories in technology-related industries (Winter 1984). As the knowledge generated in private as well as public R&D laboratories is likely to spill out, metropolitan regions offer an atmosphere consisting of a variety of intellectual externalities waiting to be absorbed by entrepreneurs consistent with the idea of inter-industry spillovers resulting from the diversity in metropolitan regions advanced by Jacobs (1969). Metropolitan regions also offer a large enough internal market potential to make the launching of innovations profitable as well as the low internal geographical transaction costs, which are critical for reducing the interaction costs for the companies developing innovations.

Entrepreneurs in metropolitan regions are likely to have lived in the region all their life or at least to have lived and worked there for many years (Keeble and Walker 1994; Saxenian 1999; Greene et al. 2008). This implies that these entrepreneurs have had time to create dense social networks based upon past experience and frequent social interactions in the region that provide access to information and knowledge

but also facilitate the process of resource generation (Stuart and Sorensen 2005; Michelacci and Silva 2007). Thus, entrepreneurship should be looked upon as a regional phenomenon (Feldman 2001; Stam 2007) stimulated by the entrepreneurial opportunities, which emerge from the regional economic milieu. In metropolitan regions it is in particular various diverse knowledge externalities, which stimulate various kinds of innovation-driven entrepreneurship.

Knowledge-intensive and high-tech industries tend to locate in new spatial patterns with a preference for larger metropolitan regions with a rich and varied supply of higher education, research, and cultural and other amenities. This implies for smaller metropolitan regions that the adjustment to technological and structural changes in the world economy and shifts in the international division of labor is of special importance. If they fail to adjust their way of functioning to the changes in the world economy and the reorientation and expansion of R&D activities they may become the losers in the international competition between metropolitan regions. Thus, for these regions the renewal of the internal structure and revitalization of their international contact patterns is critical.

4 Internal Dynamics of Metropolitan Regions and Metropolitan Management

Over time, a metropolitan region must adjust its internal structure in response to external technological, economic and demographic changes to preserve its vitality and competitiveness. The changes include short term economic fluctuations as well as slowly changing conditions as regards the metropolitan region's interaction and exchange with other regional economies nationally and internationally. The foundation of this theory of nested dynamics of metropolitan processes and policies originated from the work of the IIASA regional development group in the early 1980s. One slow internal process, which functions as an almost exogenous driving force is the time-dependent change in the age composition of the region's population.

The internal processes of metropolitan change include complex dynamics of spatial relocation of firms and households, the entry, growth and exit of firms, goods and services, household formation, which are influenced by prevailing in-congruencies between the supply of and the demand for capacities in the transportation, facility, housing, and service systems. To influence these processes and to support metropolitan development there exist a number of instruments for the management of metropolitan regions including land use planning, regulation and taxation, investments in infrastructure, operation of public facilities and services, migration and labor market policies, housing market control, and policies aiming at stimulating innovation and entrepreneurship.

Seen from a long-term perspective, the instruments for metropolitan management may affect the attractiveness and development potential of the metropolitan region. In this context, the metropolitan policies may try to influence the location

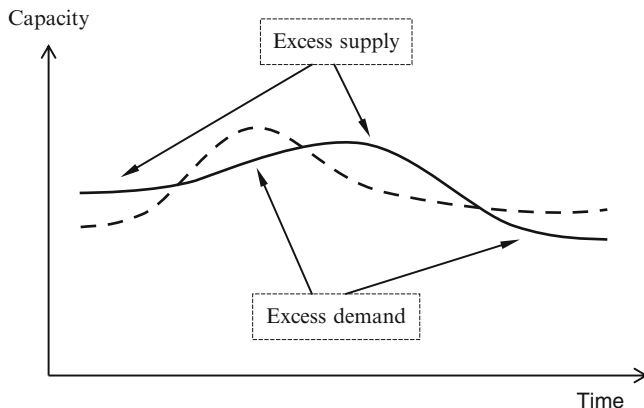


Fig. 1.1 Tension signals (Source: Johansson 1985, p. 117)

of (1) public and private R&D activities and institutions of higher education, (2) infrastructure and communication networks, (3) labor with different education, skill and competence profiles, and (4) manufacturing and service firms.

A major part of the metropolitan management takes the form of adjustments and responses to signals of malfunctioning and tensions in the various metropolitan systems. However, such signals may be misleading seen from a longer time perspective, if the dynamics of the actual system are only vaguely understood. Figure 1.1 highlights a case in which both the demand and the supply of capacity develops in a smooth way. In spite of this the tension signals do fluctuate. The “capacity” in the figure may refer to any metropolitan system, such as the labor market, the land market, the market for office space, the housing market or the market for metropolitan transport.

Although the two developments paths in Fig. 1.1 follow each other fairly closely, the sign of the capacity tension fluctuates. Quick responses to this type of signals risk aggravating the short-term mismatching, and causing new oscillations in the supply and demand paths, and thereby produce confusing signals of tension. Actually, the possible overshooting in the response pattern may be obtained through both (1) planning and public interventions, and (2) market reactions. In many cases the market and public metropolitan management may stimulate each other to an “over-reactive” behavior. When the speed of change is fast in a certain dimension, the imbalances in some metropolitan systems may be substantial. In highly attractive metropolitan regions, local inflation in the housing market and related service sectors and congestion in the transportation networks are typical indicators of disequilibria.

Metropolitan management and market behavior associated with the change processes of the type described above concerns to large extent extremely durable structures. Construction and location of infrastructure, housing areas, service and manufacturing sites, and commercial centers usually affects the life of metropolitan regions many decades into the future. A lot of metropolitan structures were determined many decades and even centuries ago. In particular, the process of capital formation determines the anatomy of the whole metropolitan region.

5 Speed of Adjustment: Fast and Slow Processes

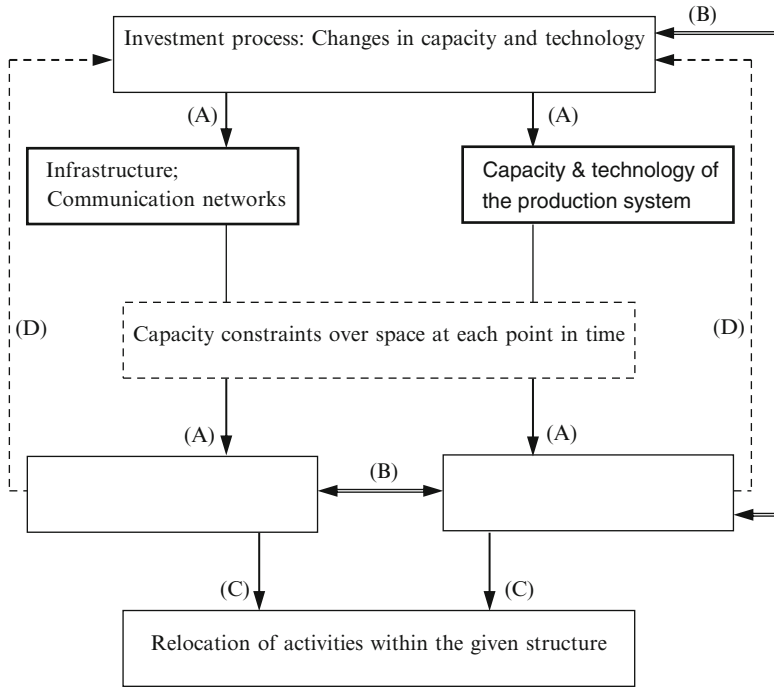
A common element of the change processes in most metropolitan regions is the inertia in the inter-process adjustment mechanisms. As housing is constructed in peripheral rings to accommodate an increasing population, the pressure on the land in the down-town business district may accelerate. A relocation of households and workplaces between different zones in a metropolitan region may bring about multi-faceted tensions in the sense that both the land market and the transport system are affected. The tensions and their signals of manifestation give rise to adjustments on different time scales. Capital stock inertia and differentials in household and sector mobility may thereby give different zones traits, which are typical for their vintage of construction.

Figure 1.2 is an attempt to provide a schematic illustration of generic types of adjustment processes in metropolitan regions. The interaction between the production system and the given infrastructure comprises adjustments, which are close to be instantaneous, given the capacity constraints that prevail at each point in time and space. Changes in the capacity constraints and relocations must be filtered through time-consuming decision and investment processes. Thus, investment and relocation decisions are delayed in relation to the observed tension signals of under- or over-utilization of existing capacities (in the form of congestion, queuing, local inflation, etc.).

Investment processes bring about new capacities at a slower pace than the B-type interactions (capacity use). The resource consumption in the investment activities contains fast adjustments. The capacity change in individual locations within metropolitan regions occur with sudden jumps, but the overall change of capacities in the production, housing and transportation systems is a much slower process than the adjustments of B-type. Investments in the built structure in a metropolitan region, for example, seldom reach more than a few percent of the value of existing structures. Spatial relocation of households and production units of various kinds represents a medium-speed type of adjustments.

The classification in Fig. 1.2 can be used to shed light on the possibilities to explain, model and forecast metropolitan dynamics. If a model is applied to analyze the fast adjustments, the slower processes will appear disguised in the form of parameters in the model. Similarly, a model of the slow adjustments will contain parameters, which are explicitly or implicitly affected by the fast adjustment mechanisms. In both cases, the parameters are not actually constants but may instead change slowly over time. Nonlinear models will in this case generate sudden shifts, i.e. catastrophes, based upon bifurcations or singularities in the model behavior for certain parameter values (Varaiya and Wiseman 1984).

The problem of the relationship between fast and slow processes in metropolitan development may also be studied from a slightly different perspective. If the system illustrated in Fig. 1.2 develops in such a manner that new capacities are created at the same speed as the demand for new capacities, there will be no imbalances or tensions. Such change processes develop along trajectories, which may be looked upon as equilibrium paths. In a sense such a path represents a balanced rate of change for the



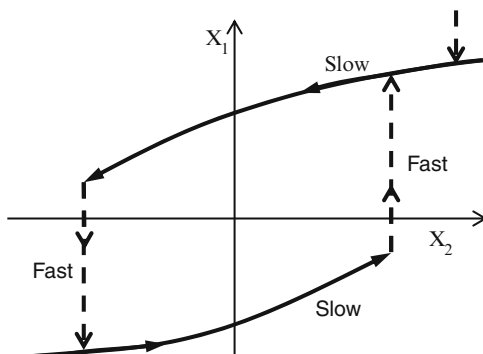
- (A) Delayed adjustments that affect specific capacities in specific locations with sudden jumps; the overall change of capacities is usually slow
- (B) Fast adjustments
- (C) Delayed, medium speed adjustments
- (D) Investment decisions which generally involve considerable time lags

Fig. 1.2 Variations in speed of adjustment (Source: Johansson 1985)

system as a whole. However, a system following such a steady path may suddenly be influenced by strong exogenous changes, e.g. a fall in the demand for certain of the metropolitan region’s export products or a shift in migration or fertility rates. Such exogenous changes will bring about a faster speed of change in some parts of the system.

A third type of change is the catastrophes mentioned above. In this case, it is usually possible to pick out a specific subset from a large dynamic process in such a way that the smaller system describes the mechanisms that give rise to catastrophic shifts in the speed of change (Casti 1985). Figure 1.3 illustrates a case in which shifts occur repetitively (cyclically), possibly with a long duration for the slow phases. The figure may for example describe the relation between land values and activity density in a given zone in a metropolitan region. The centre point of the figure represents an unstable equilibrium of the change process. The system illustrated will develop in cycles around the equilibrium point with longer periods of slow change broken by short periods of fast change.

Fig. 1.3 Oscillations of fast and slow time scales
(Source: Johansson 1985)



6 Market Potential and the Development of Metropolitan Regions

The input and output market potentials of metropolitan regions represent factors that adjust on a slow time scale, which implies that the growth (and decline) of metropolitan regions is a gradual process. This in turn implies that these market potentials, as well as their specific components, play the same role as metropolitan infrastructure. The input and output market potentials of a metropolitan region provide arenas for processes that adjust on a fast or medium-speed time scale. It should in this connection be observed that the input market potential comprise, among other things, the supply of capital, labor (with different education, experiences and skills), and built environment of the metropolitan region, which are all factors emphasized in resource-based models of regional economic development.

Metropolitan regions are among other things characterized by a knowledge-intensive labor force, which raises questions about the factors attracting such labor to metropolitan regions. Many empirical studies support the assumption that households whose members have a university education and other specific skill attributes, such as entrepreneurial skills, are attracted to migrate to and stay in regions that offer an attractive regional household milieu (Glaeser et al. 2001; Clark et al. 2002; Florida 2002). The regional household milieu consists of, on the one hand, natural amenities including climate conditions in the region, and, on the other hand, the household infrastructure in the region. The regional household infrastructure comprises the region's housing market potential and the accessibility it offers from housing areas to other market potentials in the form of different kinds of (1) household services, (2) amenities, (3) institutions of higher education, and (4) job opportunities in different workplace areas. Regions with an attractive household milieu are among other things characterized by large and varied household market potentials, which is one of the characteristics of metropolitan regions.

The perspective presented here implies that a metropolitan region's household milieu is a partly independent attractor (repellent) of household location and regional labor supply. However, it also implies that regional labor markets adjust by means of a process where companies follow the location of the labor supply, rather than the opposite (Quigley 1990; Maclellan 1990). This form of causation is associated with

the “knowledge society” in which the growing economic sectors have a high demand for knowledge-intensive labor, primarily with a university education. Under these conditions, knowledge-intensive households chose residential location in regions with an attractive household milieu, which to a high extent tend to be metropolitan regions. As a result, companies with a large demand for knowledge-intensive labor have to adjust their location accordingly. Thus, the supply of knowledge-intensive labor is one of the factors driving the growth of metropolitan regions.

The overall market potential of a metropolitan region, i.e. its size and density, is an infrastructure phenomenon in itself. It changes in a process of very slow adjustments and offers collective market opportunities that benefit both households and companies. In growing metropolitan regions, the location of households and firms form a self-reinforcing dynamic process, i.e. a cumulative causation process with positive feed-backs (Myrdal 1957). These positive feed-backs are in general constrained, on the one hand, by the development of the demand in the metropolitan region and in its external markets, and, on the other hand by the existing capacities in the form of built environment, the accessibility offered by the transport system, production capacities, and labor supply. For the expansion of certain activities these constraints may not be binding, whereas the expansion of other activities requires adjustments of durable capacities. The market potential can be assumed to adjust on a faster time scale than the durable capacities. In the longer time perspective, regional capacities and the regional economic and household milieu will adjust through a system of coupled feed-backs.

Over time, the (slow) formation of regional infrastructure affects the household and company location processes by gradually building up the basic conditions for the household milieu and the economic milieu of companies. Naturally, the economic milieu is partly determined by the household and company location processes. However, it is natural to assume that the household milieu and the economic milieu, respectively, as a whole changes at a much slower pace than the location of households and companies. Hence, in a limited time perspective it is possible to treat the milieu characteristics as approximately invariant. The regional change process described here has the form of interdependent dynamics such that companies and households mutually adjust to each other.

7 Organization and Content of the Book

7.1 Part 1 Theory of Urban Growth

7.1.1 Chapter 2. John M. Quigley

Agglomeration, Urbanization, and the Growth of Metropolitan Regions

The United Nations Population Fund released a report declaring that for the first time in recorded history, more than half the world’s population resided in urban – not rural – areas. Another report from the United Nation argued that in

many cases the economic circumstances of urban migrants are worse than those of rural peasants. How bad can urbanization be for the development process? Urbanization simply cannot be all that bad for those who live in cities in developing countries – after all, in most instances migrants to cities and urban areas could simply return to rural life if such moves improved their economic circumstances.

In this essay, we consider the evidence about the mechanisms increasing economic efficiency in metropolitan regions and the record of cities in facilitating economic output and improving the consumption opportunities available to workers. Much of this evidence is based on observations on highly-developed countries, but a growing body of evidence is based upon analyses of developing economies and low-income countries. This evidence clearly supports the conclusion that cities and metropolitan conurbations are important in facilitating economic growth, increasing worker productivity and augmenting incomes in poor and rich nations alike. Policies to facilitate, not inhibit, urbanization will improve economic conditions in developing countries. The analysis suggests a variety of broad policies – predispositions for policy – that would improve resource allocation and increase incomes in poorer countries.

7.1.2 Chapter 3. Börje Johansson and Johan Klaesson

Urban Growth: Co-evolution of Producer Services and Other Sectors.

A major characteristic of the economic development in Sweden during the past 10–15 years is a fast expansion of the producer-service sector. To analyse this process, the present paper employs an approach to identify the spatial pattern of local, regional and extra-regional demand for producer services. In the associated theoretical model producer-service firms grow in locations with large market access. The estimated model predicts that the supply of producer services grows in urban areas with large market access, whereas the rest of the economy shrinks in the same areas and expands in other parts of the urban region. The change process is interpreted as an effect of firms' outsourcing of service activities when they can rely on accessibility to service suppliers. As a result service suppliers agglomerate in central parts of the urban region, where they obtain high accessibility to their customers. The estimated change process comprises a non-linear response mechanism.

7.1.3 Chapter 4. Åke E. Andersson

Knowledge Accessibility, Economic Growth and the Haavelmo Paradox

Economic growth has conventionally been modelled for space-less economies. Econometrically, growth models have mostly been estimated on time series of national economies with minimal distinctions between economies as large as Japan or the USA and as small as the smallest economies of Asia and Europe. This approach to the analysis of economic growth is especially dangerous when the impact of scientific and technological knowledge is important for the process of growth. Creative activities and the formation of knowledge is highly clustered

in space. Thus, the spatial distribution of accessibility to knowledge capital and investments determines economic growth of nations and other spatial aggregates.

The Haavelmo paradox contrasts chaos as the generic property of non-linear dynamic models with the fact that most statistics on macroeconomic growth processes tend towards persistent constant positive rates of growth. The paradox can be resolved if the non-linear dynamic model is subdivided into fast, private variables and very slow, public variables. Modelling spatial accessibility of knowledge as a slow, public variable and machinery and similar material capital as a relatively faster, private variable ensures stable growth, at least in the short and medium terms of the economic growth processes.

7.1.4 Chapter 5. Paul C. Cheshire

Urban Growth Policies: The Need to Set Realistic Expectations

This paper reviews local growth promotion policies in the light of an analysis of the drivers of differential urban growth. It starts by arguing that major shifts in urban functions interacting with European integration and the wider process of internationalisation, have produced incentives to create local growth promotion agencies. The supporters of such agencies and the agencies themselves naturally have to make claims both as to their necessity and their likely success. An analysis of growth drivers, however, shows that there is only a restricted scope for local – indeed any – policy to influence city growth. Moreover, some existing policies work directly against urban economic growth. The most successful policies are likely to be the efficient execution of well known functions, including policies to reduce the costs of city size and efficient public administration. There is a danger, therefore, not only of raising expectations with respect to the potential contribution of local growth promotion agencies but of such agencies concentrating on inappropriate actions which are more visible but likely to be less effective.

7.1.5 Chapter 6. Scott R. Hacker, Johan Klaesson, Lars Pettersson and Pär Sjölander

Regional Economic Concentration and Growth. The Effects of Agglomeration in Different Types of Regions.

The regional relationships between agglomeration and economic growth are expected to be different in different types of regions. In the literature of the new economic geography it is common to stress the importance of access to cities with agglomeration of economic activities in the form of firms and households in order to be able to explain regional growth. However, it is also well known that many rural areas are performing fairly well in terms of employment and economic opportunities.

The purpose of the present research is to analyze if concentration of population drives economic growth or if it is the other way around. A second question is if this

relationship between concentration of population and growth is different in different types of regions.

In order to shed light on these two questions the economic performance of three types of Swedish regions (metropolitan-, cities- and rural regions) is related to changes in population densities.

In the empirical analysis the Shannon index is used in the measurement of regional concentration. By considering the effect of previous levels of the Shannon index on average wages we extract information on how regional concentration affects regional economic growth (expressed as growth in average wages). In the empirical analysis we employ a VAR Granger causality approach on regional Swedish yearly data from 1987 to 2006. From this analysis we are able to conclude that there are strong empirical indications that geographic agglomeration of population unidirectionally drives economic growth in metropolitan- and city regions. Concerning the rural regions no such indication is found in either direction. This is a fairly strong indication that urban regions are more dependent on economies of agglomeration compared to rural areas.

7.1.6 Chapter 7. Evert J. Meijers

Metropolitan Labor Productivity and Urban Spatial Structure. A comparison of U.S. Monocentric and Polycentric Metropolitan Regions

This paper questions the extent to which agglomeration economies can develop in a cluster of close-by cities, so-called polycentric metropolitan regions or polycentric urban regions (PURs). Theory suggests that agglomeration economies are also increasingly associated with more dispersed spatial structures. Are polycentric metropolitan regions, despite their polycentric spatial layout, able to reap the advantages of urban size to a similar extent as monocentric metropolitan regions? By means of a novel method, the most monocentric metropolitan regions (a MSA or CSA dominated by a single city) and most polycentric metropolitan regions (MSAs or CSAs in which several cities of rather equal size are located close-by) are identified. Polycentric metropolitan regions are furthermore divided into conurbations and polycentric metropolitan regions proper, which is based on the question of whether the cities in a polycentric metropolitan region are part of a contiguous urban area (conurbation) or not. Labour productivity serves as a proxy for agglomeration economies. Using 2006 data, strong evidence was found for metropolitan labour productivity, and hence agglomeration economies, being higher in polycentric metropolitan regions compared to monocentric ones. Referring to Alonso, this means that in polycentric metropolitan regions, cities are able to 'borrow size' from each other. The findings suggest that the location of a city nearby other relatively similar-sized cities results in a 'borrowed size' effect of 11 % in polycentric metropolitan regions. This borrowed size effects suggests that polycentric metropolitan regions on average outperform monocentric, single cities, controlling for the size of the urban population, urban density, human capital and the structure of the metropolitan economy. A similar result is found when explaining mean annual wages, though the elasticity of urban spatial structure is 5.7 %. Polycentric conurbations resemble monocentric

metropolitan regions more. Furthermore, it is demonstrated that while many sectors of economic activity have a stronger presence in monocentric metropolitan regions, productivity in many sectors tends to be higher in polycentric metropolitan regions. One explanation is that the spatial range of agglomeration advantages has been regionalized, while agglomeration diseconomies remain relatively more limited to the local level.

7.1.7 Chapter 8. Johan Klaesson and Hanna Larsson

Wages, Productivity and Industry Composition: Agglomeration Economies in Swedish Regions

It is a well known fact that wages have a tendency to be higher in larger regions. The source of the regional difference in wages between larger and smaller areas can be broadly divided into two parts. The first part can be attributed to the fact that regions have different industrial compositions. The second part is due to the fact that average regional productivity differs between regions. Using a decomposition method, akin to shift-share, we are able to separate regional wage disparities into an industrial composition component and productivity component. According to theory it is expected that productivity is higher in larger regions due to different kinds of economies of agglomeration. Also, larger regions are able to host a wider array of sectors compared to smaller regions. Output from sectors demanding a large local or regional market can only locate in larger regions. Examples of such sectors are e.g. various types of advanced services with high average wages. The purpose of the paper is to explain regional differences in wages and the productivity and composition components, respectively.

The paper tests the dependence of wages, productivity and industrial composition effects on regional size (using a market potential measure). In the estimation we control for regional differences in education, employment shares, average firm size and self-employment. Swedish regional data from 2004 are used. The results verify that larger regions on average have higher wages, originating from higher productivity and more favourable industry composition.

7.2 Part 2 Institutions and Policies of Urban Change

7.2.1 Chapter 9. Roberta Capello and Ugo Fratesi

Scenarios for European Metropolitan Regions: Winners and Losers in a Globalized World

Cities are highlighted in traditional theories to be the most efficient drivers of economic growth; they pro-act, and react, to economic volatility, by anticipating expectations on future economic trends and by absorbing the economic effects once they take place. This is true for both virtuous as well as declining cycles of development. The reasons for their static and dynamic efficiency lie in three

main elements: the physical size, source of economies of scale; the functional specialisation in advanced value-added functions, source of creativity, learning, and knowledge; the urban system (or the network of cities) in which cities lie, where advantages of scale can easily be exploited avoiding hyper-concentration of production and residential activities. In the age of globalisation like the one we are going through nowadays, cities are areas able to grasp advantages of international competition from outside Europe, and they are expected to be the drivers of growth. In this paper, the aim is to analyse – with a prospective approach – the economic performance that European cities will manifest under different assumptions on the globalisation patterns that may develop in the future. With respect to the present literature, this paper contributes in two new directions: firstly, the aim is to highlight empirically the different actions and reactions that cities of different size, different functional specialisation and located in regions with different settlement structures have in front of a world economic integration; secondly, the aim is to analyse how cities act and react to alternative globalisation patterns, to different quality of competition from outside Europe, which may be sources of different opportunities and threats for different urban areas.

7.2.2 Chapter 10. Lina Bjerke and Charlie Karlsson

Metropolitan Regions and Export Renewal

In smaller countries, the non-metropolitan regions are to a substantial degree linked together with the metropolitan regions through various networks. The national infrastructure and transport networks are often organised with the metropolitan region as the central hub. This creates a number of dependencies between the metropolitan region and the non-metropolitan regions in a small country. In this paper we focus on the role that metropolitan regions play for the renewal of the export base in the non-metropolitan regions in a small country. The analytical part can be divided into three main parts: (1) the role of the Stockholm metropolitan region for the renewal of the export base in the rest of Sweden between 1997 and 2003; (2) which non-metropolitan regions gain renewal of their export base; and (3) what factors can explain the spatial distribution of these gains. The results show that distance has little to do with the potential success of an export products diffused from Stockholm. Instead, regional characteristics such as a large manufacturing sector, educational level, size of public and/or agricultural sector, and access to producer services have a larger influential potential.

7.2.3 Chapter 11. Martin Andersson and Johan Klaesson

Market-Size and Employment: Separating Scale and Diversity Effects.

What drives the relation between market-size and employment? There is a relationship between the size of an agglomeration and its diversity; in terms of number of sectors present and in terms of number of firms within each sector. There is also a relationship between the size of different agglomerations and the average size of firms located in them. Total employment in a region may be

expressed as the product of number of sectors, number of firms in each sector and average firm size in each sector.

In the literature it is emphasized that diversity may be important for aggregate productivity and growth. The scale of operations in individual firms may also be important for productivity. Thus, the productivity in a region depends on both external and internal economies of scale. Looking at the relationship between regional size and employment it is possible to reveal the relative importance of each of the three factors.

The applied technique allows us to untangle the overall elasticity of employment with respect to market-size and estimate the contribution of each component to the overall elasticity. Using data on Swedish regions over the time period 1990–2004 we show that there are marked differences between manufacturing and service sectors in terms of the contribution of the different components to the overall elasticity. The contribution of the respective component is also different for regional and extra-regional market-size.

7.2.4 Chapter 12. Stephen Sheppard

Do Planning Policies Limit the Expansion of Cities?

... it is essential ... that the town should be planned as a whole, and not left to grow up in a chaotic manner as has been the case with all English towns, and more or less with the towns of all countries. A town, like a flower, or a tree, or an animal, should, at each stage of its growth, possess unity, symmetry, completeness, and the effect of growth should never be to destroy that unity, but to give it greater purpose. ... (Ebenezer Howard, *Garden Cities of Tomorrow* 1898)

This paper considers whether planning policies, as practiced in the world's cities, have the potential for controlling or limiting the expansion of urban land use. The question is certainly relevant for design of policies to respond to urban sprawl. The analysis does not establish that these constraints are necessarily desirable, but does find some evidence that some aspects of planning regulations can be effective in limiting urban expansion.

7.2.5 Chapter 13. Peter Nijkamp and Galit Cohen-Blankshtain

The Importance of ICT for Cities: e-Governance and Cyber Perceptions

This paper offers a critical review of current debates on the importance and the potential of ICT for modern cities. Much attention is given to the opportunities offered by local e-governance, as a systematic strategy to exploit the potential of ICT for the public domain in European cities. Since the views of many experts and elected policy-makers in cities (so-called 'urban frontliners') is coloured by subjective expectations and perceptions, we examine in particular the extent to which the expected influences of ICT, as perceived by urban frontliners, affect their perceptions of the relevance of ICT to mitigate contemporary urban challenges. The final (empirical) part of the paper addresses the issue of the systematic study of cyber perceptions of cities in Europe.

7.2.6 Chapter 14. Alain Thierstein and Stefan Lüthi

Interlocking Firm Networks and Emerging Mega-City Regions in the Knowledge Economy

Globalisation has entailed a reorganisation of spatial development processes on a global, European, national and regional scale. Cities cannot be separated from their regional hinterlands as they often compose a functional division of labour in terms of different kinds of services and value chains among firms. A process of selective decentralisation of particular urban functions has led to the emergence of polycentric Mega-City Regions. The main objective of this contribution lies in the exploration of the Mega-City Region hypothesis. One section focuses on the theoretical building blocks of the Mega-City Region concept. Based on these findings, the next section explains the Mega-City Region hypothesis that identifies polycentric Mega-City Regions as an emerging spatial phenomenon based on re-scaling processes of agglomeration and network economies. Mega-City Regions is the result of two interdependent processes: agglomeration economies as well as network economies. Agglomeration economies result from the clustering of knowledge-intensive firms in certain areas enabling them to benefit from spatial proximity. Network economies, however, result from global sourcing strategies of knowledge-intensive firms leading to relational proximity and international knowledge exchange.

7.3 Part 3 Case Studies of Urban Growth

7.3.1 Chapter 15. Michaël Deinema and Robert Kloosterman

Polycentric Urban Trajectories and Urban Cultural Economy: Cultural Industries in Dutch Cities Since 1900.

This chapter traces the urban employment trends in cultural industries in the Netherlands from 1899 onwards and argues that a historical approach is necessary to understand economic geographical patterns in this post-industrial growth sector. Longitudinal employment data for the country's four main cities and case-study information on the spatial and institutional development of separate cultural industries in the Netherlands reveal long-term intercity hierarchies of performance and historically-rooted local specializations in different forms of cultural production. The effects of historical local trajectories on the present-day distribution of cultural industry activities between the major Dutch cities are tentatively weighed against more volatile factors such as creative class densities. Implications for the general outlook and development of these post-industrial urban economies are then explored, whereby the connectivity of the cities in international and regional networks is taken into account. The chapter concludes with identifying the evolutionary mechanisms at work in Dutch cultural industries and the value of a historical perspective vis-à-vis other geographical approaches to the urban

cultural economy. As the four cities are all part of the Randstad megacity region, the dynamic Dutch urban cultural economy represents an unlikely case for stable inequalities between cities based on local trajectories, so that strong implications may be inferred for cultural industry dynamic in other contexts.

7.3.2 Chapter 16. Martijn J. Burger, Frank G. van Oort, Ronald S. Wall and Mark J.P.M. Thissen

Analysing the Competitive Advantage of Cities in the Dutch Randstad by Urban Market Overlap

At the present day and age, it has become widely acknowledged in urban studies and the planning literature that cities compete over product markets, inward investments, firm establishments, tourists, hallmark events and government funding and that this competition takes place at a local, regional, national, and even continental and global scales. In order to maintain their position within the urban system, cities have to work on their competitiveness, or their ability to successfully compete with other cities. In order to keep and attract firms, workers and tourists one should not only think of cost reductions such as tax credits and project financing, but also of investments in amenities, physical infrastructure, and public transportation networks.

In this chapter we focus on the measurement of revealed competition between cities. We calculate the relative amount of market overlap that a certain city has with any other city within an urban system, identify clusters of competitive cities, and the determinants of this competition. We thus measure the intensity of competition between cities in the Dutch Randstad on the basis of the functional linkages that these cities have with other cities. Cities are in competition to the extent that they serve the same market area for the same urban functions. We will focus on economic competition between cities in terms of providing similar products to the same market areas. In particular, attention is paid to firms in basic sectors, which have a non-local export market and are according to Economic Base Theory.

Our main conclusion is that in the Dutch Randstad region, urban competition is more the rule than the much-anticipated urban complementarities, as urban functional influences – especially of the four largest cities – spatially overlap. The prosperous co-evolution of the Randstad economy with growing urban competition even suggests a positive relationship that better should not be battled by policy.

7.3.3 Chapter 17. Javier Revilla Diez, Daniel Schiller and Susanne Meyer

Capitalising on Institutional Diversity and Complementary Resources in Cross-Border Metropolitan Regions: The Case of Electronics Firms in Hong Kong and the Pearl River Delta

The opening of China during the last 30 years has resulted in tremendous cross-border economic activities of Hong Kong manufacturers in the Pearl River Delta (PRD). More recently, the competitiveness of the business model has been

put under strain by forceful challenges that change the business environment in the PRD: rising production costs, upgrading pressures, new regulations for export processing businesses, labour shortages, a more employee-friendly labour law, and environmental issues. Against this background, it is the purpose of this paper to present and discuss findings from two surveys of electronics firms in HK and the PRD conducted in 2007 and 2008. The research question is based on the agility hypothesis, that supposes that business in highly competitive environments depends on competencies and resources of firms to capitalise on formal and informal business practices alike to gain flexibility. The results of our analysis may help to better understand how the HK-PRD business model did develop and eventually may sustain its competitiveness in the face of new challenges.

The chapter is based on the assumption that cost- and time-sensitive production in the Greater Pearl River Delta (GPRD) is embedded within fragmented global value chains and therefore largely benefits from informal dynamics.

7.3.4 Chapter 18. Kiyoshi Yamasaki, Takayuki Ueda and Shinichi Muto

Impacts of Transport Infrastructure Policies in Population-Declining Metropolitan Area: Business Productivity and Quality of Urban Life in Tokyo

In Tokyo metropolitan area, the population growth and the economic growth have caused the serious urban problems like sprawl at urban fringe, heavy congestion not only in road network but also in rail network, environmental emission and so on. Although there still now remain the difficult problems for us to tackle with, the transport infrastructure policies until today have succeeded in sustaining the high business productivity and quality of urban life in the population-growing trend. The spatial agglomeration in Tokyo metropolitan area has been functioning effectively with the transport infrastructures.

Japan is however now at the down-slope of the population trend curve and Tokyo is predicted to soon lose its population in a decade. The significant population decline in Tokyo metropolitan area is an inexperienced situation for the people and policy makers. They may be afraid that the population decline would reduce the great merit of spatial agglomeration in Tokyo. The question at the heart of policy discussion is how we can sustain the high level of business productivity and quality of urban life in the Tokyo metropolitan area by spatial restructuring. This paper has developed the Computable Urban Economic Model, which re-formalizes the conventional landuse-transport interaction model on the basis of microeconomic foundation, so as to answer the above question.

As a result, we found that the central Tokyo remains as the center of the economy in 2050 with high spatial agglomeration since the agglomeration is accelerated by the scale economy. On the other hand, population which is not affected by agglomeration, is decreasing at each zone with the same level.

The investment to the 3 Ring Roads is expected to contribute to developing more dispersive urban structure since the 3 Ring Roads increase the transportation convenience at the suburb and it induces to the entry of the firms and population

as well. This does not, however, mean the central Tokyo loses its competitiveness but they still remain strong in terms of the spatial distribution of the firms. The reduction of population mitigates the congestion of the road network. It enables us to increase our convenience in terms of the trip by car. It induces to more trips to the households and business people, which bring about more communication, that is one of the keys for the productivity growth and the enhancement of households' utility. During this period, motorization advances due to the enhancement of the transport convenience by car.

7.3.5 Chapter 19. Franz Tödting and Michaela Trippi

Innovation and Knowledge Links in Metropolitan Regions: The Case of Vienna

Given the high density and large variety of knowledge generating organizations present in metropolitan regions and the good availability of expertise and skills, these areas are acknowledged to be important nodes in the knowledge-based economy. There is, however, also empirical evidence showing that the positive relation between metropolitan regions and innovation may not be as clear as it seems to be at the first glance. In fact, many metropolitan regions suffer from various kinds of innovation. (1) Metropolitan regions might lack particular elements of a regional innovation system (RIS). (2) There might be a lack of networking between firms in the RIS and in relevant clusters. In the literature such a constellation is referred to as "fragmented" innovation system. (3) For historic reasons there might also be a specialization in low tech or non-innovative industries. (4) There might be a lack of innovation culture in a particular region.

Vienna has suffered to some extent from the weaknesses of Austria's national innovation system, which has been characterized by a low R&D quota, weak patenting activities and a poor availability of venture capital. The central purpose of this chapter is to examine whether or not the key deficiency of Vienna's RIS in the past, i.e. fragmentation is also a characteristic feature of new knowledge intensive industries, which have emerged and grown in the last few years in the region under investigation. Such sectors are regarded to be vital for the competitiveness of metropolitan regions.

7.3.6 Chapter 20. Paschalis A. Arvanitidis George Petrakos and Dimitrios Skouras

Immigrant Location Patterns in a Southern European Metropolis: The Case of Athens.

Over the last two decades, Greece has seen a substantial influx of economic immigrants giving rise to a number of studies examining the social, economic and spatial implications immigration has for the country. In terms of the spatial impact, the observed tendency is immigrants to move primarily into metropolitan areas, which offer employment opportunities and anonymity. However, very little is

known with regard to the specific, intra-urban, locations immigrants choose for their residence and the factors that affect such decisions. The current study attempts to shed light on the above issues, analysing the spatial distribution of economic immigrants within the metropolitan area of Athens, their mobility patterns and the resultant metropolitan structure. Our findings indicate a slight preference for central areas, but, over the time, the general dispersion of such immigrants to peripheral locations. On these grounds, spatial segregation, to the formation of clear ethnic enclaves, seems less plausible.

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