A COMPARATIVE EVALUATION OF KNOWLEDGE AND INCOME SPILLOVERS: THE CASE OF ANTALYA AND IZMIR CITY REGIONS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
REGIONAL PLANNING
IN
THE DEPARTMENT OF CITY AND REGIONAL PLANNING

SEPTEMBER 2008

Approval of the thesis:

**A COMPARATIVE EVALUATION OF KNOWLEDGE AND INCOME SPILLOVERS:
THE CASE OF IZMIR AND ANTALYA CITY REGIONS**

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ABSTRACT

A COMPARATIVE EVALUATION OF KNOWLEDGE AND INCOME SPILLOVERS: THE CASE OF ANTALYA AND IZMIR CITY REGIONS

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September, 2008, 172 pages

The empirical literature in economic geography has recently dealt with two fundamental questions, whether growth or innovation is spatially bounded or not and how far the economic growth is determined by knowledge. In this thesis, relations between economic growth and knowledge relation is discussed from spatial spillovers perspective with the help of spatial econometric techniques. Adding city-region discussion to the existing literature, the thesis aims to evaluate the economic growth and knowledge spillovers from a broader perspective. The selected cases are two dynamic and rapidly transforming centers, namely İzmir and Antalya City-regions and the results suggest the strong relevance of proximity effects and spillovers in both of the cases. Moreover, the analyses show that growth and knowledge spillovers operate in opposite directions rather than a parallel pattern as expected in Knowledge Based Economy discussions.

Keywords: Spillovers, Spatial Econometrics, Knowledge Spillovers, Income Spillovers, City-Region

ÖZ

BİLGİ VE GELİR DAĞILIMI SIÇRAMALARININ KARŞILAŞTIRMALI BİR DEĞERLENDİRMESİ: ANTALYA VE İZMİR KENT-BÖLGELERİ ÖRNEĞİ

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Eylül 2008, 172 sayfa

Son zamanlarda ekonomik coğrafya alanındaki görgül çalışmalar iki temel soru ile ilgilenmektedir; ekonomik büyüme ve bilgi mekansal olarak sınırlı mıdır ve ekonomik büyüme ne ölçüde bilgi ile desteklenmektedir. Bu tezde, mekansal ekonometri uygulamaları yardımı ile, ekonomik büyüme ve bilgi ilişkisi "mekansal sıçramalar" açısından değerlendirilmiştir. Kent-bölge tartışmalarının ekonomik büyüme ve bilgi sıçramaları yazınına eklenmesi ile mekandaki sıçramanın daha geniş bir açıdan ele alınması amaçlanmıştır. Seçilen kent-bölgeler olan İzmir ve Antalya örnekleri üzerine yapılan çalışmalarda her ikisinde de mesafe dinamikleri ve mekansal sıçramaların önemini belirten sonuçlar elde edilmiştir. Ayrıca, yapılan analizlerin sonuçları Bilgi Toplumu tartışmalarında beklenen şekilde büyüme ve bilgi sıçramalarının birbirine koşut olmadığını, tam tersine zıt yönlü gerçekleştiğini göstermiştir.

Anahtar Kelimeler: : Mekansal Sıçramalar, Mekansal Ekonometri, Bilgi Sıçraması, Gelir Sıçraması, Kent-bölge

ACKNOWLEDGMENTS

First and foremost, I would like to express my gratitude to my supervisor Prof. Dr. Ayda Eraydın, not only for her invaluable guidance, but also for her endless support, motivation and patience throughout the first day of my study in the program, besides the preparation of this thesis. It is her encouragement which made me continue many times and I sincerely appreciate that her role is vital in my individual development as well as in my career development.

Sincere thanks are extended to my examining committee members, Prof. Dr. Ali Türel, Assoc. Prof. Dr. Serap Kayasü, Assoc. Prof. Dr. Bilge Armatlı Köroğlu and Dr. Bahar Gedikli for their constructive contributions and comments on the study.

I would like to thank especially to one of my friends, first of all for his invaluable friendship, and secondly for his endless technical support. Both moral and technical support of Özgün Balkanay helped me a lot during the preparation of this thesis and I am grateful to him for sharing time for all my burdens, even in his busiest periods. Another word of thanks goes to my dearest friends and former coworkers for their closeness, Yalkın Romano and Süphan Nakiboğlu.

I would also thank my friends Khawla el Barazi and Ceren Savaş for their generous and nonstop friendship since 2001. I believe the only thing that proximity does not matter is the loyalty they have provided. Additionally, a very special word of thanks goes to Koray Tokdemir, first of all for making my life more cheerful in all its aspects, and for being there with his support during all the times I needed.

Finally, I would like to thank my family. I am grateful to my mother Ayşe Hasırcı, for her patience and sacrifice during the hardest times of my work; Sinem Saltaş for her loyal sisterhood in all times of my life; and Erdem Alper Turan for all the things he has done for me. I could not get through without their love and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

CHAPTER 1

INTRODUCTION

The relationship between growth, space and innovation has been a widely discussed issue of our recent literature from various perspectives. Challenges of a new globalizing world, increasing number of factors determining success or decline of certain regions, interaction among different spatial units and emphasis on innovative capacity and growth have been in the focus of these discussions. Significant differences among different levels of interaction and dependency between different spatial units and practice of the reasoning these differences have been a the main issues. Putting into geographical foundations in this complex question, this trend is evidenced by the numerous researches on the positive externalities as a major actor in the process of development. .

The recognition of spillovers has been an important outcome of debates regarding close proximity and growth. The debate on freely gained advantages with close proximity is an issue argued for a long time, dating back to traditional agglomeration and proximity studies like the theories of Smith, von Thunen and Ricardo, with emphases on saving and transport cost reduction benefits. Obviously, the context of this discussion changed significantly especially for a few decades, in which some additional important and less concrete factors have found to be fostering the achievements of close proximity. Having put the effects of knowledge as source for economic development, theories regarding proximity dynamics began to underline the advantages of interaction beyond these physical advantages and put emphases on invisible shares or flows among proximate units as well. That is, taking its roots from famous 19th century Marshalian Industrial Districts, the debates on close proximity and interaction included the importance of both voluntary and involuntary knowledge shares and spillover effects.

The influences of Marshalian agglomeration and externality favoring proximity discussion were re-born especially with the beginning of 21st century (Fujita, Venables, Krugman, 1999, Krugman, 1991, Porter, 1990, 1998; Saxenian, 1994;Baptista and Swann, 1999) in order to answer a common question: how far and under what conditions space and interaction is effective. In return, the answers vary in a wide range and included different theories to explain the importance of proximity.

If we try to give important contributions of these theories very briefly, one of pioneering studies was Krugman's (1992) seminal work, which emphasis on both the theoretical dimension and a need for the empirical justification of regional economies with a cumulative nature. Other important contributions came from, Arrow and Romer, favoring from the asset sharing characteristics of Marshalian theory and adding up the specialization and monopoly favored nature of agglomeration, or a contrary study, Jacobian (1969) theory emphasizing on advantages generated by the dominance and competition, or Porter's (1980) combining theory including both specialization and competition.

Following these proximity dynamic based discussions, the effects of spillovers comes into practice. With an initial definition, the underlying subject of all spillover studies is to seek the interaction among different spatial units with some basic assumptions: **increasing returns to scale, knowledge flows, and the cumulative nature of the externalities generated.** The main rationale of these spillovers refers involuntary shares rather than the voluntary ones, and the benefits generated are due to a hidden pattern. (Griliches, 1992, Harabi, 1997)

Having driven from this common pattern, the studies seeking evidence in spillovers again vary considerably. A main differentiation comes from the evaluation of spillovers in a space and proximity based view, or from an approach independent from space and proximity dynamics. When the examples of each category

considered, the spatial spillover studies mainly focus on knowledge, growth, R&D externalities favored by agglomeration and close proximity, whereas the non-spatial spillovers mostly deal with the externalities created by FDI or market flows rather than the proximity effects.

This state of affairs; creation of positive externalities, further flows of knowledge and as a result gaining or sustaining the competitive advantage is the channel of development, which in turn bring knowledge and income spillovers as a vital policy question. Thus, the questions on the knowledge and income spillovers have begun to consider under which conditions these positive externalities are fostered and to what degree these processes are localized. One of the pioneering views in this sense has been the discussion of city-regions, as a catalyst to foster these knowledge and income spillovers with its complementary and inclusive character.

The spillover and positive externalities favoring character of city regions is seen to be the relevant accelerator due to its interaction favoring nature, especially after the so-called "rapid transformation" thanks to globalization when the importance and emphases on this localized but less bounded spatial forms gained significant importance. Within the changes occurring in the social and economic atmosphere with globalization, the spatial units, that is, the cities are seen to be moving beyond their traditional formats. While the new forms of production favored from a less limited processes, it also created a less limited atmosphere where an unbounded, sprawling, formless and knowledge intensive role is assigned. As indicated in Scott and Storper's terms, city regions have found to be the answer of this new role, with super-agglomeration forms and a complex structure. In this sense, the cases evaluated in this thesis consider the city-regions as the unit of analyses in order to see the full extend and effects of the spillovers. Additionally, in order to achieve a comparative result two different city-regions considered namely İzmir and Antalya.

Besides all these changes in the literature and the increasing importance of spatial side of analyses in the theoretical side, the recognition of space growth

relationship in the empirical side of the debate increased as well. The first reason is to catch up the theoretical discussions obviously, but another important facilitator of these increasing number of empirical spillover studies is the developments in methodological part. The empirical research is available in a broader and easier manner due to developments in statistical techniques and tools in the spatial side of analyses.

Here, a relevant and recent discussion of methodology comes in the form of spatial econometrics literature, where the standard econometric techniques are modified by considering the dependence and heterogeneous character of the space. The basic rationale of such a modification in the method is similar to error correction between two dependent time observations. Deriving point is that, as well as the observations from different time periods, observations from different but interacting spatial units are also dependent. (Oerlemans, 2001, Anselin 1998, 2002, 2003, Anselin and Florax 1995)

The fundamental methodology in this thesis takes its roots from this spatial econometrics perspective, by applying Moran's I method. With the application of Moran's I, whether a spatial dependent pattern is observable in İzmir and Antalya City regions would be achievable. The observation of the spatially dependent pattern would directly enable us to conclude a flow of social and economic aspects between two distant spatial units, which in turn is the evidence of spillovers.

In conclusion, the role of innovation as a catalyst for economic growth, and the space itself as a source of differences in varying social and economic aspects have been the a widely discussed issue in our recent literature. The effects and extend of spillovers have become a vital issue in order to draw some important perspectives for competitiveness, development and sustainability of the competitive advantage. City-regions, as the spatial representation of these newer forms of rapidly changing world, with its interaction promoting, formless, complex and sprawling structure have become a remarkable entity, according to which the existing forms of

policies and institutions are gradually modified. This thesis aims to include another dimension to this discussion with a comparative approach from two similar but apparently not identical city regions by analyzing İzmir and Antalya City Regions. The main question is of this thesis is how far these three major notions of our recent literature namely space, economic growth and innovation are a parallel phenomenon in two different atmospheres with the explanation of spatial econometric techniques. It firstly attempts to make an evaluation of income and knowledge spillovers in a general perspective by analyzing whether the spatial units in these two city-regions are spatially dependent or not. Secondly, it tries to find out how far these spillovers are effective, what are the boundaries of each category in each city-region. The measurement of income is made with GDP per capita, share of entrepreneurship, employment and population growth values while innovation is measured by the number of patent applications and the share of high education in each settlement.

The thesis is arranged from six chapters. Following this introduction, in the second chapter a theoretical framework for the spillovers with relation to growth is given. Beginning with the traditional proximity and agglomeration studies, it moves to recent agglomeration studies. Then, different forms of spillovers are discussed according to their differentiating content and sources of spillovers with a special emphasis on the spatial side.

In chapter three, an evaluation of empirical studies on spillovers is presented. Here, the debates on empirical evidence from both knowledge and income spillovers discussed. Since the much of literature in this sense comes from EU and US case, most of the examples have been derived from these regions, but wherever available a special attention is given to studies coming from other sources.

After chapter four, the discussion on the cases begins. Beginning with a descriptive explanation of two different cases and how the appropriate boundaries of each city region is framed, chapter four tries to put forward the main structure of each

case before the evaluation of the spillovers. With the help of the description of the indicators used in the following spatial econometric analyses it tires to provide a background for the subsequent chapters.

The fifth chapter examines the existence and extends of spillovers in Antalya and İzmir city regions in detail. Having defined the relevant methodology and the appropriate reasons to choose this methodology, this chapter continues with the evaluation of both cases. Measuring the income with entrepreneurship, GDP per capita, population growth and employment growth and knowledge with the share of high education and number of patent applications, it begins with a definition of spillovers in each case from a global perspective. Then, according to results of each global perspective, local boundaries of the spillovers are drawn for each case. After this discussion, findings of two cases have been evaluated in a comparative and conclusive manner. Finally, the sixth chapter presents the original aspects of the spillover effects in Antalya and İzmir City regions and gives some conclusive remarks.

CHAPTER 2

A THEORATICAL FRAMEWORK FOR SPILLOVERS IN ECONOMIC GROWTH

Debates on spatial dynamics in the regional analyses and the space and economic growth relationship have been discussed with an increasing importance in recent years. According to an empirical literature review by Abreu, Groot and Florax , the number of empirical papers published regarding spatial side of growth has doubled after 2002. (Abreu, Groot, and Florax 2004) When we consider the reason of the increasing importance of location based studies, the reasons can be explained twofold: The first reason is the increasing importance of proximity and space within the literature seeking "success stories" and their influence on more recent studies especially after the rebirth of agglomeration discussions. (Fujita, Venables, Krugman, 1999, Dumais, Ellison, Glaeser, 1997; Henderson, 1999; Krugman, 1991 ; Ciccone and Hall, 1996, Porter, 1990, 1998 ; Saxenian, 1994 ; Roelandt, Hertog, 1998 ; Baptista, Swann, 1999) The second reason is the increasing statistical techniques and tools in the spatial side of analyses which made availability of analyses in a broader perspective and in an easier manner (Oerlemans, 2001, Bransetter, 1998, Anselin 1998, 2002, 2003, Anselin and Florax 1995)

Although the studies considering growth and innovation in relation to space takes more attention in the recent literature, the basis of these studies are much older; first signs of them were in proximity and location studies of neoclassical literature and then completed with the interaction or agglomeration studies. Besides

some differences like unit and methodology of analyses, the space-growth linkage stays in common in these interaction and spillover studies. Hence, in order to understand the rationale of spillovers it is better first to evaluate the proximity and then agglomeration studies. In this sense I will begin with a brief description of rationale of proximity related studies, then give a brief history of agglomeration and lastly try to give a theoretical framework of spillover literature.

2.1. Traditional Proximity and Recent Agglomeration Relation

In the classical economies of eighteenth century, the emphases on space and geography, was hardly noticeable, even in influential approaches such as Adam Smith, Ricardo, and Marx in terms of its role regarding development. Although Marx has dealt with the importance of space and geography in his writings a certain extent, when compared with the recent situation of the composition of space in economics, his theories seemed to be rather abstract in spatial side. Additionally, as Van Oort claims (2002), that the Smith or Von Thunnen's agglomeration theories were the bases of recent literature on agglomeration and externalities, but the content of the debates were again far from the bases of recent literature on space and growth relationship. Apart from Marshall, the discussion was on mainly reduced transport costs and accessibility, but the main source of spillovers, the freely gained advantages, namely externalities were not in discussion yet. In other words, the core of the argument was just limited with the importance of savings in the time and transport costs due to close proximity, but the increased interaction and its outcomes was not in discussion. Hence, Marshall's industrial districts theory (1890) have found to be the root of the definition regarding economic advantages of proximity and can be seen as the deriving points of today's space and growth relationship.

With Marshall's contribution in neo-classical era, the spaceless world of economy has been motivated by the new dimensions. Namely with the birth of industrial districts theory, location and proximity dynamics were seen as the key factors

which generate further growth, or make existing successful situation sustainable in the prospective time periods. That is, the main aim was the accelerating character of close proximity in this theory, by which he considers the flow of creativity and knowledge is generated with close distance. As in mentioned in Fingleton (2003) and Fujita, Krugman and Venables(1999) the influencing work of Marshall indicates the importance of localized concentration of production and makes emphases on mainly three features of benefits generated due to it. This famous trio includes labor market pooling, intermediate inputs and knowledge spillovers.

Since this famous trio can be seen as the initial definition of externalities it is meaningful to discuss its content in detail. The first benefit of such an organization was the advantages gained in the **labor pool**, which makes skilled labor available and ready within the system all the time. With local inter firm relations; share and exchange of this labor according to firm characteristics and needs caused advantage in different stages of production. These advantages gained by both employer and employee side. Because of the concentration of firms, the provision of skilled labor is assumed to be easier for the firms seeking labor and , it is assumed to be much easier to find a proper job opportunity for the job seekers due to high concentration of the job opportunities. Additionally, availability of specialized goods and services according to needs of firms within close proximity, gives a special advantage to the agents in terms of provision of intermediate inputs as well as labor. (Fingleton, 2003). Therefore, the firms with a close proximity and high interaction can obtain goods and services with exact matching to their needs, defined as the *specialization* characteristic. As cited in Jacobs (1969) another and relatively the most striking characteristic of industrial atmosphere in Marshall's theory is the advantages generated in terms of knowledge creation and spillovers. In this side of the theory, the main idea is that the knowledge created by one agent is shared by other agents whether voluntarily or involuntarily. Such an interaction due to "face to face" relationship generates both spillover of knowledge, and creation of further knowledge (Lopez Bazo and Vaya, 2001). Having owed such a background, Marshall explains his approach regarding externalities under the

circumstances of:

- Constant returns to scale
- External economies and
- Perfect competition

And concludes that, the agents with proximity advantages and agglomeration (namely clusters in his theory) are able to observe advantages mainly depending on three reasons explained above, and able to sustain and create further advantages as well.

This view of Marshall was impressive, but did not take much attention in the contemporary time; rather it is followed in later theories and has provided the bases for modern agglomeration discussions, such as the work of Krugman, (1991,1998) Romer (1999,1986), Jacobs (1993), Porter (1990,1998) or Arrow (1962) among others which will be explained below in detail.

Table 2.1: A Brief History of Space Growth Relation (Source: Author's own Elaboration)

THEORY	SOURCE OF BENEFIT	HOW IT OCCURS	OUTCOME
Smith- Von Thunnen- Ricardo	Savings	Transport costs	Money
Marx	Savings	Transport Costs Transaction Costs	Time Time +Money
Marshall	Savings Externalities Spillovers	Labor Pool Specialized Services Knowledge Spillovers	Perfect Matching Perfect Matching + Diverse Further Creation Growth Sustained Success
 **RECENT THEORIES** **i.e. KRUGMAN JACOBS MAR ROMER**			

2. 2. Recent Agglomeration Studies

When we move further to more recent agglomeration studies, one of pioneering studies was Krugman's seminal work which emphasis on both the theoretical dimension and the need for empirical justification of regional economies.

Krugman's theory gives important insides about the general situation of growth and agglomeration relationship, especially regarding the cumulative nature of agglomeration. The bases of this cumulative nature focus on the labor and claims that, sustained growth can be generated by the accumulation of human capital and knowledge. This accumulation is provided via agglomeration, and once it is provided further growth of is possible. In other words, he defines an environment, in which there is a cumulative process of accumulation of human capital

In addition, he makes a distribution of sectors and the characteristics of knowledge and knowledge spillovers accordingly. Again depending on the features of labor, he distinguishes sectors as T sector (traditional), M sector (manufacturing) and finally I sector (innovation and investment) which is also the main source of growth. Each sector is evaluated within its own circumstances; and the market power and the rules of competition therefore results obtained varied accordingly.

Within the traditional T sector Walrasian approach is assumed, in which the feature of perfect competition is provided with perfect information and no transaction costs. Since the level of needed information is relatively the lowest one among his sectoral distribution, the free knowledge has made the unit labor costs only determining factor. The second sector is the manufacturing, in which the relevant type of competition is seen as the Dixit-Stiglitz monopolistic competition, that is the larger the size of the firm, the more advantageous situation it has. As a result, he mentions the importance of firm size and increasing returns to scale for manufacturing sector, and finds profit maximization available with only minimization of labor costs, with both unit labor and number of worker sides.

Table 2.2: A summary of Krugman's Sectors

Sector	Feature	Maximization of Profit	Condition
T sector (traditional)	Walrasian	Unit labor cost	No trade cost
M sector (manufacturing)	Dixit-Stigllitz	Unit labor cost Labor quantity	Iceberg Trade cost
I sector (innovation, investment...)	Perfect Competition	Unit production cost	Perfect Mobility No mobility

The last and most important sector he considers is the I sector, in which innovation and investment is generated, as a result which is mostly linked with the development process. In the I sector, the relevant competition type is again perfect competition, but the important side is the case-wise spillovers. The dissemination and the share of knowledge created among units is in an extreme sense, either global or localized. Again, the barriers through trade of are also case wise, and either perfect mobility or capital mobility is relevant.

Again, dating back to Marshallian Industrial Districts Theory (1890), Arrow (1962) and Romer (1986) re-formalized the theory of agglomeration and with the contribution of Glaeser et. al. (1992) this theory is called as ***the Marshall-Arrow-Romer (MAR) model***. The bases of the theory are as in Marshall, asset sharing characters, the industry-specific dominance of agglomeration and externalities and the emphases on knowledge.

The most emphasized part of MAR theory in literature is the **specialization** favoring bases of the theory and **monopolistic competition** arguments which make

a distinctive character. The specialization favoring character of the theory claims that, when units[1] are specialized within a particular industry, they become more innovative. How such a specialization generates benefits is cited in van der Penne and van Beers, as "working on similar things and hence benefiting much from each others' research"(Griliches 1979). That is, specialization is seemed more acceptable while regarding positive externalities and agglomeration since the research made in similar units are easier to generate a composition of knowledge created and innovation is seemed to be more common. Additionally, they also provide the exchange of these higher levels of knowledge easier, and as a result knowledge spillovers are more common, the sustainability of innovativeness is also more relevant. (van der Panne, 2004) This argument puts the knowledge shares within the same industry to the central place of growth channels, and claims that regional concentration is meaningful only if there is an agglomeration of firms within the same industry, that is if intra-industry spillovers are more common. These intra-industry spillovers are also known as localization or 'specialization' externalities.

Another point differentiating MAR model is the power argument on local market of the firm. MAR theory claims that, monopoly in the local level holds a favoring environment for innovation. (Gleaser et.al. 1992) [2]The idea behind that monopoly supporting structure is that, if one of the firms within the local market has

[1] These units can be clusters, cities, regions etc. but the emphasized unit here is mainly the firms since the theory of Marshall depends strongly on industrial districts

[2] As well as his re-formulazing, Glaesser also makes a meaningful critique of MAR theory in terms of its compatibility with reality. *(Henderson et. al, 1995, Gleasser 1992) "It is often argued that MAR externalities reflect in the effect on local sectoral growth of the shareof the local sectoral employment in local total employment (relative concentration), holding the level of the local sectoral employment fixed. We show that this is misleading, since it is equivalent to study the effect of the local total employment, holding the level of the local sectoral employment fixed. MAR externalities correctly reflect in the effect of relative concentration, holding local total employment constant. "*

monopolistic power it has the ability to limit the flow of ideas to others. Such a restriction in the idea flows seemed in MAR model as a structure which maximizes capability to innovate more. (Combers, 2000)

Another seminal contribution to agglomeration approaches comes from Jacobs. The most important difference of Jacobs' thesis regarding agglomeration is that, in contrast to MAR's specialization approach, her argument on knowledge may spillover between complementary rather than similar industries that is the **diversification** notion. According to her diversification thesis, the units with different industrial specialization tend to be more innovative and the knowledge spillovers are more common in these diversified units. The underlying mechanism for such a rationale favoring diversified production structures is, firms' knowledge is locally competitive and also once the knowledge is created in one industry it can be applied to other industries. In other words, the exchange of knowledge between diversified firms and economic agents facilitates further research and share of knowledge is easier since the structure is complementary rather than competitive.

Again contrary to MAR theory, local market composition is different in Jacob's approach as well. Opposite to specialization hypothesis, Jacobs claims that monopoly hurts the external economies and local competition is an advantage to accelerate the innovation. (Jacobs, 1969) The main argument is the consideration of urban economic atmosphere as a whole, rather than an industry's success within a cluster. [3] Hence, the theory considers the issue from a different scale and as well

[3] Although the main argument of these studies are firms, the regional applications are also available and more relevant for the sake of this study, and mentüoned in Jacobs as well The differentiation is explained in Martin and Sunley as:

"This discrimination of units can very briefly be made in three main branches as

- *Geographical economy,*
- *Urban growth and specialization,*
- *Industrial clusters.*

concludes industries need to have a diversified and complementary character in order to grow faster.

Additionally, the notion of Jacob's competition is mainly in the field of ideas and creativity rather than standard market competition. Contrary to standard market competition principles, it mentions a cumulative effort and such an effort is a catalyst for the creation of new ideas. As a result, with being together (not in a monopolistic situation, similar scale firms composition) and complementary activities in a diversified industrial characteristic can bring more innovativeness rather than monopolistic situation.

The first one deals with the economics of industrial location, the resulting regional differences in growth, productivity or employment across the country. Without directly addressing the question of why concentration occurs, it focuses on the reasons why it should happen as in examples from jobs growth, productivity or investment The second branch focuses on the city as the unit for analysis and tries to assess the emergence, the specialization and the growth patterns of cities (Jacobs, 1969 ; Henderson, 1988, 1999 ; Glaeser and al., 1992, Holmes, 1999). The final one directly consider what are referred as industrial clusters or districts to explore the determinants of their success, and the reasons that lead firms to co-locate in a specific area

."(There is) a.vast literature on regional specialization and agglomeration externalities. As a matter of fact, depending on the case, these externalities will refer to a firm, an industry, the industrial district, the city, the metro area, the whole state, etc. Some papers might strictly consider the scale economies at the level of the individual firms, whereas some others discuss the overall benefits of local concentration and the corresponding competitive advantage for the cluster or the industrial district as a whole. Finally, many papers mix up in a puzzling way the investigation of externalities' nature and how they work..."

Table 2.3: An Evaluation of Recent Agglomeration Debates (Source. Author's own elaboration adopted from von Ourt 2004)

THEORIES	DETERMINANTS OF GROWTH	MODE OF KNOWLEDGE TRANSFER
MAR	Specialization No competition	Intrasectoral (Homogenous Producers) Local Monopoly
JACOBS	Specialization Diversity Competition	InterSectoral IntraSectoral
PORTER	Specialization Competition	InterSectoral

The last theory mentioned regarding space and economy relation comes from Porter, who makes a contribution with special emphases on geographic concentration and clusters. According to Porter, clusters are seen as the catalysts for economic development and regarded as creating advantage as well as Marshall. Deriving from an extended form of Marshallian Industrial districts theory, Porter suggests a general and specialized cluster theory which also emphases on the importance of existence of institutions, social capital and interaction among institutions. Another notion emphasized in Porter's theory is the competitiveness and competitive advantage which was originally developed for firms and individuals and rather modified for regions and nations.

Porter's argument on notion of agglomeration found to be innovative due to such a non-formulizing approach different than MAR and Jacobs' attempts to identify the roots by either specialization or diversification. It can be seen as a composition of both theories of MAR and Jacobs, its favoring character both competition and

specialization. (Porter, 1990,1998). Beginning with a special cluster definition as "critical masses in one place of unusual competitive success in one filed" Porter emphasis the importance of ***specialization*** as the source of externalities similar to MAR. Here, interaction is put in a critical place, and divided in its vertical and horizontal forms. The vertical "relations in the form of supplier- buyer relation are seen as a source, which accelerates knowledge creation and sustainability of these "newer" forms of knowledge easier. Then the form of relation is moved one step beyond classical specialization discussions, and he stresses on horizontal specializations as well as vertical ones, which indeed mentions a complementary activity like in Jacobs. What is defined with horizontal specialization is that, composition of different but interacting industries, such as the ones supporting services and infrastructure to each other, which have a competitive character in principle but complementary as well have also been meaningful contribution to the discussions of agglomeration and externalities generated among it.

2.3. Spillover Studies

With an initial definition, the underlying question of all spillover studies can be summarized as follows: "*whether an aspect occurring in a centre captured by other neighborhood regions or not?* " While answering this question with varying aspects (such as in economic growth, in knowledge, in income) some basic assumptions remain in the centre of discussion **increasing returns to scale, distance decay, externalities and the cumulative nature** of the externalities generated.

The most important common feature of spillovers theories is that, emphasis is on the involuntary shares rather than the voluntary ones, namely on the externalities. That does not mean that close proximity, high levels of interaction and voluntary shares has no effect on spillovers, but the main deriving point generating the spillovers is the dominance of involuntary shares. In other words, the spillover theories claim that, overflow of a value is unintentionally and there is no need for extra attempt to diffuse these values such as knowledge, income, R&D activities etc, hence the benefits generated are due to a hidden pattern

(Griliches, 1992, Harabi, 1997). This definition clearly explains the notion of externalities and cumulative nature of these externalities.

The cumulative nature reflects that once the positive externalities are generated, further knowledge circulation and further knowledge creation is common (Griliches,1992). (See Figure 2.1. below) With the creation of knowledge, a cumulative process begins which generate positive externalities and then result in further knowledge creation and finally sustained long term growth. Here, the main source generating such a circulating character is seen as due to tacit knowledge and unintentional knowledge shares.

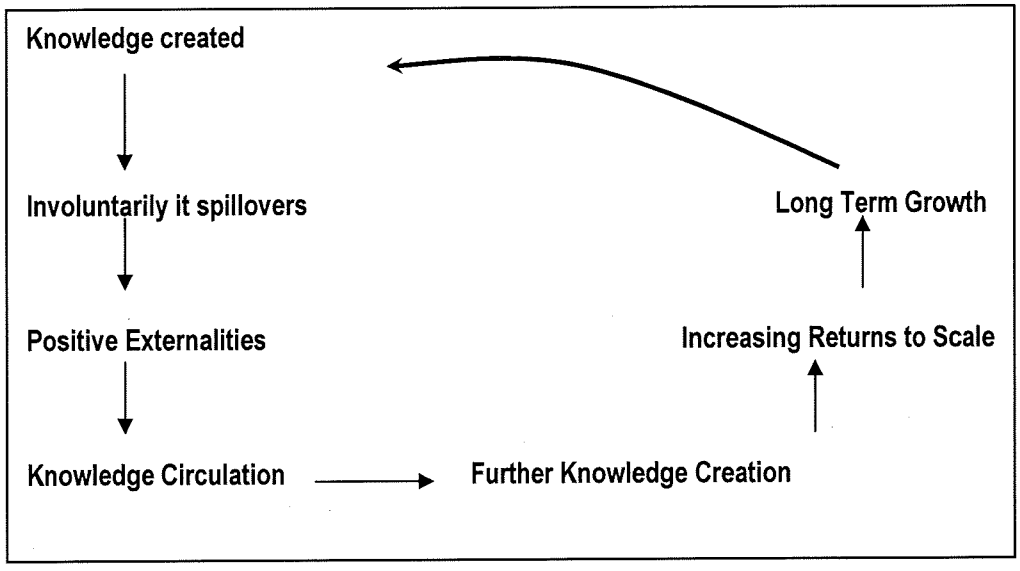

Figure 2.1: A summary of Externalities (Source: Author's own elaboration adopted from Harabi, 1997, Griliches, 1992).

As indicated in Sonn and Storper (2003) among others, geographical proximity and its role in the long term growth also have an increasing role in the literature. Here, beyond the geographical proximity, the relationships in varying degrees within it have key importance. (Storper, 1997) The range of such a relationship is

mostly negatively related with distance that is a **distance decay** function arises. Although distance decay feature is stated as common feature spillovers, one thing to bear in mind is that in many cases, we can see that the interaction may some extra-ordinary patterns which can not be defined by just taking into account the close proximity. Additional borders such as cultural or social limits, trust and reciprocity relations may also form borders apart from distance. (Saxenian, 1990; DeBresson and Amese, 1991; Maillat, 1991; Håkkansson, 1993; Fisher, 1999) Having accepted such special characteristics of interaction, we can say that proximity is a core generator of such relations, but not the only criteria. Whereas the units with close proximity tend to interact and have a stronger relationship, due to some extra ordinary conditions, such a chain could be broken. In that case, the real form of interaction besides the proximity and distance can be a more appropriate way of evaluation.

2.3.1. A Typology of Spillovers:

The studies seeking evidence in spillovers vary considerably. A main differentiation comes from the evaluation of spillovers in a space and proximity based view, which I call spatial spillovers, and the second one is evaluating in an approach independent from space and proximity dynamics, which I call non-spatial spillovers. Here, I will try to discuss both ones, but with a special emphasis the former, since the main aim of my study is to clarify the role of proximity and interaction resulted spillovers.

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The main distinguishing part of spatial and non-spatial spillovers arises in the source of the externalities. Whereas both of them considers the generator of externalities as shares and benefits generated via them, the later, non-spatial one takes its bases from voluntary shares of knowledge, regardless of the interaction among units. That is, the consideration of non-spatial spillovers arises in a framework in which voluntary shares may arise even in a cross country setting, such as introduction of a lower price of raw material, or a voluntary cooperation between two professionals. Additionally, the bases of non-spatial knowledge spillovers also favor from material and supplier-buyer relationship as

explained. below, whereas the main discussion on spatial spillover literature depends on a distance decay type of approach, mainly rooting the source of externalities to knowledge shares.

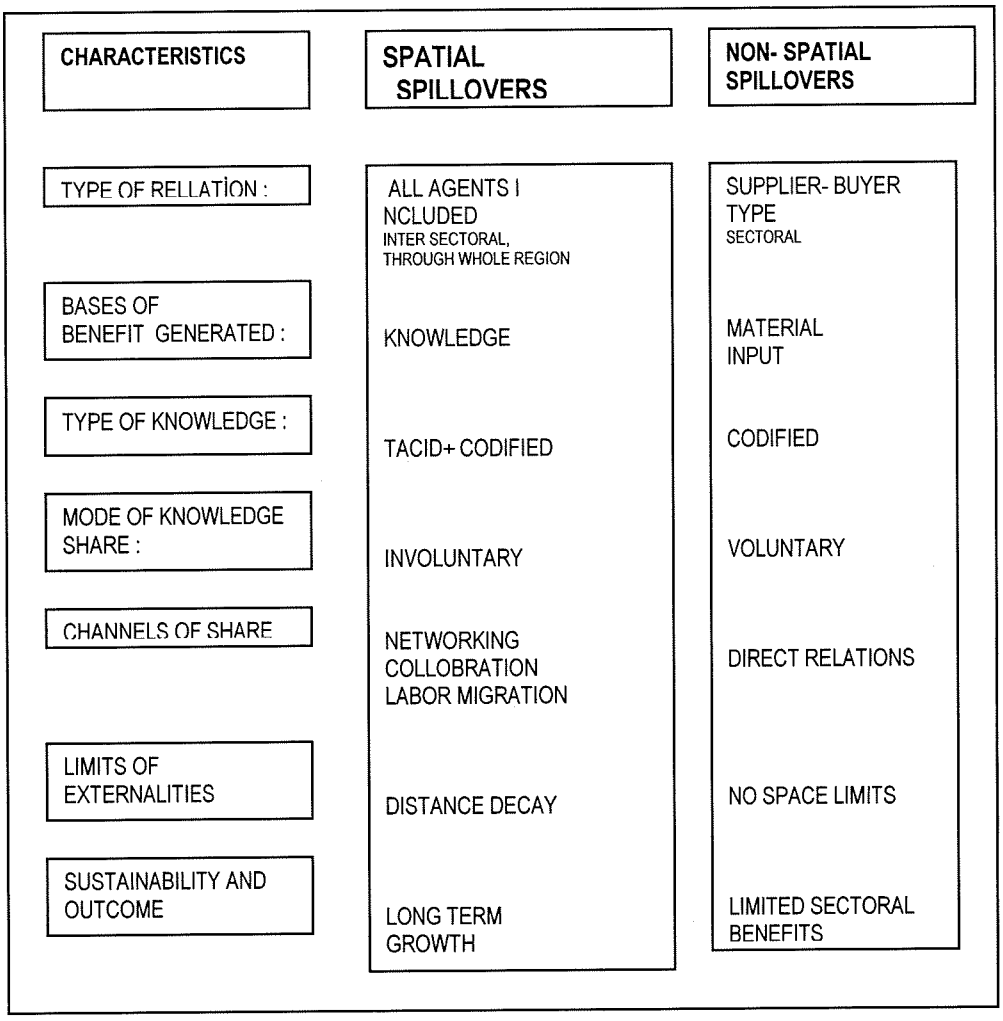


Figure 2.2: A Comparison of Spatial and Non-spatial Spillovers

In the spatial spillovers literature, the main emphases are on the knowledge flowing involuntarily, namely the tacit knowledge, which is assumed to be bounded locally and as a result have a spatial bias. Here in this part of the study, I will begin

with reviewing spatial spillovers literature and give some important examples from them, since it is important in order to be able to differentiate spatial ones from classical externality focus. Then, I will try to give a brief framework about non-spatial spillover concept and try to categorize the main sources and outcomes of the externalities regarding them.

2.3.2. Spatial Spillovers:

Spatial spillovers or proximity externalities, which dates back to Marshallian externalities concept re-emerged about two decades ago like the explanation of specialization and trade (e.g. Krugman, 1979; Grossman and Helpman, 1991; Porter, 1990), urban formation (Fujita, 1988; Krugman, 1991),and the models of spatial clusters (Baptista, 1998).the focus on innovations. Although not explicitly mentioned, the concept of spatial spillover was present in many regional growth theories, like the growth pole theory of Perroux (1955), in the export-base theory of North (1955); but the main foundations came in practice with the development of new economic geography

Constituting a uniform spillovers typology is hard to achieve, since both identification of spillovers literature diverges in a wide range with varying natures (Capello, 2005) and more importantly the existing literature fails to make a clear distinction between agglomeration studies and spillovers (Anselin and Varga, 2000). Among these large variety of spillover identifications, knowledge spillovers can be regarded as the most discussed one. (Maier and Sedlacek, 2005; Coe and Helpman, 1995; Acs et al., 1994; Anselin et al., 2000; Audretsch and Feldman, 1996; Feldman and Audretsch, 1999; Fischer, 2006; Karlsson and Manducchi 2001.) *The second* widely studied type of spillovers is intra-industry spillovers concept in which the effects generated by mutlifirms are discussed. (Barrios et al., 2003; Grünfeld, 2002; Blomström, 1989; Kluger, 2006; Audretsch and Feldamn, 2004; Markusen and Venables, 1999; Henderson et al., 1993; Moreno et al., 2003) The third one can be identified as the growth spillovers, measuring the effects of growth in a region with reference to its neighborhoods. (Arora and Vamvakidis, 2005; Holod and Reed, 2004; Cheshire, 1995; Cheshire and Carbonaro, 1996)

2.3.2.1. Knowledge spillovers:

The levels of knowledge bounded locally, accumulation of factors of production (Romer, 1990) or the "stock of knowledge capital" (Grossman and Helpman, 1990) are undoubtedly seen as on the main catalysts of long-term growth performance. Having accepted that role in advance, the boundaries of knowledge generated or used, externalities resulting from the increase in the level of technology in the neighboring regions (Lopez Bazo, Moreno 1998), regional dependence (Jaffe 1996,1989; Usai and Paci, 2000; Sonn and Storper, 2003; Fingleton, 2005; Grossman and Helpman, 1990; Anselin edt 1991; Carrington 2002) or free floating character of knowledge (i.e. Coe and Helpman 1995) and its outcomes have received special attention in theoretical discussions.

A paradoxical view regarding the limits of knowledge and knowledge flows occurs in the literature. The first one is the emphasizing the free floating character of knowledge, (Coe and Helpman (1995) which defines knowledge as a free floating factor without any limits or boundaries and the second one emphasizing the varying degrees on geographical proximity that allow actors to coordinate in order to innovate. (Acs 2002;Audretsch and Feldman 1996; Feldman 1994; Glaeser 1999; Patel and Pavitt 1991; Porter2000; Smith 1999; Storper 1997; Marshall 1890; Foray 1991)

The basic rationale of such a borderless character favors from advanced technologies enabling the flow of knowledge via different channels, to each and every part of the globe. This view, which is contradictory to spatial spillover nature in advance, is supported by the accelerating characteristics of relatively newer type of telecommunication technologies such as internet access. Unquestionably, changing technological patterns make some part of the knowledge transfer, namely "codified knowledge" easier and worth considering (Cairncross 1997). What is ignored and emphasized by the opponents of the argument is the more sticky features of knowledge, namely the "tacid knowledge" , decreasing value of knowledge via transfer process and finally accessibility to considered transfer channels. Indeed, despite all changes that facilitate transfer,

knowledge transfer is still costly and it is difficult to overcome the explained limitations of the transfer[4]

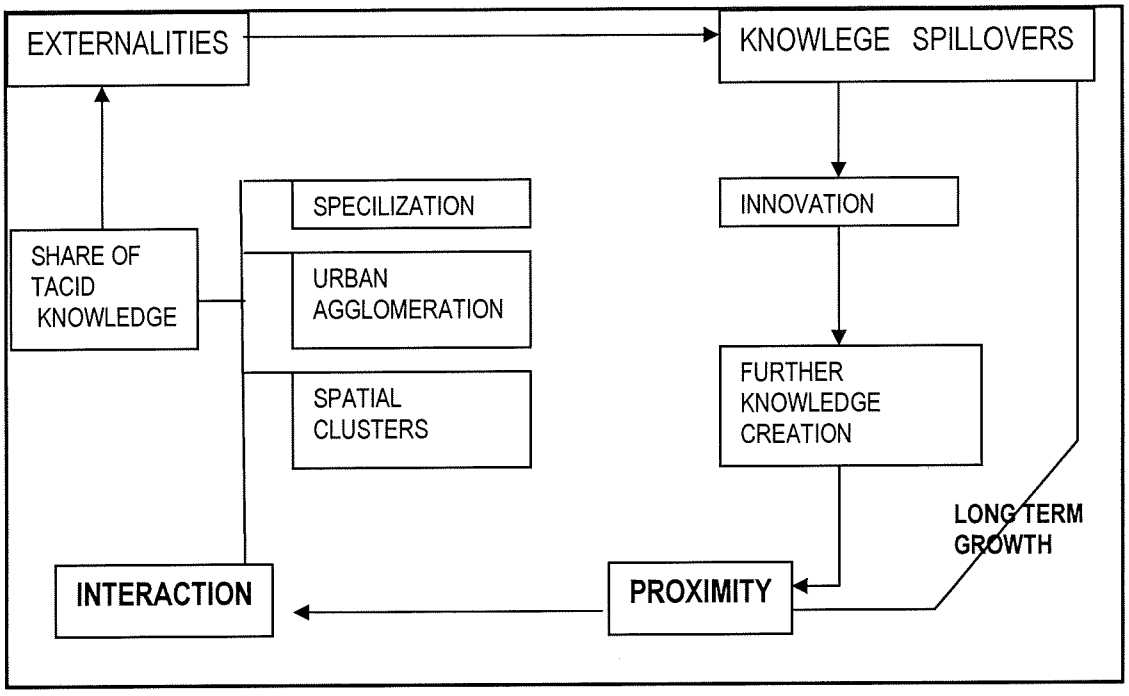


Figure 2.3: A summary of knowledge spillovers

The second approach, taking into account the limits and borders of knowledge transfer does not consider the flow of knowledge as free, and puts emphasis on the

[4] There are some forms of knowledge transfer which can be seen as relatively free or less costly. When the forms of knowledge transfer is categorized under three basic headings, intentional knowledge transfers, commercialization and movement of factors of production, it is visible that the first two forms are more likely to be boundedness and less costly regarding the last one. What is being emphasized in these no-cost and no border type of approaches is also the first two type of transfers, that is intentional knowledge transfers and commercialized type of knowledge. When intentional a knowledge transfer is considered, a good example can be publishes or patented inventions. An example for the commercialized type of knowledge can be any type of products whose inventor has given the application rights. As can be seen from the examples, these type of knowledge transfers are relatively later developments than the natural flow of knowledge and additionally, they are rarely cost free.

spatial characteristics of knowledge created and applied. Contradictory to previously explained approach, this view considers the local and non-local relations in knowledge transfer, tries to define the boundaries of transfer, and generally emphases proximity dynamics. Indeed, a broad literature has emerged, which sees innovation as a systemic process which depends on multiple interactions. The availability of this multiple interaction is structured around nodes and channels of various types of relations between innovating agents, different degrees of intensity. As a result of this, the costs and feasibility of carrying them out over geographical space is not free. (Breschi, Lissoni, and Malerba 2003). Along these lines, the systematic nature of the knowledge formulation does make the role of proximity still vital.

From the extension of such a locally bounded knowledge and limited knowledge transfer view, the role of neighborhoding areas, externalities and spillovers literature arise. How these flows occur and affect its surroundings, namely the channels of knowledge spillovers can be explained in a two way taxonomy, localization and pecuniary externalities. (Griliches ,1992) What is considered with localization externalities is a more agglomeration type of approach favoring benefits of famous effects of interaction in terms of cost reduction, and the second one, pecuniary externalities by Scitovsky (1954) which all incorporated in the new theories of industrial location and trade as engines for agglomeration (Krugman 1991; Krugman and Venables 1995; Puga and Venables 1996; Venables, 1996).

2.3.2.2. Agglomeration and Growth Spillovers

Agglomeration spillovers can be considered as a more gravity type of analyses and, in which the productivity of the firms or regions are enhanced by the dynamic form of other firms or regions, favoring agglomeration or density as well as close proximity. The rationale of agglomeration spillovers directly stems from agglomeration discussions mentioned above, and constitutes the bases with a similar foundation, namely by the *productivity enhancing tools* (Girma and Wakelin, 2000) either in the form of reduced transport costs, labor pooling or inter-industry linkages. By adding productivity enhancing tools to spillover

concept, agglomeration spillovers deals with a broader channel of spillovers, knowledge is only one of them.

By the explanation of growth spillovers, a situation is referred in which a region grows thanks to the performance of neighboring regions. In the relationship between growth and proximity trade would be the main channel for diffusion of technology and by which the growth spillovers are gathered (Grossman and Helpman1991; Coe and Helpman 1995). Keller (1997) Forward and backward linkages across regions would be the main catalyst of growth in the surrounding regions and diffusion of knowledge would strengthen the situation.

The main consideration of agglomeration spillovers is the firm level discussions, that is a remarkable increase in productivity or rant spillovers in Gleaser terms, (Gleaser, 1992), and the improving elements in this agglomeration externalities (Glàeser and Kohlhase, 2004). Important distinctions in this type of agglomeration related spillover studies comes in the form of intra and inter industry spillovers, researching whether the outcomes of single sector MAR model monopolistic environment would be more dominant or mutlisector diversified Jacobs type agglomeration is more relevant in the course of spillovers.

Although a vast majority of literature regarding agglomeration based spillovers deals with the industry spillovers, another important research consideration in this type is the urban-rural spillovers. In this context, the success of urban areas have been evaluated under their high density character, that is the agglomeration favoring discussion putting emphases on the spillovers between major metropolitan areas and their surroundings (Feser and Iserman, 2005 De Lucio 1997) This work mainly depends on the rapidly increasing spatial growth modeling literature (Rey and Boarnet, 2004), while being motivated by rural development and core-periphery relations (Hoselitz, 1955; Myrdal, 1957; Hirschman, 1958)

Another striking point of agglomeration spillovers is the magnitude of spillovers. Although knowledge and growth spillovers are always used in the meaning of positive externalities, agglomeration spillovers can be in the form of both

negative and positive externalities. The negative externalities in the industry level named as the lock-in effect prompts further growth. Expansion may also have certain adverse influences on the development of nearby less developed areas. Selective induced migration flows (e.g., out-migration of educated population from the periphery), uneven terms of trade, or other factors may offset the various advantages that proximity to an expanding center brings an outlying community (Gaile, 1981).

2.3.3. Non-Spatial Spillovers:

As understood from the nature and definition of spillovers within the economic analyses literature, they can be defined as the extra benefit gained without any extra attempt. Although in the literature the main emphases is given to spillovers and the results obtained from them, in the form of involuntary flowing knowledge and outcomes of it, with a special emphases to interaction, there are other examples of creation of spillovers which are far from discussing the role of interaction and proximity. Such type of spillover seeking studies can be seen in **market related spillovers**, in which only the natural market relations relevant regardless of proximity dynamics, and the second one is a part of **FDI spillovers literature**, which takes into account the technology transfer related issues without the role of interaction.

Market related spillovers can be seen as a result of the natural operation of market, as **a new product or process** by one of the participants of the market and can be shared by other actors. What is defined under this type it is that, when a firm creates a new product, or reduces the cost of producing an existing product, the natural operation of market forces will tend to cause some of the benefits created to pass to buyers. What is common in such a spillover concept is that, it is mostly in the form of "leakage" benefits and most of the times more concrete and direct when compared with other forms (Jaffe, 1996).

When we try to examine each agent considered within the market spillovers

framework, the most common one is the supplier-buyer relationship. The benefits generated from a supplier firm such as implementation of a new production method and lower prices are met by the buyer firm without any extra attempt. Hence, the production costs of the supplier firm and buyer one is positively related, and most of the times this flow is considered as a cumulative process and extends to end customers.

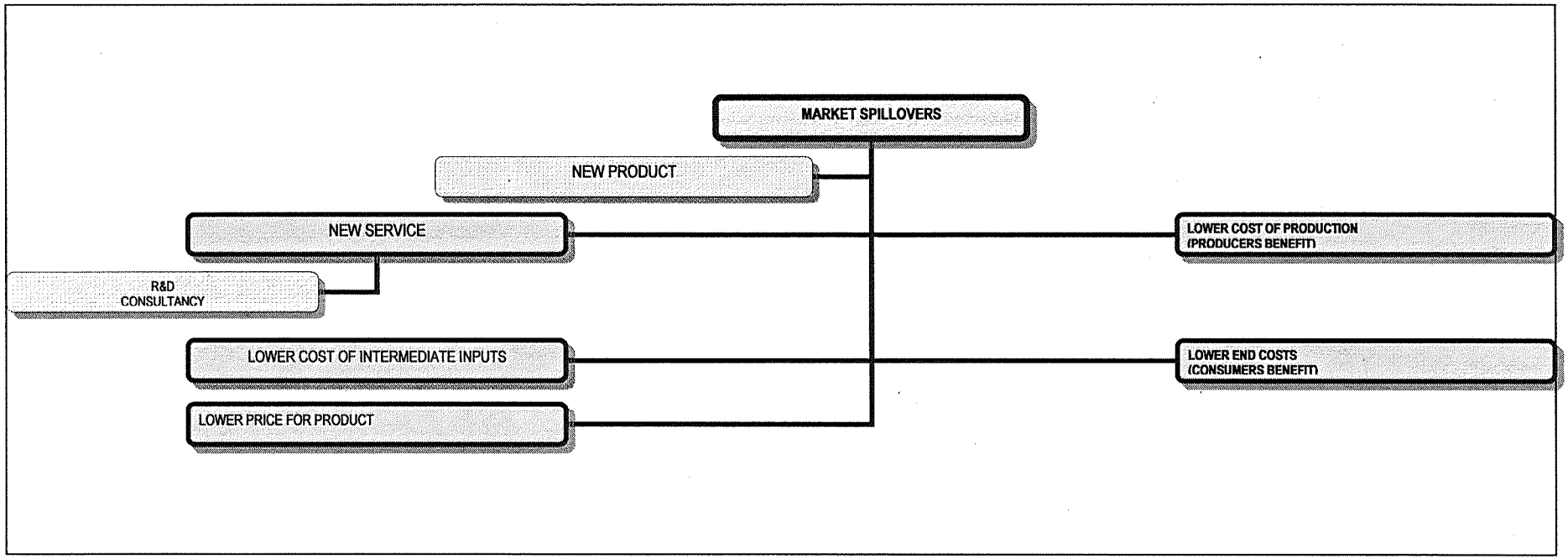


Figure 2.4: A Summary of Market spillovers

Although in Jaffe (1993), market spillovers is mainly emphasized in supplier-buyer relation, Oerlemans and Meus (2002) extends the content of relationship or "leakage" one more step beyond, and adds other factors like R&D units and consultants to framework of market related spillovers. Such an addition does not change the operation of market related spillovers, but in turn extends the content of it. Having mostly driven from knowledge economy and post-fordist system dynamics, these types of extension adds R&D and consultancy activities directly to the profitability within the system, and assures to include more factors generating spillovers within the supplier-buyer relation form.

FDI spillovers literature can be seen as a part of both spatial and non-spatial spillovers discussion. While relating spatial part of discussion, research questions like the flow of FDI and proximity relation or effects of FDI in neighboring regions is relevant and will be discussed. But in this non-spatial part of the FDI-spillover literature, mainly the benefits generated through FDI flow in the host country and technology transfer issues discussed without giving any emphases to spatial relations.

What derives the bases of FDI and technology transfer relation is that, it is assumed that investors have more advance technological infrastructures compared with the host ones. As a result, the benefits generated in the atmosphere of such a higher level of technology, will assist the lower ones in order to catch the changing patterns. In other words, when a firm moves with better-quality production facilities, higher standards of product or superior managerial activities, this movement in turn will create the catch-up process for the lower ones. This basic view underpinning the growth and FDI relation results in a technology transfer.

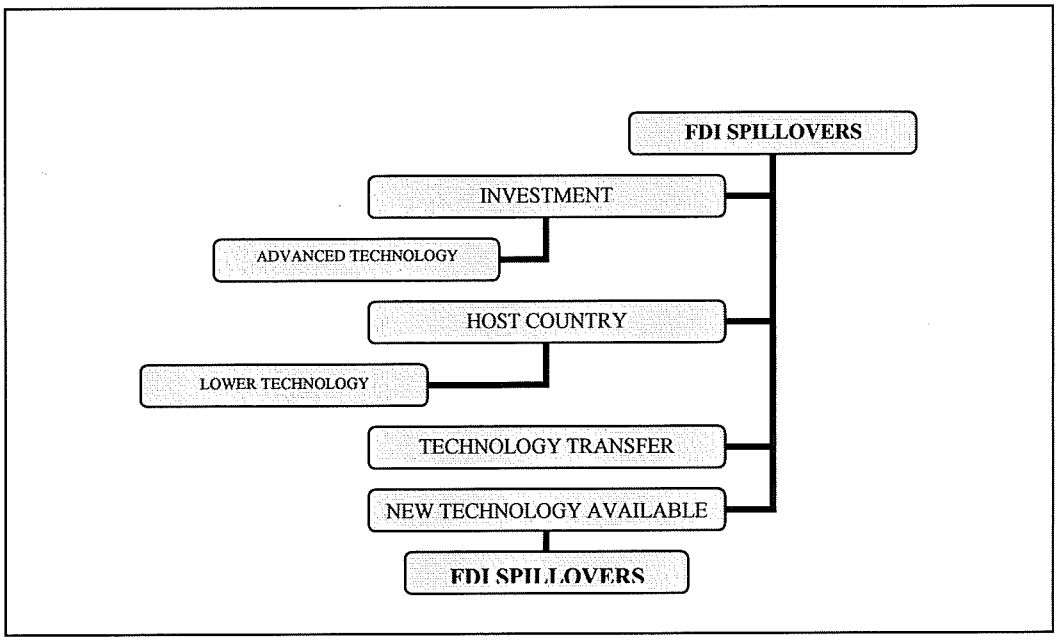


Figure 2.5: A Summary of FDI Spillovers

The rationale in FDI and technology transfer discussed up to here is relevant for both spatial and non-spatial analyses of FDI spillover literature. But, the main differentiating point is that, the studies regarding spatial subjects of FDI flow goes one step further and analyses these effects in a proximity and interaction view. The non-spatial ones, only deal with the results obtained from FDI flow in the view of growth effects; instead of taking account the interaction relations and boundaries of such a growth effect.

CHAPTER 3

STUDIES ON THE SPILLOVERS IN GROWTH OF TERRITORIAL UNITS

3.1 . Empirical Evidence for Spatial Spillovers

The debates regarding empirical evidence in innovation, economic performance and space relation are relatively recent and take place mostly in EU and the US When we consider the literature on spatial analyses we can see that a large number of the studies come from two main resources, mainly the US observations or EU examples. This can be illustrated clearly by the work of Abreu (2003), making a comprehensive evaluation of the whole space-growth relations and concluding t that 60 percent of the spatial analyses come from the US data bases. The reason of such a relatively high proportion within the literature and dominance of US based studies can be given as in two reasons. The first one comes from the availability of relevant database, and the second one is relatively earlier beginning of discussions on space- growth relationship. The second highest source of studies comes from EU examples as expected. With the help of statements by Varga (2000), the reasons of such an unequal distribution of studies regarding spatial context of growth and space can be explained. According to Varga, first of all EU is a leading actor of scientific discussions and it is more natural to see the concentration of new trends in these areas. Additionally, since these analyses are closely related with policy discussions and EU has to cope with a lot of inequality problems. As a result the importance of studies in EU is much more evident than other countries . Whereas the literature on spatial analyses may not be relevant for a generalization of the spatial patterns since they only seem to deal with a limited part of the globe, it can easily be seen that there is an increasing

importance of such studies and recently the area chosen for the analyses varies considerably.

A wide range of empirical studies regarding spillovers comes from the examples on knowledge and knowledge related spillovers such as, innovation, technological, academic knowledge or R&D. The range of measuring units and proxies varies from cross-country examples to region based studies in terms of unit side, and from spending on knowledge generating activities to employment in proxy as used. This part of the study reviews the empirical literature regarding income and knowledge spillovers.

3.1.1. Evidence on Knowledge spillovers

In recent years, a lot of literature has dealt one way or other with spillover effects in innovation and knowledge creation. The formal treatment of knowledge creation is based on the introduction of the knowledge production function by Griliches (1979). By linking R&D and human capital as the inputs and the resources of further innovative activity, the linkage between the knowledge and economic activity justified.

Having derived from this strong relationship, a bulk of empirical evidence seeking studies carried on where the existence and boundedness of knowledge and income discussed. It is observed that the scale economies that favored high level of productivity is relevant, but not adequate to explain the all determinants of success. Additionally, the firms with the largest inputs into knowledge production aren't necessarily the ones with the highest level of innovation activity. This finding is interpreted as strong evidence for spillovers in knowledge production and innovation activities. Since knowledge shows characteristics of a public good, dating back to Arrow (1962), the hypothesis that knowledge spills over from one economic actor to another is widely accepted (Wheeler and Mitchelson, 1991). However, substantial

disagreement exists about the mechanisms of these spillovers and whether they are geographically bounded (Audretsch, Feldman, 2004). Furthermore, as mentioned in Karllson and Manduchi (Karlsson, Manduchi, 2001) in those studies that deal with knowledge spillovers in a spatial context, the spatial element is seldom put forward in a satisfactory way and often given very implicitly. Additionally, the range of the studies varied in terms of spatial units in discussion as well as the definition or indicators used in the research question. As pointed out by Audretsch and Feldman (2004) the concept of the knowledge production function is strongly supported at an aggregate level; countries or industries.

One of these studies comes from **Paci and Usai (2000),** investigating the spatial distribution of innovation in Italy case. Having found positive spatial correlation by using patent applications as a proxy for innovation and innovative capacity, the authors investigate the evidence for spatial externalities among 784 Italian Labor Systems. They use a panel data of 85 sectors between the years of 1978 and 1995, and by investigating knowledge spillovers in a sectors specific locational manner they plan to assign a comparative assessment of Marshalian and Jacobian externalities. However, the results obtained from the analyses suggest that innovative activities in a local industry is positively affected by both Marshall externalities associated to productive specialization in the same sector and Jacobs externalities associated to the degree of diversity of the local system. This result favoring both types of externalities is contrary to much of the US examples as the studies indicated in the following paragraphs. Furthermore, they also find evidence for positive externalities of technological process among contiguous areas, especially in high-tech sectors.

Thera are two more supporting studies indicating the importance and high volume of effects of sector specific feature of knowledge spillovers, especially in the high-tech sectors. The first analyses from US case comes from

Anselin, Varga and Acs, (2000) discussing the sector specific distribution and spillover of academic knowledge. The paper investigates the spillovers from a detailed sectoral framework and concludes that there is no uniform pattern regarding externalities in academic knowledge. The dependent variable in their study is the number of innovations as reported in the U.S. Small Business Administration Innovation Database and their measure for industrial R&D activity is constructed from data on professional employment in high technology research laboratories. They considered innovations in four 'high technology' sectors, as Drugs and Chemicals, Industrial Machinery, Electronics and Instruments and the "Other". By using a contiguity type of approach regarding the proximity, it finds out positive evidence for knowledge externalities and also similar to former Paci and Usai's work it concludes that that university research spillovers most effective in high-tech sectors such as electronics. These results are similar to another study carried by **Anselin (2000)** also indicating that machinery and instruments sector has a strong spatial dependence pattern. The important conclusion of these three studies is that, the positive spatial dependence obtained in all cases is not attained to the existence of academic institutions. Rather than the spillover of academic knowledge, some other factors more important in creating the spatial dependence, (as the older forms of agglomeration theories) favoring labor pool or tacit knowledge shares. Another important implication obtained by these studies is that, although the spillovers resulted from day to day relationships rather than the strong presence of R&D facilities, **sector specific features of these spillovers are important in the effects of spillovers in since they are effective in more knowledge intensive sectors.**

One of the early contributions in the knowledge spillovers is an example from the US case comes from **Jaffe et. al** (1993) that measured the extend of spillovers, whether these spillovers are locally bounded or not. Defining patent citations again as a proxy for innovation, the authors try to figure out the geographical association of knowledge in the USA. Although the

methodology of the paper is not borrowing its techniques from spatial econometrics and instead it is using descriptive analyses, it is again useful to discuss these findings since it is one of the initial and influential contributions on issue. Analyzing the issue from a chronological manner, they find that the geographical localization of the patent applications have an increasing tendency since the results obtained from 1985 are more localized characteristics of patent citations than the ones in 1980 and 1985. A following study of Jaffe et. al comes from **Sonn and Storper (2003)** evaluating the proximity and innovation between 1975 and 1997 for the US case, by using patent citations as the indicator of innovative activity. The findings of the paper support spatial dependence of knowledge that was limited to the spillover within the states (US Federal states) rather than intra-state ones. Hence, this study shows a localized knowledge spillover typology exists mentioning the role of metropolitan areas, and the role of proximity dynamics is seemed to be relevant. Additionally, this study refers the increasing role of knowledge localization with a time perspective since the proximity in the creation of economically-useful knowledge appears to be becoming even more important than was in the previous period. When we combine the result of these two studies in terms of the discussions on importance of proximity over time, they both conclude that the role of proximity is not decreasing as initially expected by the globalization, and by the introduction of new communication technologies, in contrast the importance of proximity especially in the form of economic useful knowledge creation, is increasing.

Two other recent examples from the US are by ***Goldstein and Renault*** and ***Varga, Anselin and Acs***, dealing with core aspects of the knowledge creation process. Both use regional data for the United States for their empirical investigation. Goldstein and Renault focus particularly on the role of universities in knowledge based regional development. They use the fact that research universities have some specific locations. Goldstein and Renault find significant knowledge spillover effects, but only a moderate level. Varga,

Anselin and Acs tackle the question of knowledge production in a more direct way by applying a knowledge production function. They measure the output of newly produced knowledge by the number of patent applications. Since they also used pooled data, they identified regional and temporal differences in the knowledge production process. As a result, these two papers provide complementary views of the same process

Another grasp of studies come from EU, either in the form of cross country or regional analyses. One of these is **Magrini's** work, analyzing 122 major European Functional Regions in terms of knowledge spillovers and boundedness of knowledge by measuring knowledge with number of laboratories per population. With the use of distance decay approach is the study found a positive relation between growth and knowledge. Additionally, with a methodology similar to Moran's I, the paper finds out evidence for spatial dependence and (implicitly) mentioned the spillover of knowledge. Moreover, it indicated the polarization of knowledge and makes a classification of "knowledge generating" and "knowledge gathering" regions.

Similarly, **Paci and Piglaru** analyzed the innovative activity spillovers on EU, by using 131 regions. The main aim of the paper is to discuss the convergence process among EU regions, but it extends to discussions of spillovers while analyzing the convergence process. Additionally, they also analyzed the relationship between knowledge and growth spillovers which is quite rare in the literature. . The indicators used in the study are similar to the recent literature, patent citations as a proxy for knowledge, GDP per capita as a proxy for TFP (Total Factor Productivity). Testing the effects of spillovers of R&D up to third order contiguity, the paper finds out positive results in spatial dependence and concludes that neighborhood relations have a positive role on its surroundings' innovative performance. Their results show, at first, that the performance of each region does depend on that of the surrounding areas and second, that the intensity of such spillovers decrease with distance. Finally, they showed

that these spillovers are strong enough to play a role that cannot be ignored in the econometric analysis of the convergence process in Europe.

Carrington (2002) also analyzed the knowledge, with its effect on growth and tried to define the pattern of income spillovers in the EU case. His aim is to discuss the knowledge spillovers and their impacts on growth. Having applied a contiguity approach and adding the spatial dimension of income distribution to the analyses, the paper mainly deals with the effects of knowledge spillovers on the income convergence. The important point of the study is a methodology, that the neighborhood is not the same in all cases in a unit, that is geometric averages is not enough to judge the spatial effects and they obtained a model which takes into account the relative importance of each neighborhood. Similar to former examples like Sonn and Storper, the paper derives from the discussion of convergence and as a part of these analyses presents the evidence for geographical spillovers. The outcomes of their study reflects spillovers which arise from physical and human capital accumulation in neighboring regions

Another example from the EU case comes by **Oerlemans and Meus (2002)** identifying the knowledge spillovers in the case of Netherlands by using 5500 manufacturing and services firms with more than 5 employees. The important feature of this study is the attempt to discover the organizations fostering knowledge flows. The study uses a firm level survey to define the innovation and uses four different hypotheses in order to understand in which structures the flow of knowledge is more common. The concluding results are the positive spatial dependence in the innovative activity as well as the high impact of buyer-seller networks and supplier networks to firm performance. Finally, as a consequence the cumulative nature of these it has proved that regional and firm level innovation spillovers have a positive effect on the firm performance.

Table 3.1: Evaluation of Selected Empirical Studies for Knowledge Spillovers

Author Year Source	*Purpose*	*Method of Study*	*Study Area*	*Units of analyses*	*Measurement Variables*	*Results Strengths and Suggestions*
Paci and Usai (2000) *GeoJournal* 49: 381–390, 1999.	to investigate the process of spatial agglomeration of innovation and the extend of the spillovers	Global and Local Indicators of Spatial Association	Italy	Clearly identified 784 Italian Labor systems 85 Industrial Sectors	Data on innovative activity comes from patent applications to the European Patent Office (EPO) from 1978 to 1995	positive externalities of technological process among contiguous areas high tech sectors favor more from these spillovers innovative activities in a local industry is positively affected by both Marshall externalities associated to productive specialization in the same sector and Jacobs externalities associated to the degree of diversity of the local system
Anselin, Varga and Acs (2000) Papers Reg. Sci. 79, 435–443 (2000)	to evaluate the sectoral and geographic characteristics of university externalities	Spatial Econometrics Spatial Regression –Cobb Douglas Modification of Knowledge Production Function	US	USA MSAs 4 broad category sectors	dependent variable is the number of innovations as reported in the U.S. Small Business Administration Innovation Database location quotient for high technology employment	empirical evidence for the existence of both sectoral and regional differences in the innovative process. the results are sensitive to the specification of the spatial design

Table 3.1Continued

Author Year Source	*Purpose*	*Method of Study*	*Study Area*	*Units of analyses*	*Measurement Variables*	*Results Strengths and Suggestions*
Jaffe , . Trajtenberg and Henderson (1993) ***The Quarterly Journal of Economics*, Vol. 108, No. 3. (Aug., 1993), pp. 577-598.**	To evaluate the geographic localization and limits of knowledge spillovers	Standard Econometrics Descriptive methods	US	SMSA no sector specification	patent citations as a proxy for knowledge	Significant geographical localization of knowledge Research review is dated to early 1990s
Sonn and Storper (2003) ***Paper prepared for the Conference: What Do we Know about Innovation? in Honour of Keith Pavitt, Sussex, 13-15 November 2003***	To asses whether the importance of proximity and knowledge relation increasing or decreasing in spite of the global flows	T tesl Expletory Analyses	US	Multiple comparative units of analyses National level Metropolitan level	Net percentage of patents as a measure for innovation	Proximity dynamics are important both in national and metropolitan levels Proximity in the creation of economically-useful knowledge appears to be becoming even more important than was previously the case.
Magrini (1998) ***Paper prepared for the 38th Congress of the European Regional Science Association 28 August – 1 September 1998, Vienna***	To asses how bounded the knowledge among EU	A modification of Moran's I Time distance is the measure of distance	EU	122 European Functional Urban Regions (FURs)	number of laboratories per unit population for R&D specialization GDP per capita for income number of university staff employed	positive relation between growth and knowledge "knowledge generating" and "knowledge gathering" regions positive evidence for knowledge spillovers

Table 3.1Continued

Author Year Source	Purpose	Method of Study	Study Area	Units of analyses	Measurement Variables	Results Strengths and Suggestions
Paci and Piglareu (2001) in: J. Cuadrado-Roura and M. Parellada (eds), *Regional Convergence in the European Union: Facts, Prospects and Policies*, pp. 273-292, Springer, Heidelberg and New York.	the spatial pattern of the regional heterogeneity in technology and the relevance of this pattern for Europe	Spatial Econometrics Lagrange Multipliers OLS The discussion of space up to third contiguity	EU	131 EU regions	GDP per worker instead of TFP Innovation Propensity: Patents assigned	the performance of each region does depend on that of the surrounding areas intensity of such spillovers decrease with distance spillovers are strong enough to play a role convergence process in Europe
Carrington (2002) *Kyklos*, 56, pp. 381-394	Evaluate the neighbours' performance on knowledge creation and income formation Defining the effects of knowledge spillovers in the convergence process	Regression analyses A conditional convergence analyses (extended Beta Convergence)	EU	10 EU regions in NUTS2 and NUTS3 level	Proxy for innovative activity : Patents GDP as a proxy for income	The geographical spillovers thus reflected arise from physical and human capital accumulation in neighboring regions
Varga, Anselin, Acs (2008) **Spillovers and Innovation, Environment and SpaceMaler and Sealnick etd., 2008**	spatial and temporal aspects of US innovation	Spatial Econometrics The knowledge production function (KPF) framework	US	MSAs	aggregated data to the "high technology" sector, that is a set of industries where the intensity of knowledge inputs to production exceeds the industrial average	Differences in the trends of knowledge production across large US regions do not seem to be the result of a changing spatial distribution of local innovation inputs.

There are some also limited numbers of studies on knowledge spillovers other than the stuedies on US and EU regions. One of them is metropolitan Tel-Aviv case by **Kipnis (2005),** investigating the use and spillover effects of knowledge in a detailed framework. The focus of the paper is knowledge based economy and the components of it, as well as the importance of these components in the process of knowledge spillovers. Deriving Florida's seminal work, knowledge based economy is considered to be created in some key locations which provide both some physical and other (like tolerance and agglomeration of knowledge) features. The research question of the paper was based on this framework evaluate the attributes of a host milieu for a knowledge based economy and questions if Greater Tel Aviv possess the required attributes for accommodating a knowledge based economy with spillovers effects. By using a descriptive methodology the paper concludes the impact of spillover in the greater Tel-Aviv area.

In this sense, a very recent contribution is *from* Gumpecht et.al. **Gumprecht, Gumprecht and Miiller** (2008) deal with the external effects by using the methodology in the seminal article by Coe and Helpman (1995) (on international spillovers). They use a total factor productivity approach and the parallel dataset to discuss various aspects of econometric estimation in the context of spillovers. The measurement variables include indices generated from a panel data set, total factor productivity (TFP), domestic R&D capital stock (DRD) and foreign R&D capital stock (FRD). The important feature of the paper is that, by applying a different methodology it does not support significant positive spillover effects. The study which applies a panel cointegration model with random coefficients and dynamic repressors, does not support the hypothesis of international spillover effects contradicting; but brought to contradicting to the results of Coe and Helpman.

One last example of knowledge spillovers in this sense comes from Abreu et.al., which again carries a Coe-Helpman type of approach to define the spillovers in a cross-country setting. By using the volume of human capital as a proxy for TFP, they try to define whether total factor productivity

(TFP) has a positive correlation with space. In this sense, by applying a Cobb-Douglas function type of analyses they have carried out the expletory analyses with human capital and TFP relation. The results indicate a positive relation between proximity and knowledge spillovers, as well as the importance of knowledge spillovers on the TFP.

When we consider all these examples together, the main purpose of all studies was somehow the same; to explain,

- what are the limits or boundaries of knowledge spillovers,
- what are the factors strengthening these knowledge flows,
- does the changing communication methods and globalization decrease the role of proximity
- how far the knowledge spillovers is effective on the growth process

Despite these common objectives, the findings or the existence and limits of spillovers vary accordingly to different research areas. Such a contradictory case implies the sole role of units of analyses and the choice of indicators. From the point of factors strengthening knowledge flows, more or less the results are similar, that is a sector specific introduction of knowledge creation and flow is achievable. Although the definitions used in the studies vary in terms of content of the "high-tech" sector, all studies point into the flow of knowledge is much more familiar in knowledge intensive "high-tech" sectors. One other common result obtained is the effectiveness of knowledge on growth process, regardless of the indicators of growth and knowledge. Finally, although in the theoretical side there can be some arguments of decreasing role of proximity, in the empirical studies do not be support the so-called death of proximity in terms of knowledge flows.

Table 3.1 Cont.: Evaluation of Selected Empirical Studies for Knowledge Spillovers

Author Year Source	Purpose	Method of Study	Study Area	Units of analyses	Measurement Variables	Results Strengths and Suggestions
Kipnis (2005) **presentation at the Open Conference 2005: Knowledge nd Regional Economic Development, Barcelona, Spain, June 2005.**	Describe factors impinging knowledge based economy and knowledge spillovers	Descriptive	Tel-Aviv, Israel	Metropolitan level	The share of FIRE Volume of human capital	Greater Tel Aviv possess the required attributes for accommodating a KBE with spillovers effects
Gumprecht, Gumprecht and Miiller (2008) **Spillovers and Innovation, Environment and Space** **Maier and Sealnick etd., 2008**	To re-evaluate the initial example of Coe and Helpman	Spatial Econometrics OLS regression Panel regression	G7 countries	Country level	Indices regarding : total factor productivity (TFP) domestic R&D capital stock (DRD) d foreign R&D capital stock (FRD)	does not support the hypothesis of international spillovereffects contradicting to the results of Coe and Helpman.
Abreu M., Groot H., Florax, H.(2004) **Tinbergen Institute Discussion Paper**	Whether total factor productivity in terms of human capital positively correlated over space	Correlation Moran's I Lagrange Multiplier	73 countries over the period 1960-2000	Country level	TFP= Residual Human Capital : avarage years of schooling	With the application of a 6000 miles limit, the study finds positive correlation on proximity and knowledge spillovers

3.1.2. Evidence on Income Spillovers

The empirical evaluation of growth spillovers show that the growth related spillovers are mainly in cross country or cross region analysis. One of the seminal studies in cross country setting is **Moreno and Treahan's** work **(1997)** testing long term growth rates of countries with respect to their neighborhoods. Following Summers and Heston (1991) they use the rate of per worker GDP as the proxy of growth. By using a series of spatial econometric techniques they show that a country's growth rate is closely related to that of nearby countries. The sample size is determined by data availability and the sample contains ninety-three countries over the period 1965 to 1989. The distance between two countries is measured as the distance between central cities in the countries. Using the effects of trade similar to Grossman and Helpman's seminal work that emphasize the importance of trade and openness in the growth spillovers, they also mention the relative location of the countries and observe that close proximity to big markets is a positive factor on the growth of regions.

Similarly, **Ramirez and Reservas (2002)** evaluate the relation between spatial dependence and economic growth in a cross country setting by including a panel data of 98 countries for three decades and found that country's economic growth is indeed affected by the performance of its neighbors and its own geographical position. With the help of a pool cross-sectional data set, they apply Spatially Lag and Spatially Error models to determine the spatial effects. The indicators used in the study are the initial value of the per-capita GDP; the investment-GDP ratio, government's consumption ratio by turn, black market premium on the foreign exchange rate as an indicator of market distortions, fertility rate and life expectancy at birth. At the end they found the importance of the relative location and supporting Moreno and Trehan, (1997) and the significance of its own geographic location as well as the spatial relationships. . This result indicated the existence of the spillover effects.

Table 3.2: Evaluation of Selected Empirical Studies for Income Spillovers

Author Year Source	*Purpose*	*Method of Study*	*Study Area*	*Units of analyses*	*Measurement Variables*	*Results Strengths and Suggestions*
Moreno and Treahan (1997) ***Journal of Economic Growth*, 2, pp. 399-418.**	Whether a country's long-term growth depend on what happens in countries nearby	Spatial Econometrics Regression	Cross country	ninety-three countries over the period 1965 to 1989	growth in terms of rate of per worker GDP distance between two countries is measured as the great circle distance between or central cities in the countries	importance of trade and openness in the growth spillovers the relative location of the countries close proximity to big markets are also a positive factor to effect the growth of regions
Ramírez Loboguerrero (Reveras) (2002):, **Banco de la República, Borradores de Economia, no. 126, Bogota.**	the relation of spatial dependence and economic growth	Spatial Lag Model Spatial Error Model	Cross country	98 countries for three decades	the initial value of the per-capita GDP; the investment-GDP ratio government's consumption ratio by turn black market premium on the foreign exchange rate is an indicator of market distortion rate and life expectancy at birth	A country's economic growth is indeed affected by the performance of its neighbors it is also influenced by its own geographical position.

Table 3.2: Continued

Author Year Source	*Purpose*	*Method of Study*	*Study Area*	*Units of analyses*	*Measurement Variables*	*Results Strengths and Suggestions*
Koshi, (2006)	spatial dependence across EU	Spatial Econometrics	EU	110 EU regions	the initial value of the per-capita GDP	significant results
Lopez Bazo edt. **INTERNATIONAL REGIONAL SCIENCE REVIEW 30, 1: 47-71 (January 2007)**	higher intensity of growth performance effects the neighboring region	Spatial Econometrics both contiguity and distance	Spain	50 Spanish Regions 1965-97	Productivity : Labor and Value Added	The paper examines regional externalities, and provides empirical evidence for regional spillovers in terms of income.
Vayá, E., E. López-Bazo, R. Moreno and J. Suriñach (2004): **in: L. Anselin, RJ.G.M. Florax, and S. Rey (eds), *Advances in Spatial Econometrics: Methodology, Tools and Applications*, pp. 433-455, Springer, Berlin.**	Cross boundary feature of the regional externalities	Spatial Econometrics **Weights:** **Contiguity** **Distance** **Trade Networks**	Spain and EU	Spanish and EU NUTs regions	estimated the production function using data for the Spanish regions (NUTSII EUROSTAT classification) for the period 1964-1993 human capital is the fraction of the population in employment that has at least started secondary schooling	the growth rates of a region are a (positive) function of the stock of capital in its neighbors

Table 3.2: Continued

Author Year Source	Purpose	Method of Study	Study Area	Units of analyses	Measurement Variables	Results Strengths and Suggestions
Easterly, W. and R. Levine (1998): ***Journal of African Economies*, 7, pp. 120-142**	the determinants and spatial dimension of Africa's poor economic performance	Spatial Econometrics Cross country Regression	Cross Country	African Countries	initial income schooling policy strategy	for over 30 years of time, they indicate the identification of the spillover effects in the growth Statistically quantify the relationship between long-run growth and array of factors than any neighboring countries. if neighboring countries act together, growth are much greater.

The EU case is again widely in growth spillovers as well as the literature on knowledge spillovers. One of the examples comes from **Koshi, (2006)** who evaluated spatial dependence across EU and found significant results. Another example is by **Lopez Bazo et.al., (2007). In this study** the effects of income spillovers is tested with the use of data on Spanish regions in order to define whether higher intensity of growth performance affects the neighbourhoding regions. Assuming the positive effects of urban agglomeration on innovative capacity and using income as an output of this situation, the paper examines regional externalities, and provides empirical evidence for regional spillovers in terms of income.

Another well known EU example is by **Vayá et al. (2000)** which determined the growth externalities among the NUTs regions of Spain. They present a simple growth model, which includes externalities across economies and develop a methodology for testing their existence and estimating their strength by using the spatial econometric techniques. The study a trade matrix obtained from trade Networks between regions is added defined the weighted matrixes, since as well as the contiguity and distance matrixes.. In turn, they obtain evidence on the presence of significant externalities both across Spanish and European regions. It has been deduced that the growth rates of a region are a (positive) function of the stock of capital of its neighbors. Additionally, they found evidence indicating growth rates are positively affected by both investments and the existing stock available in the neighboring economies.

Finally, the last important study comes from Easterly and Levine (1998), which evaluated the determinants and spatial dimension of Africa's poor economic performance. By using cross-country regressions from a spatial econometric perspective for over 30 years of time, they identified the contribution of spillover effects on growth. They statistically quantified the relationship between long-run growth and a wider array of factors other than growth in neighboring countries. The spillover effects of growth have implications for initial income to capture

convergence effects, schooling, and policy strategy. At last they have found that, if neighboring countries act together, growth is much faster

3.2. The Importance of Spillover Effects in the City Region Context

City regions have recently been the focus of much of policy debates since the recognition of their positive attributes makes them central to processes of rapid economic growth and dynamism. The misleading interpretation of globalization as the key for an unbounded and unlimited spatial atmosphere left its place for stronger emphases on the role of differentiating spatial units and these differentiating spatial units have found to reveal in a city-region context.

A relevant definition of "city-region" would be the spatial extent of closely linked economic activities which is much more beyond the defined administrative boundaries of a city. (Simmonds and Hagr, 200) In this respect, most of the city regions include more than dozens of smaller administrative boundaries or political sub-divisions. As a consequence, these new urban forms have been the focal spatial formulation in the globalizing world with their multi-industry, significantly growing and transforming structures.

Contrary to spaceless world of growth, it has been widely agreed that globalization promotes competitiveness leading to agglomerative tendencies at different levels. (Puga and Venables, 1999; Scott, 1998) As a consequence, regional agglomeration of economic activity is accepted as the major source of growth in economies at every stage of development As evidenced by Sonn and Storper, the most striking forms of today are super-agglomerations. Super-agglomerations include diverse, dynamic and complementary forms where the flexible structure of world is caught up with a flexible organization, and the different needs of this catch-up process is met with a pool of talents, inherited advantages, specialized units as well as the powerful interrelations. These super-agglomerations form city-regions in

geographic space.

By definition, the city regions have complex internal structures comprising multiple urban cores, extended to the suburbs, and they own wide hinterlands (Courchene, 2001; Hall, 2001; Scott et al., 2001). The pattern of complementary relations between the different nodes of the city-region leads the synergy of growth. This synergy is neither the outcome of a dominant single urban core, nor the sub-centers covering it, on the contrary it is the outcome of strong complementary inter-relations arising between main area and its hinterland. The spatial proximity of large numbers of cooperating agents with dense networks of interaction provides the essential conditions for growth and development and the higher growth rates recently in major city-regions. As a result, city-regions have found to be the catalysts of development and competitive advantage.

There is an increasing amount of evidence that creativity and learning have a special geography, with regions playing active roles as sites of continuous learning. Additionally, these regions are the nodes where both informal forms of the knowledge are generated. This process of bounded and cumulatively improving character of the knowledge made available and creatable within certain places, dense urban centers and city-regions being the two most important ones. (Jaffe et al, 1993; Russo, 1985; Saxenian, 1994; Scott, 1999).

How city-regions sustain their leading role in the global economy and new ways of competitive advantage. In the knowledge based economy, main sources of the competitive advantage became innovation and knowledge creation and in this sense, city-regions, as the complex, reflexive and multi-actor organizations are seen as the leaders of knowledge creation, growth and the competitive advantage.

Spillovers in this process play a vital role. The dynamic advantages and

competitiveness gained in a city-region can only be evidenced by the spillovers where the interaction among different spatial units generates benefits which can not be created otherwise. The key point arising in this manner is the effects of positive externalities, especially knowledge spillovers. Knowledge spillovers, which help to support the rate of innovation and to promote long-term growth, are vital for the generation of the competitive advantage. (Audretsch and Feldman, 1996; Jaffe et al., 1993) Additionally and more importantly, the outcomes of knowledge spillovers contribute to the overall development of city-region. In short, with the help of spillovers, city-regions are able to both act as a leading actor in the overall economy, and they are also able to initiate growth in their hinterland.

As a result, the city-regions can be seen as the new catalysts of the sustainable economic development as the centers of interaction. In this sense, the roles of the policy makers have significantly changed in order to cope with the changing structure of the new spatial formulation. As we have been discussing so far, one of the main generator of this successful forms of urban agglomerations is the externality favoring nature. In other words, the spillovers have vital importance in the process of development and coping with the flexible structure of the globalizing world.

The nature of this spillovers are unintentional and made mostly from the intrinsic features of the interaction among differentiating units, but this does not mean that the ways to promote spatial spillovers are not evident. First of all, elimination of all physical boundaries can be an important and essential policy step which has been in discussion for a long time. Among this initial physical boundedness, another important and relatively more recent policy decision would be the elimination of institutional barriers. The promotion of this type of institutional networks can be achievable in any form of common objective among and beyond region, such as the constitution and enhancement of economic, research and development based, social and governance networks.

As a result, spatial policy should not be restricted to the local or regional boundaries. Spatial externalities relevant in local atmosphere are also relevant in larger extents. The achievement of higher levels of spillover effects and competitiveness throughout the whole region can only be carried out when the policies are discussed and applied in a broader manner. The first policy in this manner would be the constitution of a higher level political institution representing the whole city-region. As well as constitution of upper-level political institutions which will be responding the needs of the city-region as a whole smaller political levels as the parts of this new institutional atmosphere also must be able to behave in a participatory manner. Local policy makers should be open to the argument of spillover effects from nearby spatial units, and they must be open to joint decisions and policies instead of promoting only within their own spatial units.

3.3. Summary of the Existing Studies and the Hypothesis:

The effects of spillovers have generated a large body of research from different point of views. In this part of the study a summary of some important hypothesis in existing studies will be given. Obviously, it is not possible to mention each hypothesis of whole literature in this part, but some important and commonly argued ones can be given to provide a base for our further analyses.

The first and one of the most important hypotheses in this sense is the inevitably strong relation between the knowledge creation and growth performance. The way of competitiveness in the globalizing world is defined as the capacity to innovate, and the relation between the level of knowledge and the higher levels of growth found to be vital.

The second hypothesis of the spillover studies is the proximity dynamics. Following Tobler's first law "*everything is related to everything else but near things is more related than distant things*" (Tobler, 1979) the distance and interaction are in the central place of spillovers. Externalities resulting from high levels of interaction, increasing potential to create knowledge and

productivity enhanced by the creation of knowledge are defined as the bases of higher levels of growth rates and competitiveness.

The third one is, in addition to proximity dynamics, the crucial role of cities or urban agglomerations in the knowledge creation is emphasized by a number of cases. The classical agglomeration benefits in the firm or cluster level are extended to city and more recently to city-region level. The complex structure of social and economic relations necessary to gain competitive advantages found in this city-region context which includes a mixture of dynamic settlements with complementary features. Urban agglomerations are the nodes for sufficient value of talent, as well as they are the centers of flexible formations which is essential for ongoing globalization trends. Therefore, the vital role of urban centers, not only for their own hinterland but also for a larger extends, is another important hypothesis of the existing literature.

The fourth hypothesis can be set as the positive effects of specialization on the growth process. When the units concentrate on similar things, they benefit from each other's sources more, since the areas of interest and the necessary resources are similar. This similarity resulting from specialization creates a capacity to innovate more and these higher levels of knowledge creation foster knowledge spillovers which result in higher rates of growth.

Fifth, the contribution of entrepreneurship activities on growth and knowledge spillovers generated a large number of researches. Since the entrepreneurs are assumed to be free to select the places they will invest, they are also assumed to locate in the areas with strong knowledge assets. This investment tendency will create new employment and new opportunities. As a result, the concentration of new ideas and talents in an already knowledge rich environment will provide further growth.

Sixth, the increasing share of service activities is another hypothesis regarding the competitiveness of the regions in the globalizing world. Parallel to the changes

in the production, increasing need of diversified types of services to support the new forms of flexible and innovative production is another issue in consideration. In this sense, increasing share of services activities as a combination of different types of services defined as a necessity.

In summary, the research on the knowledge and income spillovers revealed a large number of different hypotheses linked to each other. Obviously, the factors affecting the knowledge and income spillovers are not limited with these hypotheses; as well as the knowledge and income spillovers are not the only indicators of the competitiveness of the regions in the globalizing world. However these common implications are still worth discussing in a case specific manner.

CHAPTER 4

THE CASE STUDIES

It is clear that the issue of connectivity between core cities and their neighboring areas plays a key role in the explanation of economic performance of regions. Concentration of economic activity, increasing interactions between people, firms and institutions in neighboring spatial units provide economic benefits and generate positive externalities in the form knowledge. As well as the knowledge creation, sustainability and growth of the regions effected by high levels of interaction. The conditions sustaining these high levels of interaction and larger scale operations are beyond a single city's assets and include a mix of different spatial units. Along this line, our analyses based on two city-region level cases, Antalya and İzmir City-regions.

Overall, in Antalya City-region 39 and in İzmir City-region 46 districts have been in consideration. The definition of boundaries of the City-regions made through the analyses carried out at METU department of City and Regional Planning in the lectures of RP 501 Regional Planning Studio in fall 2005 and fall 2006. The network analyses have been applied to see the linkages between settlements. The networks are tested by using a municipality level questionnaire referring all levels and types of relations among settlements such as trade, commuting or governance networks. Then the results obtained from these questionnaires have been analyzed by using UCINET and the settlements with a strong relation in terms networks have constituted the boundaries of our city regions.

As expected both regions comprise spatial units in varying characteristics, and it is useful to give a summary of each region in order to prepare a baseline for the analyses of the spillovers discussed in chapter 5.

In this sense, this chapter outlines some key features of each city region with different indicators, namely beginning with the *employment and population structure*, *the level of entrepreneurship*, *income in terms of GDP per capita and finally education and innovation levels in terms of patenting* which then is used to evidence the spillover effects.

4.1. İzmir City-region

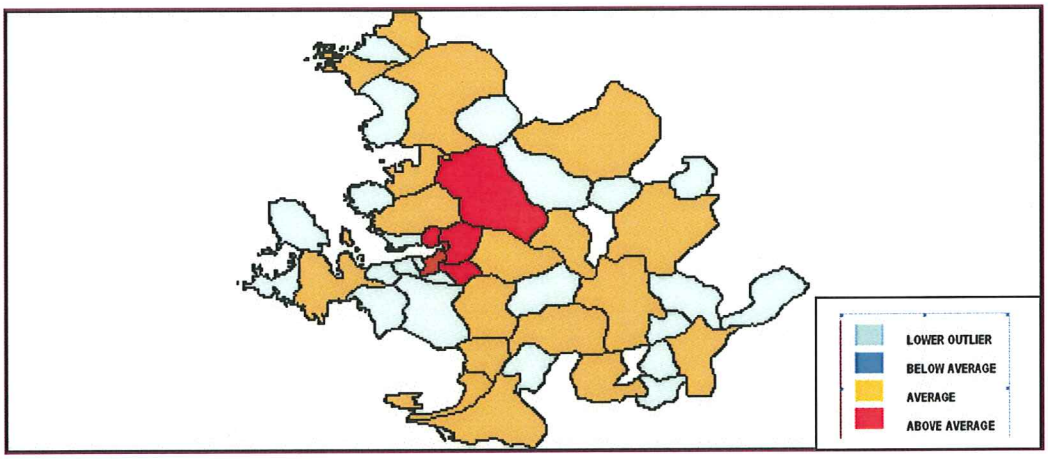
4.1.1. Izmir City-region Employment and Population Structure

While considering economic growth of the regions, employment growth has been at a focal point of the indicators defining the rate of growth. Population growth also is another complementary indicator and it additionally indicates the changing spatial distribution. (Henderson et.al, 1995) In this part of the study these two measures have been used to figure out the changing pattern of the İzmir city-region between 1990 and 2000. Giving these structural changes would provide a baseline for the further evaluation of the spillover effects since these two indicators were used also in the definition of income spillovers in chapter 5.

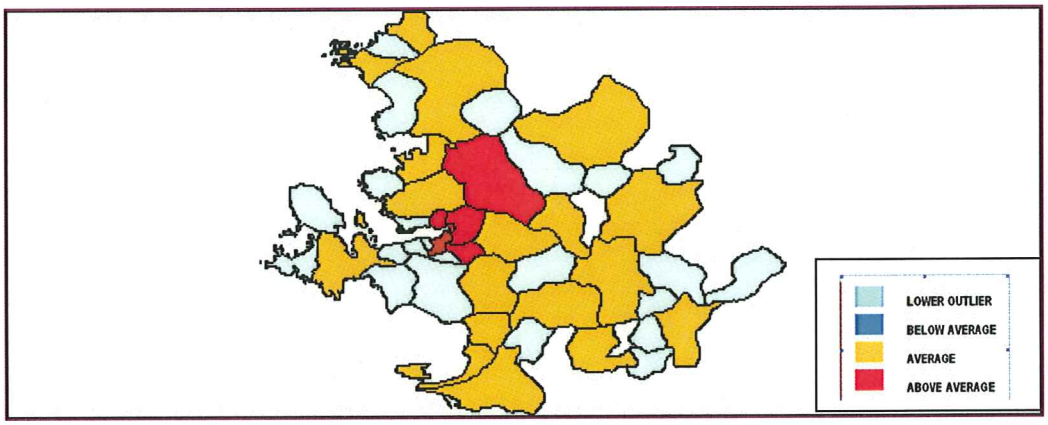
Before the discussion of growth patterns of economic activity and population; it is useful to determine the initial picture of them for both the years of 1990 and 2000. If we begin with the general distribution of employment within the region, overall, a two facade picture can be observed, with a highly urbanized, dynamic and core metropolitan area in the centre and a more traditional oriented periphery with complementary characteristics.

As can be seen from the following Map 4.5 and Map 4.6, the main centers of economic activity and population are the main metropolitan area of the region. When the distribution of economic activities concerned, in terms of total employment four major districts, Konak, Bornova, Karşıyaka and Buca have important roles. (Table 4.1) Overall, hiring more than half of the total employment among region, these four districts constitute the leading

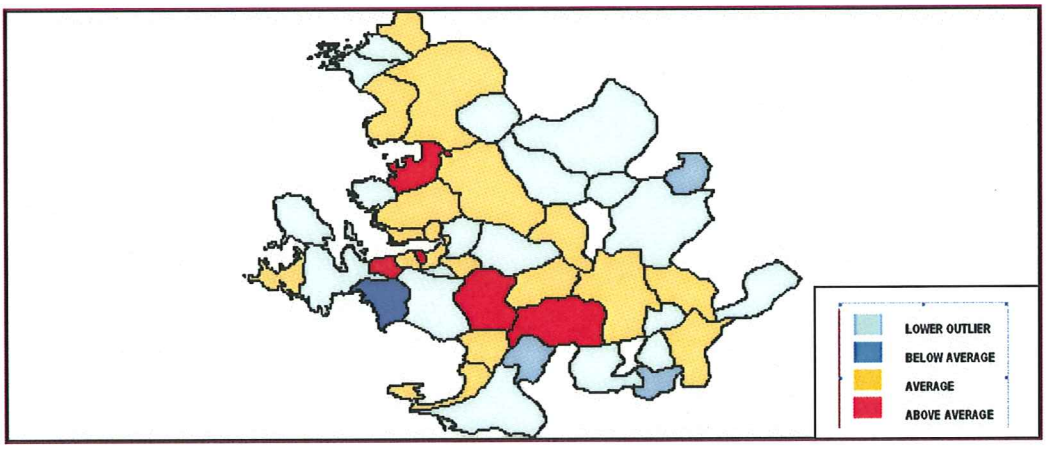
economic activity center for the entire region. When we consider population, a parallel pattern to economic activities is observed. in which the distribution of population is again concentrated in the main metropolitan area. We observe the dominance of settlements around the core such as Konak, Karşıyaka, Buca, Bornova and towards the periphery, Manisa City Center, and Kemalpaşa, (Map 4.2)



Map 4.1: General Distribution of Population 1990

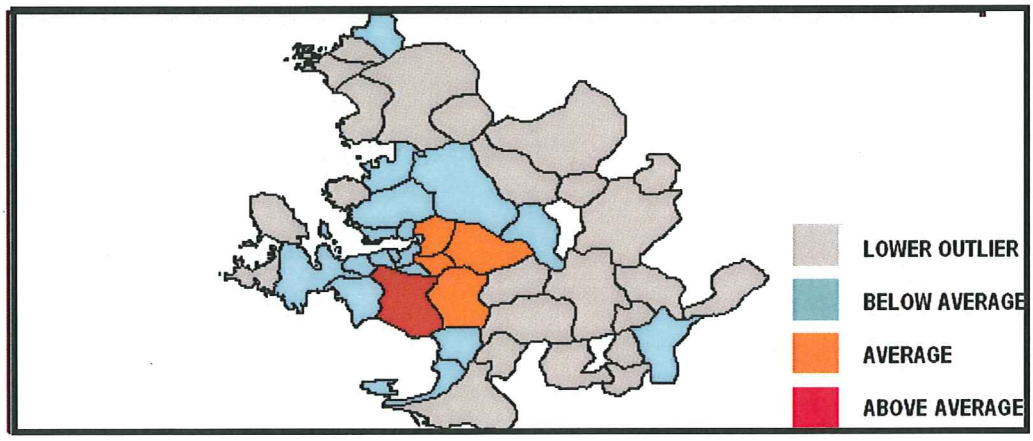


Map 4.2: General Distribution of Population 2000



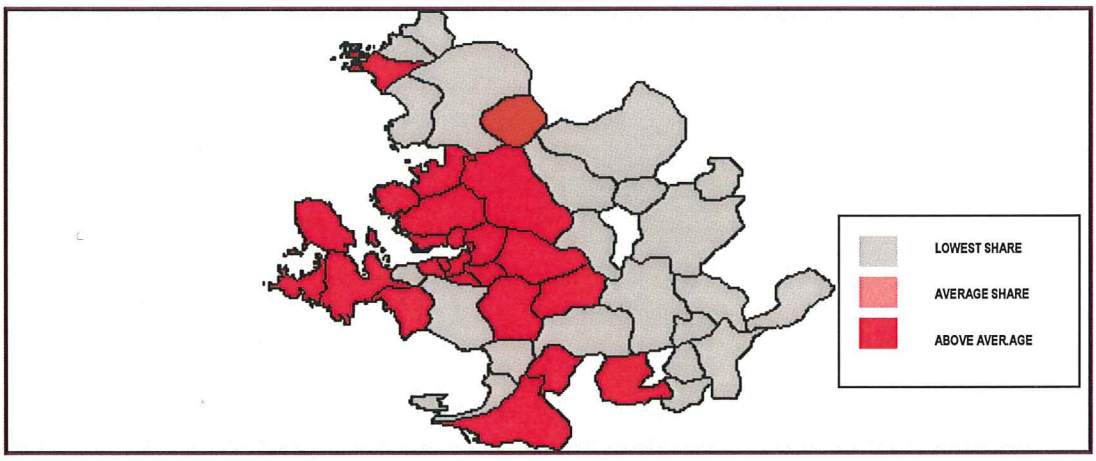
Map 4.3: Population Increase

It is also useful to make a comparison of the relative importance of metropolitan area between 1990 and 2000. We observe that the core is keeping its importance, additionally; for employment, mentioned settlements are all employment population gaining settlements. (Table 4.1) We see that from 1990 to 2000, the share of Konak increases to 30,5% from 29,7%, the share of Buca increases 8,2% from 6,3% and the share of Bornova increases from 9,9% to 11,8%. Only Karşıyaka settlement has a decrease in the share of its employment from 13,0% to 11,9 %. Along with these results, we can say that the settlements with a high level of initial employment value are keeping their dominance and continue to grow further Additionally, as well as keeping their role in employment, they also keep their dominance in population. Besides the assessment of the relative role of the core area between two time periods, one other important thing is the highest shares of employment increase. Map 4.4.represents the standard deviation of employment growth. As can be seen from the map,, the settlements adjacent to the core have highest increase in employment. These settlements are Menderes, Torbalı, Buca, Kemalpaşa and Bornova respectively. The core metropolitan area also has a tendency to increase its employment, but with a moderate level

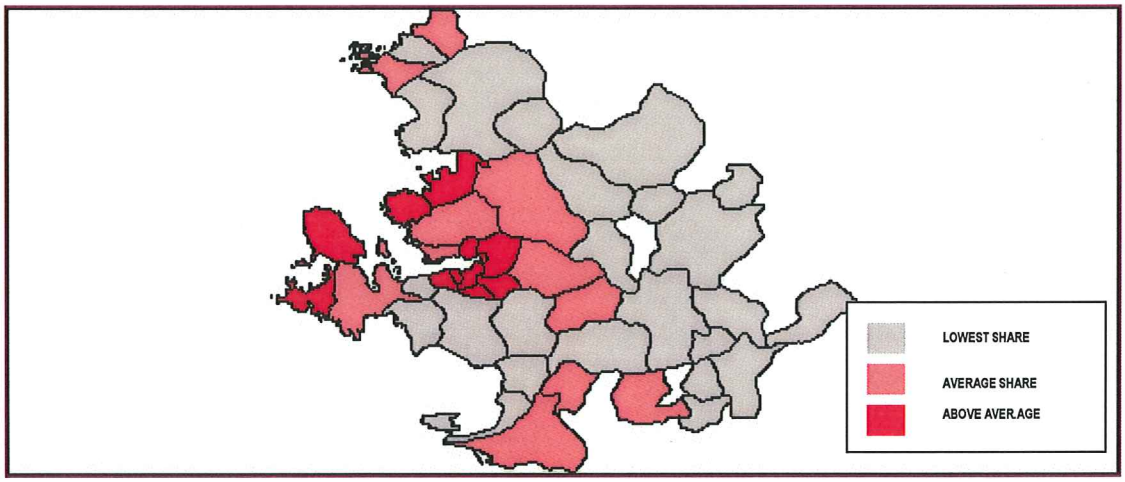


Map 4.4.Standard Deviation of Employment Growth

As well as the employment growing settlements, an observation of employment losing settlements is also relevant. When we consider the settlements with a high level of employment loss, six different nodes of the region observed with an employment decrease more than two percent. When we consider the sectoral dynamics in these settlements we see that the employment loss is not a random fact. Apart from Karaburun, all settlements are dominant in agriculture such as Köprübaşı, Yenipazar, Kınık, Germencik and Beydağ. In this sense, another important trend in the region can be as the employment losing settlements are the undersized agricultural oriented ones.



Map 4.5: General Distribution of Economic Activities among Region 1990



Map 4.6 General Distributions of Economic Activities Among Region 2000

TABLE 4.1 PERCANTAGE SHARES OF ECONOMIC ACTIVITIES AMONG REGION 1990 -2000

	TOTAL		AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY GA		CONSTRUCTION		TRADE		TRAS .COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
AYDIN	3,29	3,51	1,28	2,00	9,76	10,95	2,20	1,84	5,24	4,91	3,72	3,97	3,28	3,38	3,79	3,45	3,43	3,47	5,11	5,1091
GERMENCIK	0,46	0,69	2,24	0,62	0,21	1,08	0,29	0,24	0,29	0,64	0,30	1,74	0,31	1,09	0,32	0,60	0,23	0,64	0,60	0,599
KUSADASI	1,48	0,20	0,48	0,80	0,62	0,09	0,44	0,21	0,53	0,16	3,11	0,32	3,45	0,17	1,96	0,15	1,44	0,07	0,14	0,1382
NAZILLI	2,37	0,18	3,10	1,01	5,84	0,09	1,81	0,10	2,36	0,16	3,11	0,12	2,57	0,14	1,98	0,13	1,97	0,13	0,17	0,1661
SOKE	1,90	2,33	4,20	4,08	12,16	3,02	1,25	1,94	0,98	1,79	2,14	3,17	1,57	2,48	1,30	1,58	1,40	2,08	2,30	2,2952
SULTANHISAR	0,20	1,68	0,77	5,39	0,14	10,68	0,08	1,29	0,23	0,85	0,14	1,81	0,12	1,47	0,18	1,03	0,19	1,35	1,71	1,7123
YENIPAZAR	0,37	0,20	2,26	2,04	0,00	0,09	0,11	0,07	0,27	0,12	0,16	0,13	0,23	0,14	0,12	0,08	0,14	0,09	0,15	0,1531
AYVALIK	0,85	0,78	0,73	1,16	0,34	1,13	0,72	0,50	0,78	0,68	1,57	0,96	0,93	0,95	0,94	0,73	1,00	0,79	0,78	0,7845
BURHAN'YE	0,80	0,80	1,24	1,56	0,62	0,68	0,28	0,33	0,59	0,83	1,37	1,33	0,60	0,72	0,68	0,62	0,61	0,70	1,06	1,0576
GOMEC	0,12	0,11	0,50	0,61	0,00	0,14	0,05	0,04	0,00	0,06	0,24	0,18	0,10	0,09	0,14	0,12	0,03	0,07	0,10	0,1037
BORNOVA	9,87	11,78	3,59	1,64	15,88	9,68	13,58	14,78	16,08	16,06	8,12	9,96	7,84	10,40	9,03	13,62	8,77	11,41	10,70	11,853
BUCA	6,33	8,25	0,62	1,14	2,47	2,75	8,66	10,12	7,23	8,43	7,01	9,20	6,05	8,32	7,21	9,26	7,15	8,46	11,85	7,3004
KARSIYAKA	13,07	11,93	4,28	1,67	7,63	6,22	15,02	12,66	15,40	12,02	15,61	12,93	13,34	12,93	14,36	13,10	19,71	17,39	7,30	10,699
KONAK	29,70	30,49	10,67	6,47	9,35	12,07	31,88	30,93	28,92	26,63	25,21	25,28	34,51	33,04	33,70	33,49	36,32	35,03	32,04	32,045
ALIAGA	1,01	1,13	0,21	0,26	1,24	2,03	1,99	1,88	3,38	4,39	1,04	1,41	0,59	0,82	1,45	1,37	0,71	0,80	0,73	0,7348
BAYINDIR	0,53	0,42	2,54	3,48	0,07	0,14	0,25	0,20	0,29	0,40	0,21	0,28	0,40	0,33	0,31	0,21	0,28	0,19	0,32	0,3246
BERGAMA	1,51	1,35	2,56	3,32	1,86	9,59	1,13	0,89	0,96	0,99	1,19	1,26	1,52	1,35	1,12	1,07	1,00	0,96	1,55	1,5468
BEYDAG	0,19	0,13	0,51	0,52	5,09	0,18	0,15	0,11	0,14	0,12	0,14	0,14	0,15	0,12	0,18	0,09	0,21	0,07	0,11	0,114
ÇESME	0,91	0,73	0,66	0,66	0,41	0,23	0,35	0,26	0,31	0,48	2,10	1,30	1,60	1,11	0,77	0,80	1,67	1,10	0,67	0,6702
DIKILI	0,38	0,34	1,07	1,25	0,55	1,80	0,10	0,13	0,29	0,28	0,62	0,54	0,35	0,37	0,58	0,36	0,33	0,33	0,32	0,3155
FOÇA	0,85	0,74	0,25	0,31	0,00	0,09	0,10	0,11	0,14	0,28	0,38	0,17	0,31	0,39	0,28	0,26	0,27	0,36	1,89	1,8897
KARABURUN	0,15	0,09	0,43	0,04	0,00	0,05	0,05	0,02	0,14	0,26	0,26	0,16	0,11	0,09	0,17	0,10	0,08	0,17	0,13	0,1346

TABLE 4.1 CONT. PERCANTAGE SHARES OF ECONOMIC ACTIVITIES AMONG REGION 1990 -2000

	TOTAL		AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY GA		CONTRUCTION		TRADE		TRAS .COMMINICAT		FIRE		OTHER	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
KEMALPASA	0,50	0,62	0,91	0,75	0,27	1,62	0,64	0,91	0,41	0,60	0,66	1,08	0,30	0,46	0,49	0,66	0,28	0,36	0,33	0,37
KINIK	0,93	0,40	6,69	5,12	3,23	4,37	0,16	0,11	0,31	0,24	0,22	0,15	0,21	0,18	0,30	0,19	0,21	0,14	0,28	0,21
KIRAZ	0,29	0,21	0,90	0,48	0,07	0,05	0,15	0,15	0,18	0,30	0,21	0,23	0,27	0,22	0,23	0,16	0,17	0,11	0,29	0,23
MENDERES	0,28	0,49	0,74	1,70	0,41	3,06	0,23	0,62	0,41	0,40	0,10	0,49	0,24	0,39	0,55	0,48	0,21	0,28	0,20	0,30
MENEMEN	1,06	1,20	1,09	1,81	0,55	0,59	0,78	1,35	0,59	0,93	0,74	0,99	0,77	0,91	0,88	0,99	0,59	0,66	1,75	1,38
ÖDEMIS	1,78	1,54	4,33	5,43	0,41	0,50	1,34	1,12	1,25	1,39	1,67	1,70	2,04	1,79	1,59	1,06	1,05	1,00	1,41	1,32
SEFERIHISAR	0,48	0,52	0,98	1,08	0,00	0,05	0,11	0,27	0,16	0,30	1,28	0,73	0,30	0,37	0,38	0,37	0,28	0,61	0,61	0,72
SELÇUK	0,78	0,72	2,51	2,73	1,17	0,27	0,27	0,25	0,39	0,44	1,23	0,72	0,96	1,19	0,70	0,67	0,44	0,44	0,48	0,59
TIRE	1,36	1,13	3,66	4,37	3,85	2,21	1,15	1,06	0,70	0,87	1,23	1,24	1,30	1,05	1,05	0,89	0,75	0,62	1,01	0,87
TORBALI	0,72	0,96	1,82	2,18	0,07	0,68	0,52	1,14	0,51	0,70	0,82	1,31	0,61	0,82	0,73	0,81	0,50	0,73	0,58	0,72
URLA	0,93	1,05	1,93	1,54	2,41	0,77	0,39	0,45	0,68	0,79	1,07	1,52	0,87	0,96	0,89	0,79	0,75	1,06	1,15	1,48
MERKEZ	5,77	5,89	4,06	5,46	3,44	4,41	6,85	7,46	4,38	5,60	5,35	5,68	3,91	4,44	3,61	4,15	3,15	3,81	7,72	6,36
AKHISAR	2,54	2,02	7,34	6,23	3,64	3,15	1,44	1,45	2,07	2,27	2,56	2,19	3,01	2,46	2,06	1,77	1,58	1,29	1,90	1,71
GÖOLMARMA	0,49	0,34	3,71	4,11	0,48	0,50	0,11	0,13	0,20	0,14	0,13	0,38	0,16	0,14	0,19	0,12	0,11	0,08	0,19	0,17
KOPRUBASI	0,18	0,11	1,20	0,67	1,17	0,05	0,04	0,04	0,14	0,12	0,05	0,10	0,07	0,08	0,14	0,11	0,05	0,07	0,10	0,11
SALIHLI	2,26	1,91	3,79	3,79	1,92	1,71	1,91	1,47	1,29	2,13	2,40	2,20	2,42	2,12	3,13	2,43	1,48	1,53	1,93	1,77
SARIGOL	0,39	0,34	1,87	2,71	0,14	0,00	0,16	0,15	0,27	0,36	0,23	0,38	0,33	0,27	0,19	0,14	0,16	0,17	0,28	0,26
SARUHANLI	0,53	0,37	2,96	2,51	0,21	0,05	0,30	0,34	0,49	0,34	0,22	0,29	0,21	0,24	0,28	0,20	0,22	0,19	0,32	0,25
Turgutlu	2,38	2,27	5,32	7,31	2,34	3,24	2,95	2,91	1,00	1,57	2,08	2,21	2,10	2,02	2,05	1,76	1,11	1,18	1,41	1,44

In a city-region context, as well as the distribution of activities, the sectoral pattern, that is the dominance and specialization of these activities are vital discussions. Since the interaction among these differentiating units generate the complementary and synergetic pattern of the city-region, a discussion of different centers of each economic activity would be relevant.

In this sense, here firstly the dominance and then the specialization pattern of each sector and each settlement have taken in discussion. In order to see the initial picture of economic activities among region, it is useful to begin with the main centers of each economic activity.

If we begin with the most dominant ones, Konak[5], hiring 30 % of the total employment and highest shares in all sectors apart from agricultural employment, found to be the primary area of the region. As well as this dominant role in total economic activities, Konak keeps its dominance in the share of all sectors with a share of more than 25 percent in all sectors apart from agriculture. When we consider Karşıyaka, the settlement also has an important role by including more than 10% of total employment in 7 different sectors. These sectors are manufacturing, electricity and gas, construction, wholesale and retail trade, transportation and communication, FIRE and finally social and individual services. (Table 4.1)

Besides Konak and Karşıyaka, some sector specific dominant settlements can be given as :

- Aydın, Sultanhisar, Bornova and Söke in mining (about 10% shares)
- Kınık, Ödemiş, Manisa City Center, Gölmarmara and Turıgutlu in agriculture (about 5%)
- Bornova, Buca and Manisa City Center in manuıfacturing (from 7 to 14 percantages)

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[5] Konak district mentioned includes three former districts in order to maintain comparable results between two time periods of data obtained. Therefore, it is meaningful to keep in mind whenever Konak is mentioned its former three districts are also included.

At this point, another important implication would be the change in the pattern of the sectoral distribution between 1990 and 2000 for the core area. By comparing the percentage share of settlements in each sector in two time we can find out the changes above 2 percent as follows:

- Increasing role of Konak in mining
- Decreasing role of Karşıyaka in agriculture, manufacturing, FIRE and electricity and gas.
- Increasing role of Buca in manufacturing, construction, wholesale and retail trade, transportation and communication
- Decreasing role of Bornova in mining
- Increasing role of Bornova in transportation and communication, FIRE, social and individual services

When we closely analyze the general sectoral tendency, in terms of total employment values of entire region; the highest share belongs to social and individual services for both 1990 and 2000 (Table 4.1.) The indication of social and individual services as the highest proportion activity is not surprising since it can be seen as one of the basic sectors common in all regions. In other words, a high proportion of social and individual services do not clearly indicate the specialization of the region in that field, rather it is a common incidence since it covers population derived distribution service activities and have tendency to share a main part in all regions. The second important share of economic activity belongs to manufacturing activities, which may indicate the specialization of the region and needs further discussion as given in the following part of this chapter.

The following sectors respectively are retail and wholesale trade activities, FIRE, transportation, construction, agriculture and infrastructure activities. The lowest value is for mining activities, for both 1990 and 2000. As can be seen from this

TABLE 4.2 PERCANTAGE SHARES OF EACH ECONOMIC ACTIVITY IN DISTRICTS 1990-2000

	AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY GAS		CONSTRUCT.		TRADE		TRAS .COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
AYDIN	3,73	2,63	0,45	0,63	16,82	13,52	0,80	0,64	9,53	8,04	17,08	19,17	6,26	5,51	5,44	6,03	38,65	43,75
GERMENCIK	46,10	4,16	0,07	0,32	15,50	9,02	0,31	0,42	5,53	17,93	11,28	31,35	3,71	4,91	2,55	5,69	14,19	26,07
KUSADASI	3,09	18,28	0,06	0,09	7,53	27,17	0,18	0,36	17,71	11,13	40,07	16,40	7,22	4,02	5,10	2,10	14,29	20,38
NAZILLI	12,53	26,59	0,37	0,10	19,24	14,71	0,50	0,41	11,07	5,01	18,63	16,37	4,53	4,18	4,34	4,34	27,66	28,29
SOKE	21,14	8,10	0,96	0,26	16,59	21,55	0,26	0,35	9,50	9,66	14,15	21,19	3,70	3,79	3,84	5,43	28,95	29,60
SULTANHISAR	36,39	14,82	0,10	1,28	10,04	19,75	0,56	0,23	5,76	7,63	10,14	17,35	4,84	3,42	4,84	4,89	22,99	30,58
YENIPAZAR	57,78	46,09	0,00	0,09	7,56	8,27	0,36	0,27	3,50	4,36	10,76	13,61	1,71	2,09	2,01	2,62	14,56	22,46
AYVALIK	8,18	6,87	0,06	0,29	21,23	16,70	0,46	0,40	15,44	8,77	18,66	24,39	5,98	5,23	6,09	6,16	22,75	30,23
BURHAN'YE	14,85	8,99	0,12	0,17	8,95	10,76	0,37	0,48	14,37	11,79	12,93	17,76	4,58	4,33	3,97	5,33	38,85	39,59
GOMEC	38,95	24,96	0,00	0,24	9,42	9,13	0,00	0,24	16,35	11,39	13,93	15,75	6,17	5,98	1,08	3,72	13,59	27,63
BORNOVA	3,47	0,64	0,24	0,17	34,61	32,36	0,82	0,62	6,93	6,00	13,62	17,57	4,96	6,47	4,64	5,90	29,27	30,21
BUCA	0,94	0,64	0,06	0,07	34,41	31,65	0,57	0,47	9,32	7,91	16,39	20,07	6,18	6,28	5,89	6,24	24,78	26,57
KARSIYAKA	3,13	0,65	0,09	0,11	28,92	27,39	0,59	0,46	10,06	7,69	17,50	21,58	5,96	6,16	7,87	8,88	24,15	26,94
KONAK	3,44	0,98	0,05	0,08	27,02	26,18	0,49	0,40	7,15	5,88	19,93	21,58	6,16	6,15	6,39	7,00	27,91	31,56
ALIAGA	2,02	1,07	0,18	0,36	49,50	42,79	1,68	1,78	8,66	8,84	9,99	14,47	7,76	6,81	3,68	4,32	15,28	19,51
BAYINDIR	46,11	38,17	0,02	0,06	11,95	12,12	0,27	0,43	3,42	4,80	13,03	15,68	3,23	2,81	2,74	2,74	18,06	23,14
BERGAMA	16,19	11,38	0,18	1,44	18,77	17,02	0,32	0,34	6,66	6,65	17,26	19,86	4,02	4,45	3,46	4,32	32,04	34,43
BEYDAG	25,66	18,33	4,01	0,28	19,65	21,13	0,38	0,42	6,12	7,63	13,91	18,47	5,20	3,99	5,79	3,43	18,68	26,31
ÇESME	6,94	4,21	0,07	0,06	9,64	9,13	0,17	0,30	19,35	12,63	30,07	30,41	4,59	6,14	9,54	9,20	18,37	27,59
DIKILI	27,00	16,83	0,22	1,06	6,77	9,76	0,38	0,37	13,76	11,19	15,86	21,39	8,38	5,86	4,53	5,91	21,89	27,60

TABLE 4.2 Cont. PERCANTAGE SHARES OF EACH ECONOMIC ACTIVITY IN DISTRICTS 1990-2000

	AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY GA		CONTRUCTION		TRADE		TRAS .COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
FOÇA	2,85	1,97	0,00	0,02	3,04	3,73	0,09	0,17	3,80	1,65	6,35	10,46	1,78	2,01	1,67	2,99	79,33	76,92
KARABURUN	27,37	1,85	0,00	0,10	7,71	5,35	0,48	1,26	14,68	12,16	12,22	18,68	6,28	6,03	2,87	11,19	27,10	43,19
KEMALPASA	17,50	5,65	0,08	0,53	32,41	38,25	0,41	0,44	11,16	12,46	10,25	14,85	5,38	6,04	2,94	3,58	17,95	18,12
KINIK	68,62	58,70	0,52	2,19	4,25	6,82	0,17	0,27	2,01	2,69	3,90	8,83	1,73	2,62	1,15	2,12	8,02	15,67
KIRAZ	29,73	10,71	0,04	0,04	12,99	18,27	0,32	0,66	6,23	7,74	15,78	21,11	4,33	4,28	3,08	3,32	26,76	33,78
MENDERES	25,45	15,92	0,22	1,25	20,77	32,19	0,74	0,37	2,97	7,10	14,75	15,85	10,81	5,48	3,90	3,43	19,47	18,30
MENEMEN	9,87	6,96	0,08	0,10	18,62	29,09	0,28	0,36	5,90	5,85	12,40	15,11	4,52	4,61	2,91	3,37	44,39	34,42
ÖDEMIS	23,22	16,29	0,03	0,07	18,98	18,73	0,35	0,41	7,89	7,84	19,61	23,09	4,84	3,86	3,07	3,94	21,34	25,72
SEFERIHISAR	19,27	9,57	0,00	0,02	5,95	13,19	0,17	0,26	22,20	9,91	10,57	14,19	4,25	4,02	3,04	7,18	33,94	41,54
SELÇUK	30,88	17,49	0,23	0,08	8,70	8,78	0,25	0,28	13,29	7,11	21,10	32,74	4,88	5,22	2,94	3,71	16,64	24,44
TIRE	25,79	17,90	0,43	0,39	21,32	24,24	0,26	0,35	7,66	7,82	16,48	18,51	4,19	4,41	2,89	3,32	20,08	23,00
TORBALI	24,36	10,47	0,01	0,14	18,19	30,50	0,36	0,33	9,66	9,64	14,72	16,87	5,52	4,73	3,63	4,59	21,80	22,56
URLA	19,71	6,83	0,39	0,15	10,40	11,05	0,36	0,35	9,62	10,32	15,90	18,34	5,15	4,25	4,17	6,17	33,20	42,43
Merkez	6,72	4,29	0,09	0,15	29,89	32,64	0,38	0,44	7,81	6,83	11,62	15,02	3,39	3,95	2,85	3,94	36,04	32,39
Akhisar	27,64	14,25	0,22	0,31	14,32	18,44	0,41	0,51	8,51	7,68	20,31	24,25	4,41	4,91	3,24	3,89	20,20	25,42
Tolmarmara	72,25	55,15	0,15	0,29	5,48	10,10	0,21	0,18	2,16	7,77	5,71	7,98	2,14	2,01	1,20	1,45	10,48	14,80
Koprubasi	63,27	27,93	0,97	0,08	5,57	10,17	0,40	0,50	2,22	6,20	6,94	15,21	4,09	5,79	1,53	3,80	14,78	29,92
Salihli	16,02	9,15	0,13	0,18	21,24	19,83	0,29	0,51	8,93	8,16	18,34	22,06	7,51	7,12	3,41	4,87	22,99	27,71
Sarigol	45,52	36,60	0,05	0,00	10,12	11,25	0,34	0,48	4,97	7,88	14,33	15,74	2,63	2,34	2,16	2,95	19,56	22,45
Saruhanli	53,30	31,29	0,06	0,02	14,39	23,32	0,47	0,42	3,45	5,62	6,79	12,78	2,91	2,99	2,15	3,04	16,07	20,30
Turgutlu	21,40	14,89	0,15	0,29	31,18	33,02	0,21	0,32	7,38	6,92	15,17	17,70	4,67	4,33	2,43	3,17	15,94	19,06
TOTAL	9,56	4,63	0,15	0,20	25,16	25,81	0,50	0,46	8,42	7,10	17,15	19,92	5,43	5,60	5,22	6,09	26,92	30,03

observation, **the region, overall defines a manufacturing and service oriented structure, where relative roles of agriculture and mining are less dominant**

Having discussed the dominance of each settlement, we can further to the specialization. Specialization is an important discussion in our due to mainly two reasons. The first one is the specialized settlements can be seen as the signs of competitiveness. It is observed that the specialization makes the agents favor from the benefits of agglomeration in a more in-depth level, and also assure the sustainability of the success in the long term. Secondly and more importantly, specialization of the settlements has a special importance in the city-region context, since in this way they will tend to behave complementary.

With the motivation of these two challenges to understand the , general pattern of specialization is important. In order to achieve the general specialization pattern for the economic activities, a Localization Curve is used. According to Isard, (1960) a localization curve is a superior tool to discuss the relative specialization of each industry, or as economic sector in our case. The curve is constructed from the plots of regional percentages of each economic activity, by plotting the cumulative percentage of economic activities in total (base magnitude), in the X axis and by plotting the cumulative percentage of the employment in the each specific economic activity in the Y axis.

The important feature of localization curve is the usage of a ranking system while constituting the cumulative percentage. The ranking system is determined by Location Quotient values. Cumulative percentages resulting from this ranking system are used instead of a raw distribution of the proportions.

The indications of the resulting localization curve can be directly seen in the plot i. If we consider a totally parallel distribution of the industry with the base magnitude, a 45 degree line would be the resulting localization curve Otherwise, if an economic activity is distributed among the region in a more specific manner than the base variable then, the localization curve would be far from this 45 degree line.

Accordingly, we have made a comparison of the level of specialization in each economic activity by constructing the localization curves of each sector separately.

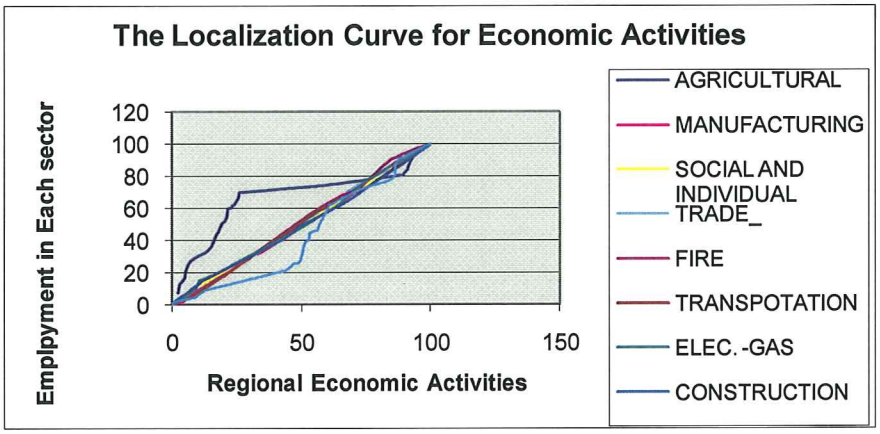


Figure 4.1: The Localization Curve for İzmir City-region

As can be seen from the preceding figure of localization curve, the sector with the clearest specialization and localization pattern is the agriculture, followed by mining.

In addition to general tendency of specialization among region, it is also necessary to give a brief discussion of each specialized settlement. Obviously, not all the settlements indicate a specialized pattern and may indicate a more homogenous pattern with an almost equal distribution of each sector as well as the highly existence of concentrated and specialized ones. Additionally, there are some base sectors which are population derived. These base sectors own high shares of employment without indicating a specialization pattern. In this sense, it is useful to make a distinction of economic sectors with a specialization patterns and the ones without. Here, we can say that *the social and individual services, transportation and communication, and electricity – gas, wholesale and retail trade,* does have similar values of employment share in entire region. (Table 4.2.) That is, the

values attributed to these four sectors are not settlement sensitive in our analyses, and as all the districts more or less share a common percentage of their employment in these four sectors and a conclusion of settlements specialized in these sectors is not possible to achieve.

However, it is worth discussing the specialization of the remaining sectors, especially agriculture, manufacturing and service activities. Beginning with the agricultural activities, .as can be seen from the first two rows of Table 4.2., the share of agricultural activities in each district show a unique pattern. That is values ranging from 1 percent of total employment in Konak to 72 percent in Gölmarmara can be observable. As seen from Table 4.2. some settlements are found to be specialized on agricultural activities. These settlements are Bayındır, Gömeç, Nazilli ,Gölmarmara, Kınık, Sarıgök, and Yenipazar with a proportion of more than 25 percent of all economic activity in the settlement belonging to agricultural activities.

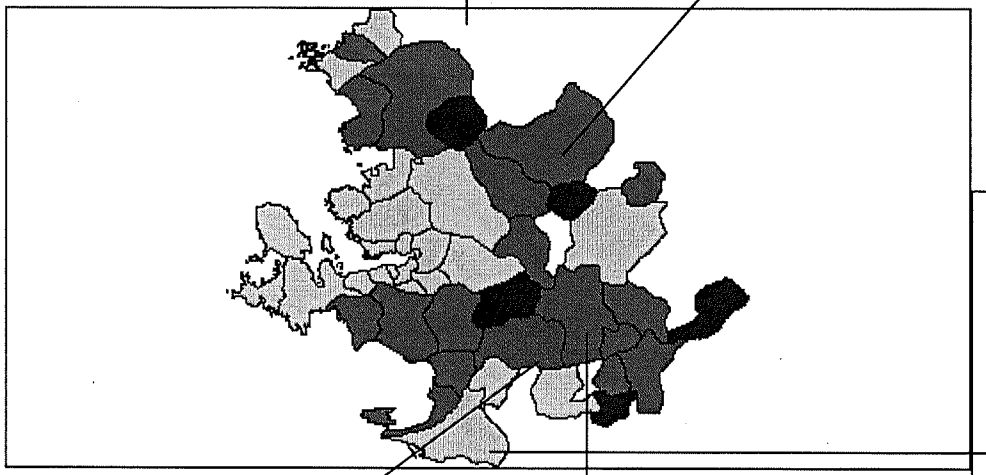
Map 4.7. figures the settlement level analyses of this specialized pattern of agricultural activities.As we can see from the summary statistics given along the figure in these agricultural specialized settlements, a common point can be observable. That is, these settlements hiring high numbers of agricultural employment relatively own the lowest values of total employment and the share of economic activity in general. As a result, a generalization of the specialization on agriculture is seen in undersized settlement in general.

Another important specialization pattern can be is in manufacturing sector. As seen in Table 4.2. , in each settlement at least a minimum of three percent share of manufacturing sector is evident. These values can reach up to 49 percent in Aliaga for instance.

Map 4.8. gives summary of industrial specialization among region. As revealed in the figure the main areas of industrial specialization in the region take place in the inner parts of the region namely in Aliağa, Bornova, Buca, Kemalpaşa and Turgutlu districts.

AGRICULTURE	KINIK
% in district	68
LQ	12,69
% of district in total econ. Act.	0,344492
% total region	4,107,297

AGRICULTURE	GOLMARMARA
% in district	72,247899
LQ	11,92
% of district in total econ. Act.	0,344492
% agr. İn total region	4,107297



AGRICULTURE	BAYINDIR
% in district	46,107199
LQ	8,25
% of district in total econ. Act.	0,42142
% agr. İn total region	3,477525

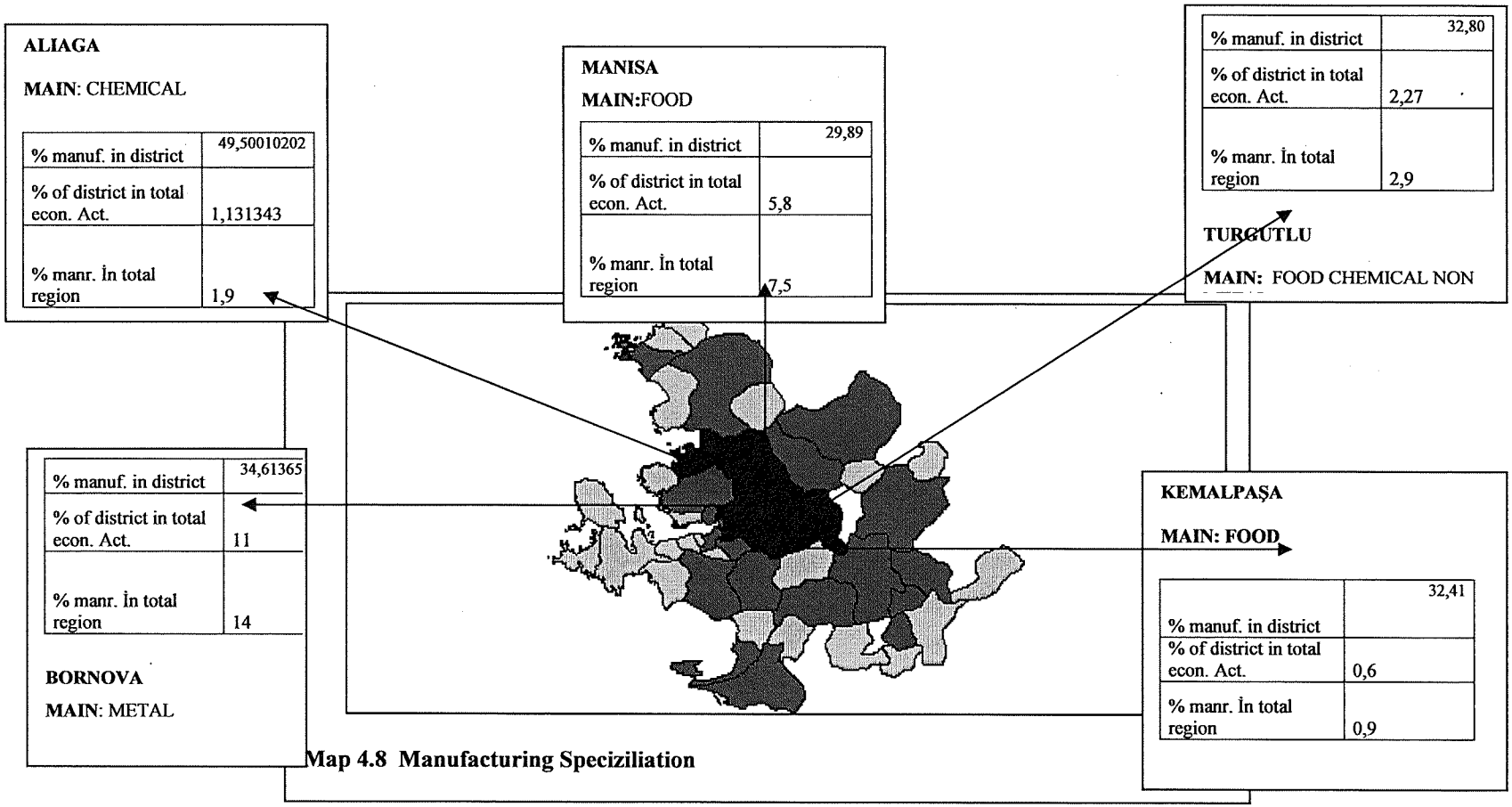
Map 4.7. Agricultural Specialization

AGRICULTURE	SARUHANLİ
% in district	53,295851
LQ	6,76
% of district in total econ. Act.	0,371257
% agr. İn total region	2,511218

AGRICULTURE	GERMENCİK
% in district	46,102598
LQ	4,9120598
% of district in total econ. Act.	0,690076
% agr. İn total region	0,619932

AGRICULTURE	YENIPAZAR
% in district	57,777165
LQ	9,96
% of district in total econ. Act.	0,204656
% agr. İn total region	2,038888

AGRICULTURE	SARIGÖL
% in district	45,516697
LQ	7,91
% of district in total econ. Act.	2,713926
% agr. İn total region	0,343035



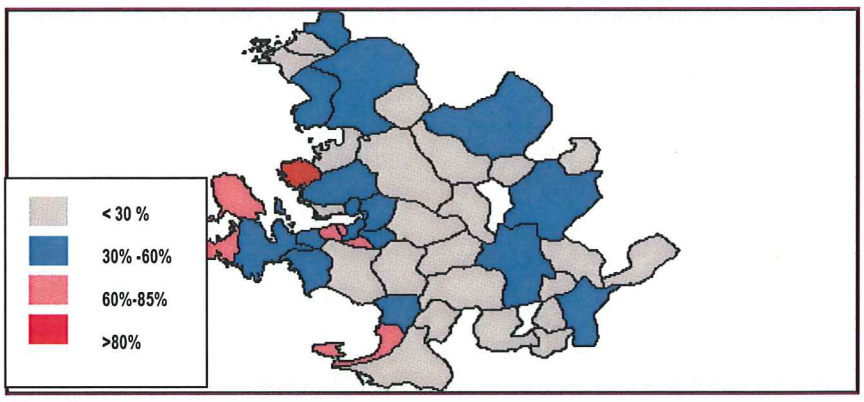
Map 4.8 Manufacturing Speciziliation

TABLE 4.3. LQ VALUES FOR IZMIR CITY REGION

LQ2000	AGRI	MINING	MANUF	ELECTR	CONS	TRADE	INFORM	FIRE	SOCIAL SERVI
AYDIN	0,57	3,12	0,52	1,40	1,13	0,96	0,98	0,99	1,46
GERMENCIK	0,90	1,57	0,35	0,92	2,53	1,57	0,88	0,93	0,87
KUŞADASI	3,95	0,44	1,05	0,78	1,57	0,82	0,72	0,34	0,68
NAZILLI	5,75	0,51	0,57	0,90	0,71	0,82	0,75	0,71	0,94
SÖKE	1,75	1,30	0,84	0,77	1,36	1,06	0,68	0,89	0,99
SULTANHISAR	3,20	6,35	0,77	0,51	1,08	0,87	0,61	0,80	1,02
YENIPAZAR	9,96	0,44	0,32	0,58	0,61	0,68	0,37	0,43	0,75
AYVALIK	1,48	1,44	0,65	0,87	1,24	1,22	0,93	1,01	1,01
BURHANIYE	1,94	0,84	0,42	1,04	1,66	0,89	0,77	0,88	1,32
GÖMEÇ	5,40	1,20	0,35	0,53	1,61	0,79	1,07	0,61	0,92
YENIKONAK	0,21	0,40	1,01	0,87	0,83	1,08	1,10	1,15	1,05
BORNOVA	0,14	0,82	1,25	1,36	0,85	0,88	1,16	0,97	1,01
BUCA	0,14	0,33	1,23	1,02	1,12	1,01	1,12	1,02	0,88
KARŞIYAKA	0,14	0,52	1,06	1,01	1,08	1,08	1,10	1,46	0,90
ALİAĞA	0,23	1,79	1,66	3,88	1,25	0,73	1,22	0,71	0,65
BAYINDIR	8,25	0,32	0,47	0,94	0,68	0,79	0,50	0,45	0,77
BERGAMA	2,46	7,11	0,66	0,74	0,94	1,00	0,79	0,71	1,15
BEYDAĞ	3,96	1,38	0,82	0,92	1,07	0,93	0,71	0,56	0,88
ÇEŞME	0,91	0,31	0,35	0,65	1,78	1,53	1,10	1,51	0,92
DİKİLİ	3,64	5,25	0,38	0,81	1,58	1,07	1,05	0,97	0,92
FOÇA	0,43	0,12	0,14	0,38	0,23	0,53	0,36	0,49	2,56
KARABURUN	0,40	0,48	0,21	2,76	1,71	0,94	1,08	1,84	1,44
KEMALPAŞA	1,22	2,63	1,48	0,97	1,76	0,75	1,08	0,59	0,60
KINIK	12,69	10,84	0,26	0,59	0,38	0,44	0,47	0,35	0,52
KİRAZ	2,31	0,22	0,71	1,43	1,09	1,06	0,76	0,55	1,12
MENDERES	3,44	6,21	1,25	0,81	1,00	0,80	0,98	0,56	0,61
MENEMEN	1,50	0,49	1,13	0,78	0,83	0,76	0,82	0,55	1,15
ÖDEMİŞ	3,52	0,32	0,73	0,90	1,10	1,16	0,69	0,65	0,86
SEFERİHİSAR	2,07	0,09	0,51	0,57	1,40	0,71	0,72	1,18	1,38
SELÇUK	3,78	0,37	0,34	0,61	1,00	1,64	0,93	0,61	0,81
TİRE	3,87	1,95	0,94	0,77	1,10	0,93	0,79	0,55	0,77
TORBALI	2,26	0,70	1,18	0,72	1,36	0,85	0,84	0,75	0,75
URLA	1,48	0,73	0,43	0,76	1,45	0,92	0,76	1,01	1,41
MANISA	0,93	0,75	1,26	0,95	0,96	0,75	0,70	0,65	1,08
AKHISAR	3,08	1,56	0,71	1,12	1,08	1,22	0,88	0,64	0,85
GÖLMARMARA	11,92	1,44	0,39	0,40	1,09	0,40	0,36	0,24	0,49
KÖPRÜBAŞI	6,04	0,41	0,39	1,08	0,87	0,76	1,03	0,62	1,00
SALIHLI	1,98	0,89	0,77	1,11	1,15	1,11	1,27	0,80	0,92
SARIGÖL	7,91	0,00	0,44	1,04	1,11	0,79	0,42	0,48	0,75
SARUHANLI	6,76	0,12	0,90	0,91	0,79	0,64	0,53	0,50	0,68
TURGUTLU	3,22	1,43	1,28	0,69	0,97	0,89	0,77	0,52	0,63
	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00

Another important thing in the industrial activities is the specialization in subcategories of industrial activities. In this sense, Location Quotient values have been applied to see the specialization of each sub category supporting the specialization. (Please refer table 4.3) Overall, especially in food, paper, chemical, soil and metal industries we can conclude high level of specialization. These industrial categories also draw a figure of the newer forms of specialization occurring outside the boundaries of İzmir Metropolitan area. In other words, newly specializing industrial clusters are distributed in periphery of the region. The distinctive patterns obtained in the analyses can be summarized as the specialization of Aliağa in chemical and metal industries, Turgutlu, Söke and Salihli in soil industries, Kuşadası in "other," Germencik, Akhisar and Saruhanlı in food industries, Tire in paper by driving high values. (Map 4.8 and Table 4.3.)

As a last sector, a focus on the service activities within region is meaningful due to its relative importance among other sectors in competitiveness discussion. It is important to analyze the mass and spatial distribution of service activities both. The first one, the increasing share of service related activities may indicate the global integration of the city-region, which is a shift towards service oriented structure or the service economy. The specialization pattern is also a useful since it may indicate the increasing interaction between the service providing settlements and the hinterland.

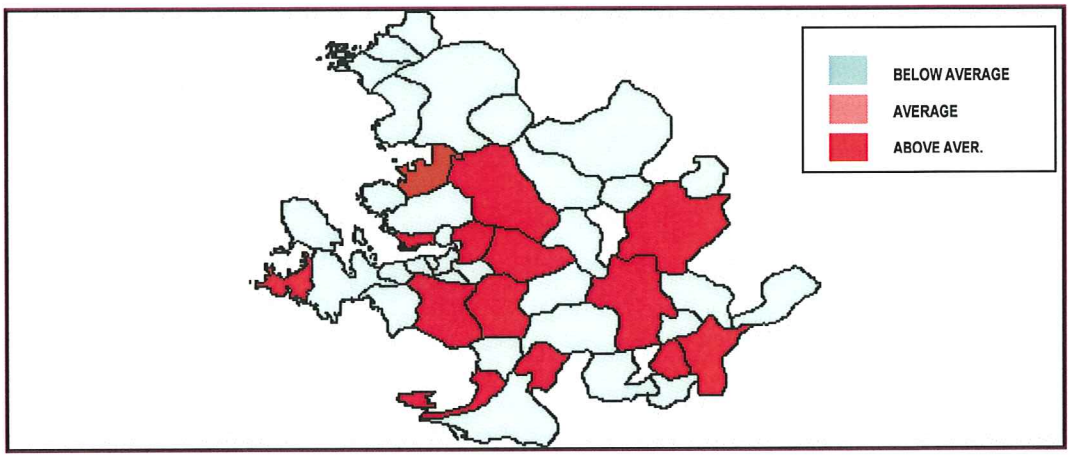


Map 4.9. Proportion of service employment

The share of service activities increased 7% from 1990 to 2000 as a whole. When the categories of services concerned, highest sub-category increase is in social and individual services with 3.2 percent followed by retail and wholesale trade with 2.6 percent and finance, insurance and real estate with 1 percent.

4.1.2. İzmir City Region GDP per capita

In order to capture the general structure of the region, another important implication would be in terms of the distribution of GDP per capita values. The values regarding GDP per capita have obtained from TURKSTAT for the year of 1996. The values obtained in the form of volume of GDP in each district, and then divided to the relevant population in each settlement. Unfortunately, it is not possible to make a discussion of the changing pattern of GDP in a dynamic manner, since the values in the district level can be obtainable only one spot of time, which is 1996.



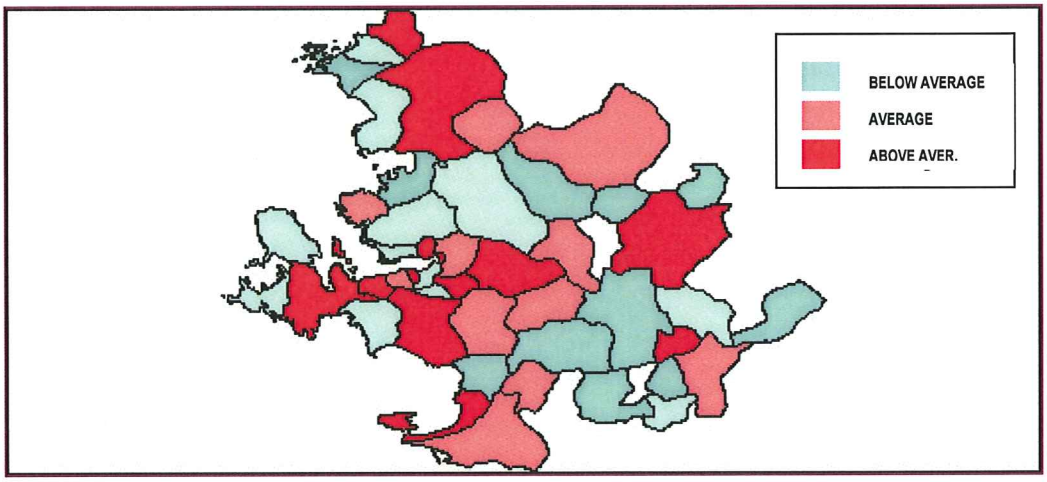
4.10 Standard Deviation of GDP per capita

The map 4.10 above indicates the distribution of GDP per capita among region according to standard deviation. As indicated in the map with red marks, the

highest values of GDP per capita is assigned to the districts with a highly specialized and concentrated pattern adjacent to the core metropolitan area.

These districts are Aliağa, Kuşadası, Bornova, Kemalpaşa, Ödemiş in the first upper stage and followed by Çiğli, Nazilli, Menderes and Sutlanhisar in the second upper stage. The lowest values are attained to Sarıgöl, Yenipazar, Kınık, Bergama and Konak districts. As can be understood these figures, the distribution of GDP per capita significantly varies from the distribution of other social and economic activities and instead of hiring the highest values in the core metropolitan area, it is clustered around as a belt to the core metropolitan area. In addition to that, manufacturing or service oriented settlements have the highest levels of GDP per capita whereas the agriculture oriented ones have the lowest levels.

4.1.3. İzmir City Region the Level of Entrepreneurship



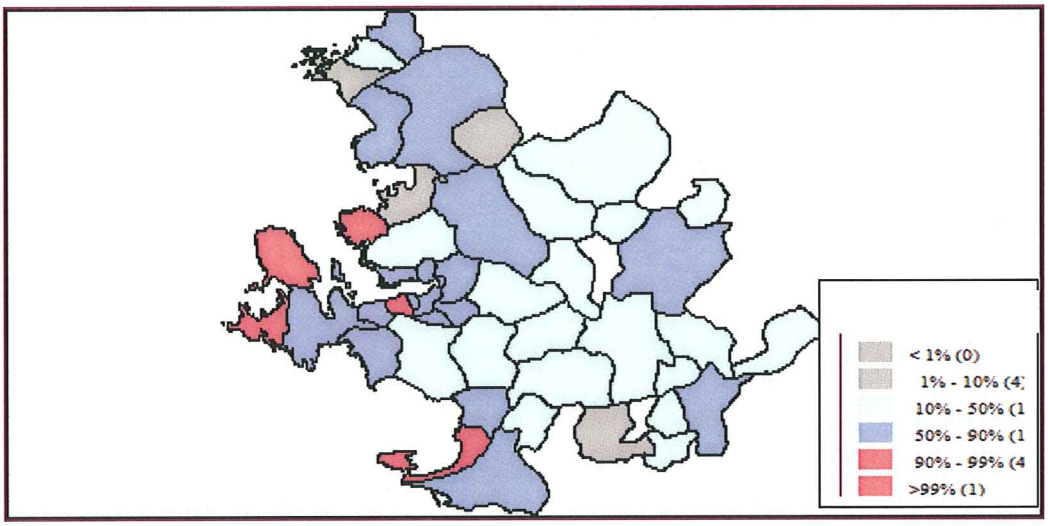
Map 4.11. The Distribution of level of entrepreneurship

The distribution of the proportion of entrepreneurshipis also important and again can be seen as a factor determining the growth of the regions. In this sense, when we consider the spatial distribution of the entrepreneurship among region, we can see that this pattern has almost an arbitrary structure than the other indicators

of income. Instead of following a strictly organized pattern, apart from the agglomeration of some high level of entrepreneurship owing areas in the mid parts of the region, in the periphery some other clusters of high level of entrepreneurship arise. Such a spatial pattern may indicate that, the level of entrepreneurship is concentrated in different nodes mostly because of a demand determined fact. .

4.1.4.İzmir City Region the Level of High Education and Patenting

When we consider the educational and innovative aspects of the region, as well as the concentration of economic activities, educational aspects also follow an agglomerated spatial pattern. The highest share of high level education areas are Çeşme, (18 %) Karaburun (17 %) , Foça (15 %) and Kuşadası (12 %) which are four important coastal tourism centers of the region and Narlıdere (13%) a more metropolitan oriented coastal settlement. The distribution of these settlements can be seen from the red plots in following Map 4.12. Other settlements with share of highe education above the regional average are Kuşadası,Balçova, Karşıyaka, Güzelbahçe, Seferihisar and Urla which again concentrated on the coastal side of the region.



Map 4.12 Proportion of High Education

Table 4.4. Proportion of high education

UPPER		ABOVE AVERAGE		AVERAGE	
ÇEŞME	18,41	AYDINMERKEZ	9,70	NAZILLI	6,77
KARABURUN	17,00	BORNOVA	9,25	ÇIĞLI	6,68
FOÇA	15,16	KONAK	8,92	SELÇUK	6,65
NARLIDERE	13,49	AYVALIK	8,70	SÖKE	6,44
KUŞADASI	12,42	ALIAĞA	7,95	MANISA-MERKEZ	6,00
BALÇOVA	12,38	DIKILI	7,64	BUCA	5,80
GAZIEMIR	11,85	BURHANIYE	7,31	BERGAMA	5,66
KARŞIYAKA	11,76			SALIHLI	5,55
GÜZELBAHÇE	11,42			ÖDEMIŞ	5,31
SEFERIHISAR	10,73			TIRE	5,30
URLA	10,64			TORBALI	5,22

BELOW AVERAGE			
AKHISAR	5,06	KEMALPAŞA	3,64
MENEMEN	4,61	TURGUTLU	3,42
SULTANHISAR	4,47	BEYDAĞ	3,21
GERMENCIK	4,37	KÖPRÜBAŞI	2,88
KIRAZ	4,35	GÖLMARMARA	2,81
GÖMEÇ	4,24	KINIK	2,42
YENIPAZAR	4,03		
SARIGÖL	3,86		
BAYINDIR	3,76		
MENDERES	3,73		
SARUHANLI	3,69		

Here, in order to capture a typical pattern of the effects of educational aspects in settlements, a mutual comparison of them can be made in terms of their position in education, employment , population growth and initial level of their income.

Such a conditional comparison will enable us to understand the correlations between different effective variables.

Figure 4.2 below displays a conditional plot of population growth and employment growth on education and initial income levels. Proportion of population growth and employment growth is plotted against the share of high education and log GDP, in order to see that whether the levels of education is effective in terms of new employment, income and population generation.

As we have observed from the first column of the figure indicating the highest level of employment increase in Y axis, we can not view a satisfactory number of observations to indicate the correlation. The highest correlation among GDP and high education of settlements can be achievable in the lower values of population growth, and average values of the population growth. Dealing with low population growth and high employment growth, these settlements can be seen as the attraction centers of the region, and we can conclude that a parallel pattern – either

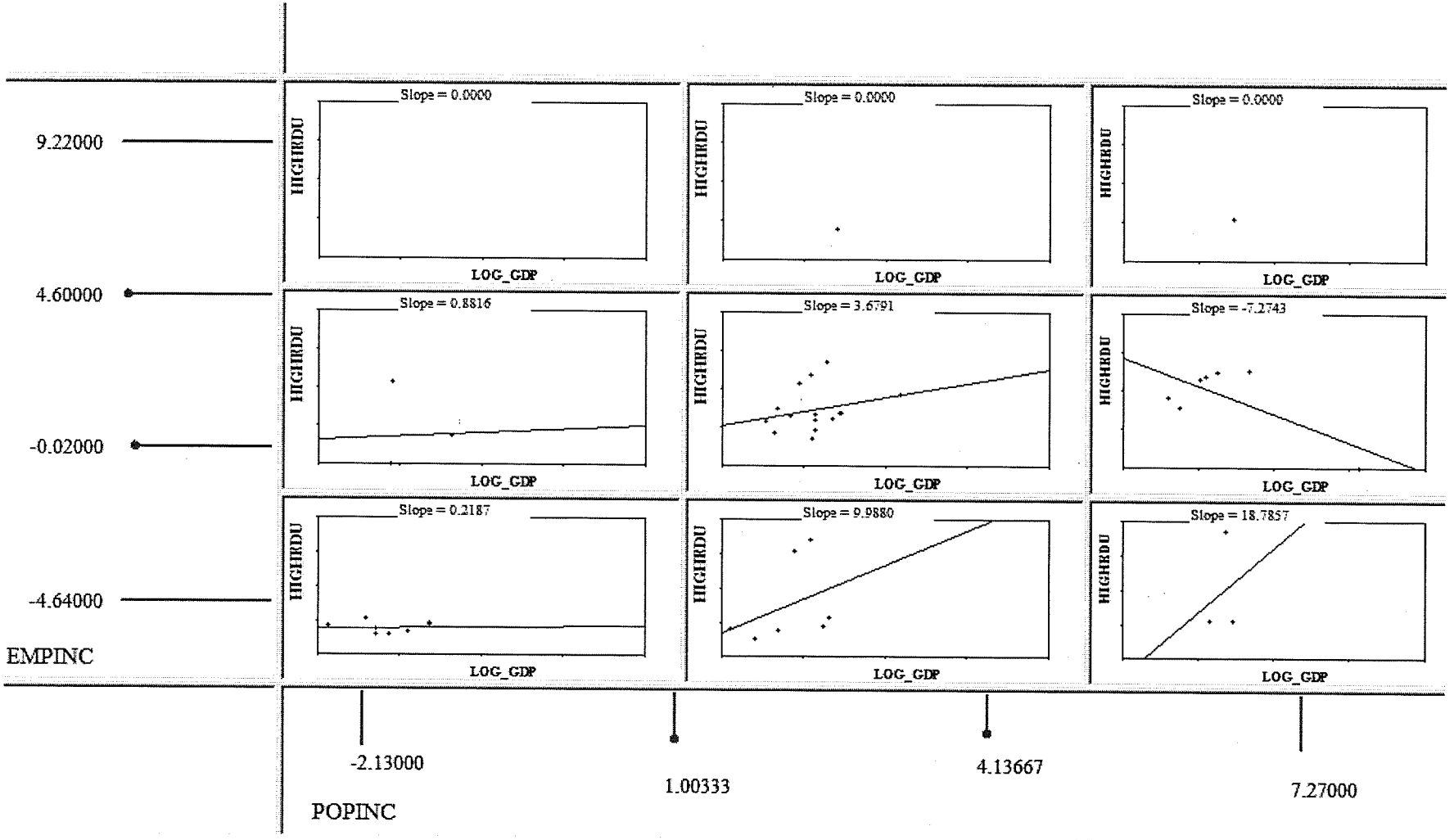
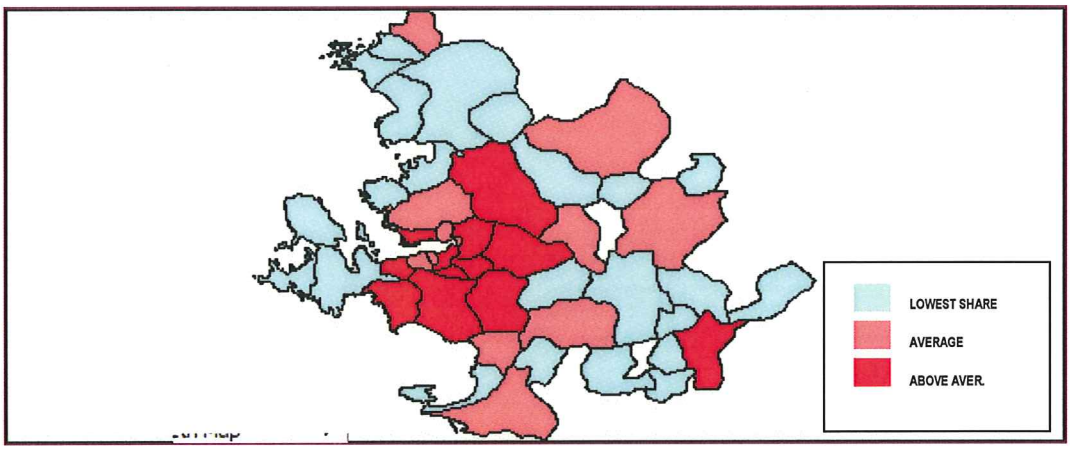


Figure 4.2: Conditional Map for the Correlation of High Education Proportion

negative or positive- occurs in terms of income and education in these areas. When we move to more average values of employment growth, we can observe that most of the settlements are situated in average population increase areas. However, it is not quite easy to generalize this pattern for the whole settlements since the correlation values obtained are not statically significant and, more importantly, there are also signs of negative correlation of income and proportion of high education, and a negative correlation in the high population growth and low employment growth areas are observed.



Map 4.13: Distribution of Patenting

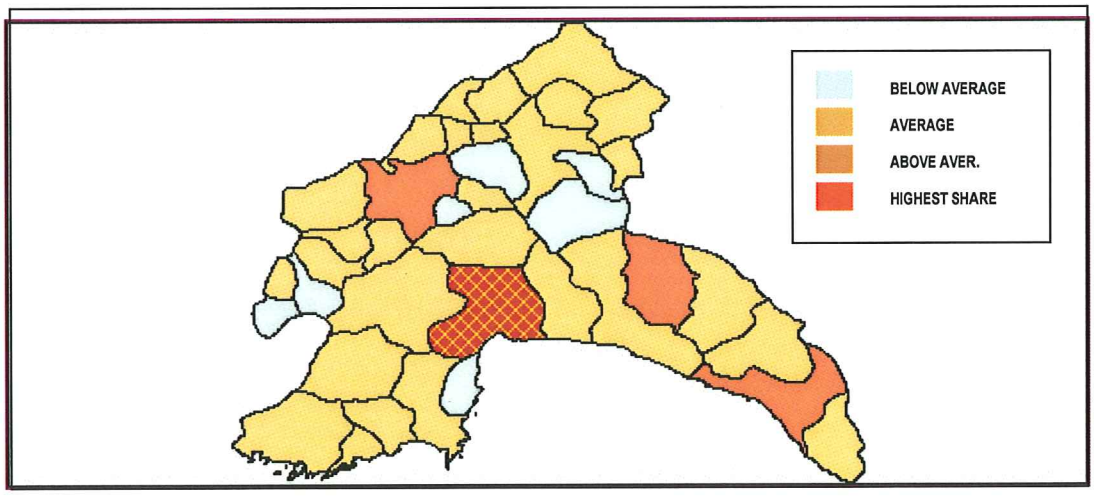
Lastly, if we consider the distribution of patenting among region, we can observe a quite significant spatial organization indicating the existence of high numbers of patenting values centered in and around the core metropolitan area. The second significant centers for patenting values are unsurprisingly the relatively important smaller economic activity center in the inner parts of the region which can be seen as the sub-centers in this sense.

4.2. Antalya City Region

As the second case, Antalya city-region is in consideration. Overall, the region is comprises 39 districts with a varying economic and social structure. This complementary structure is given in this part of the study in terms of population and economic features, the level of GDP per capita, structure and changing pattern of entrepreneurship and finally the level of innovation and educational levels.

4.2.1. Antalya City-region Employment and Population Structure

When we consider the general economic structure of Antalya City region, we can observe a highly specialized and complementary pattern, as the leading sector of social and individual services which indeed figures out the tourism activities (with a 30 percent share of all activities) and supported by trade (18 percent) and agriculture (18 percent). As figured in the following standard deviation map of total employment, the relative importance of Antalya City Center in the total economic activities have a distinctive character Overall, Antalya City Center seems to be the most dominant and dynamic settlement, by including 45 percent of all total economic activities and hiring highest share of all economic sectors varying **from 20 percent to 60 percent in different categories.**



Map 4.14: Standard deviation map for total employment

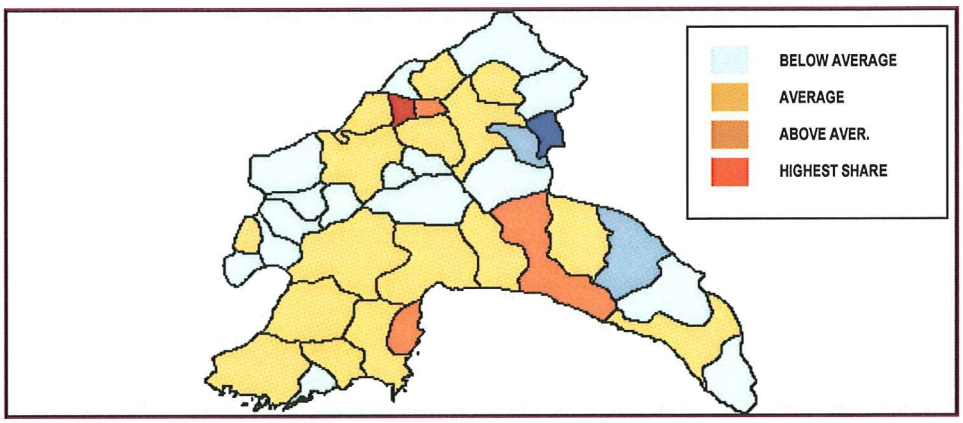
Table 4.5. below summarizes the general distribution of economic activities among region. For the year of 2000, Antalya city center covers more than 50 percent of total employment in three different sectors, namely *transportation and communication activities, electricity –gas and mining sectors*. Additionally, in *finance insurance and real estate sector* a significant almost 60 percent proportion of the whole region is again hired by Antalya City Center. These figures indicate us an obvious central and dominant position of the settlement, especially as a service providing area for the entire region.

Following Antalya City center, Isparta City Center also plays a significant role in the general economic activities of the region. Hiring almost 13 percent of total employment among region, and more importantly, constituting 30 percent of all *manufacturing activities* within region it can be seen as a complementary center for the industrial activities among region. (Table 4.5) In terms of the share in the total employment, Alanya, Manavgat and Burdur follows Isparta with their dominant character which specialized especially in retail and wholesale trade.

As well as these dominant settlements, some other settlements are also worth discussing with their relatively small proportion in the overall economic activity, but high contribution to specific sectors, due to their relatively significant role in related economic sectors. The first group is the ones with dominant pattern in *agricultural activities* of region. When we consider the dominant settlements in agriculture sector, we can see that apart from Antalya City Center some other important agricultural centers also arise, Kumluca and Kale with a significant eight and 10 percent shares respectively. In *mining* sector we can not find sings of dominance in other parts of region apart from Antalya city center, whereas in *manufacturing* sector a more complementary pattern can be observable. Following Isparta City center, Burdur City Centre, Gönen, Alanya, Yalvaç and Manavgat play also a significant roles in the composition of overall regional manufacturing activities with more than 3% shares.

Having described the dominance of each settlement in different economic activities, another important implication would be the change in employment.

By considering employment growth as the main indicator of growth or decline of each settlement, it can be observed that the regions with a high employment growth rate are the ones in the coastal ones in the southern part of the region with between the periods of 1990 and 2000. When the highly service and tourism oriented structure of the region is considered, this picture can be seen as predictable result.



Map 4.15. Spatial Distribution of Employment Growth between 1990 and 2000

The highest increase within region obtained in, Kemer (of Antalya) and Manavgat in two coastal tourism centers, and followed by Atabey and Gönen in the northern inner part. Besides, a large part of the settlements suffers from decrease in employment, which is also worth considering. The districts of Yenişarbademli, Akseki, Aksu , Gündoğmuş , Çeltikli, Ağlasun and Sütçüler in the inner parts of the region have been subject to decreasing levels of employment.

Table 4.5. Antalya City Region Percentage Shares of Economic Activities Among Region 1990 -2000

	AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY		CONTRUCTION		TRADE		TRAS. COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
ANTALYA	22,04	20,41	20,99	52,03	39,42	41,82	39,99	49,06	43,50	47,56	44,00	48,84	45,45	58,27	50,67	57,37	36,10	41,13
AKSEKİ	1,76	1,50	5,03	0,00	0,51	0,17	3,07	0,73	3,30	0,68	1,00	0,37	0,99	0,31	1,10	0,49	0,80	0,45
ALANYA	2,14	1,75	0,54	2,11	4,13	4,12	3,13	3,75	8,70	5,11	12,00	10,58	6,00	6,53	7,40	8,23	3,40	4,75
ELMALI	0,75	2,15	0,08	0,16	1,25	1,13	1,48	0,47	0,70	0,79	1,00	0,77	1,10	0,74	0,97	0,67	1,20	0,87
FİNİKE	0,72	1,54	0,00	0,16	0,39	0,47	1,26	1,25	0,70	0,72	1,00	0,57	0,67	0,45	1,04	0,91	0,80	0,73
GAZİPAŞA	5,52	4,89	2,17	1,14	0,68	0,60	0,49	0,78	1,30	0,98	1,00	0,97	1,03	0,87	1,04	1,00	1,10	1,04
GÜNDOĞMUŞ	2,07	0,66	0,00	0,00	0,11	0,11	0,33	0,26	0,20	0,09	0,00	0,11	0,41	0,24	0,16	0,15	0,30	0,26
İBRADI	1,10	2,24	0,00	0,00	0,07	0,11	0,44	0,36	0,30	0,49	0,00	0,17	0,42	0,37	0,32	0,20	0,10	0,19
KALE	10,20	11,59	0,00	0,49	0,43	0,35	0,44	0,26	0,70	0,44	1,00	0,51	0,49	0,53	0,51	0,49	0,50	0,49
KAŞ	0,37	0,25	0,15	0,16	0,19	0,28	0,27	0,31	0,80	0,40	1,00	0,97	0,74	0,77	0,74	0,68	0,50	0,51
KEMER	0,58	0,46	0,00	0,49	0,47	0,76	1,32	0,47	1,70	1,05	4,00	5,39	1,54	1,91	0,92	2,14	0,80	1,15
KORKUTELİ	1,45	1,42	0,08	0,81	1,21	1,03	1,48	0,99	0,70	1,50	1,00	0,93	1,58	1,06	0,70	0,71	1,10	0,89
KUMLUCA	8,69	14,44	0,00	0,00	1,00	0,86	0,71	0,73	1,10	1,33	1,00	1,14	0,56	0,49	1,03	1,12	0,90	1,01
MANAVGAT	3,65	2,03	0,15	0,98	2,14	2,92	1,81	2,40	5,70	8,55	9,00	9,85	3,19	4,20	3,15	4,12	1,90	2,72
SERİK	3,48	2,86	0,23	0,33	2,30	1,72	4,00	1,61	2,00	2,24	2,00	2,38	1,58	1,15	1,84	1,61	1,70	1,68
BURDUR	2,14	1,76	3,64	4,55	7,94	7,39	4,72	7,50	3,10	3,06	4,00	2,75	4,68	3,83	5,01	4,04	10,90	7,42
ALTINYAYLA	0,97	1,11	11,93	1,30	0,39	0,31	0,44	0,21	0,30	0,20	0,00	0,10	0,78	0,18	0,12	0,18	0,20	0,24
AĞLASUN	1,61	0,61	0,00	5,37	0,74	0,50	0,38	0,10	0,20	0,23	0,00	0,11	0,40	0,33	0,28	0,08	0,40	0,19
BUCAK	3,00	1,49	1,70	1,63	4,84	3,44	2,03	1,35	3,70	1,90	2,00	1,34	7,97	2,56	1,95	1,24	2,30	1,70

Table 4.5. Cont. Antalya City Region Percentage Shares Of Economic Activities Among Region 1990 -2000

	AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY		CONTRUCTION		TRADE		TRAS. COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
ÇAVDIR	1,41	0,93	0,08	0,00	0,20	0,17	0,22	0,16	0,10	0,25	0,00	0,18	0,43	0,23	0,23	0,20	0,30	0,25
ÇELTİKÇİ	1,18	0,72	0,00	0,65	0,32	0,12	0,00	0,21	0,20	0,06	0,00	0,07	0,25	0,17	0,11	0,07	0,10	0,15
GÖLHİSAR	2,46	2,46	0,08	1,63	0,54	0,73	0,49	0,78	1,00	1,04	1,00	0,49	0,72	0,40	0,68	0,53	0,80	0,75
KARAMANLI	1,53	1,20	0,08	0,33	0,26	0,32	0,82	0,47	0,30	0,25	0,00	0,15	0,68	0,29	0,32	0,23	0,40	0,31
KEMER	1,20	1,25	0,00	0,00	0,13	0,07	0,06	0,16	0,08	0,09	0,00	0,04	0,20	0,07	0,16	0,13	0,20	0,13
TEFENNİ	0,96	0,53	0,46	0,00	0,34	0,24	1,37	0,78	0,20	0,31	0,00	0,17	0,42	0,12	0,63	0,32	0,60	0,34
YEŞİLOVA	0,48	0,37	4,88	0,65	0,45	0,35	0,27	1,04	0,20	0,52	0,00	0,31	0,43	0,23	0,51	0,39	0,60	0,39
IPARTA	1,54	1,51	3,10	5,53	17,42	17,00	19,25	15,99	7,30	8,71	7,00	6,31	8,23	7,97	8,69	7,06	19,40	19,54
AKSU	1,02	0,33	0,00	0,16	0,29	0,08	0,38	0,26	0,30	0,18	0,00	0,06	0,25	0,09	0,18	0,14	0,30	0,17
ATABEY	0,47	0,80	0,08	1,79	1,19	1,37	0,60	0,31	0,40	1,26	0,00	0,14	0,35	0,26	0,24	0,25	0,50	0,56
EĞİRDİR	3,77	1,20	0,54	0,16	0,91	0,70	1,65	1,56	0,80	0,72	1,00	0,62	1,41	0,86	1,06	0,58	3,60	3,64
GELENDOST	2,59	5,22	0,08	0,00	0,65	0,20	0,27	0,36	0,40	0,22	0,00	0,20	0,61	0,40	0,40	0,22	0,50	0,31
GÖNEN	1,01	2,89	0,00	0,00	0,57	5,06	0,17	0,21	0,30	0,68	0,00	0,12	0,28	0,25	0,16	0,24	0,70	0,49
KEÇİBORLU	0,17	0,70	41,21	3,58	0,39	0,64	0,77	0,94	0,30	1,00	0,00	0,30	0,62	0,75	1,05	0,36	0,60	0,52
SENİRKENT	0,97	1,20	0,15	0,00	0,57	0,57	1,21	0,42	0,50	0,80	0,00	0,38	1,14	0,66	1,21	0,55	1,10	0,81
SÜTÇÜLER	0,43	0,09	0,46	0,00	0,39	0,15	0,33	0,26	0,10	0,13	0,00	0,11	0,55	0,24	0,57	0,21	0,30	0,23
ŞARKİKARAA	1,11	1,75	1,16	12,52	1,39	0,61	0,99	0,52	3,90	0,93	1,00	0,74	0,84	0,47	1,08	0,86	1,00	1,15
ULUBORLU	1,35	1,37	0,54	0,65	0,69	0,41	0,88	0,78	0,40	0,46	0,00	0,26	0,81	0,57	1,02	0,66	1,10	0,66
YALVAÇ	2,65	1,70	0,31	0,65	4,72	3,07	2,14	1,98	3,40	4,65	2,00	1,41	1,96	1,08	2,36	1,38	2,40	1,94
YENİŞARBADE	1,47	0,60	0,08	0,00	0,38	0,06	0,33	0,21	1,10	0,41	0,00	0,07	0,24	0,07	0,39	0,16	0,40	0,23

As explained in the former part of this chapter, another important issue in discussion is the relative **specialization** of economic activities. In this sense, again we will have a look at the general specialization pattern of the region with the help of a localization curve, and then try to determine the specialization pattern of the settlements.

What is important in this localization curve is that, it eliminates the ordinary or common specialization patterns such as the base sectors. Since it takes into account the overall distribution of a sector in the whole region, some sectors commonly having high shares of the economic activity in a region but not purely indicating a sign of specialization is eliminated.

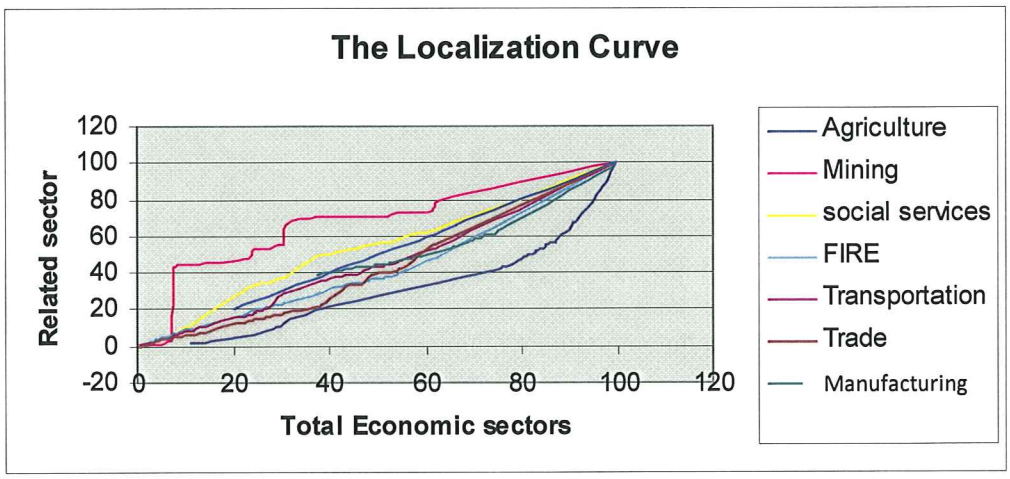
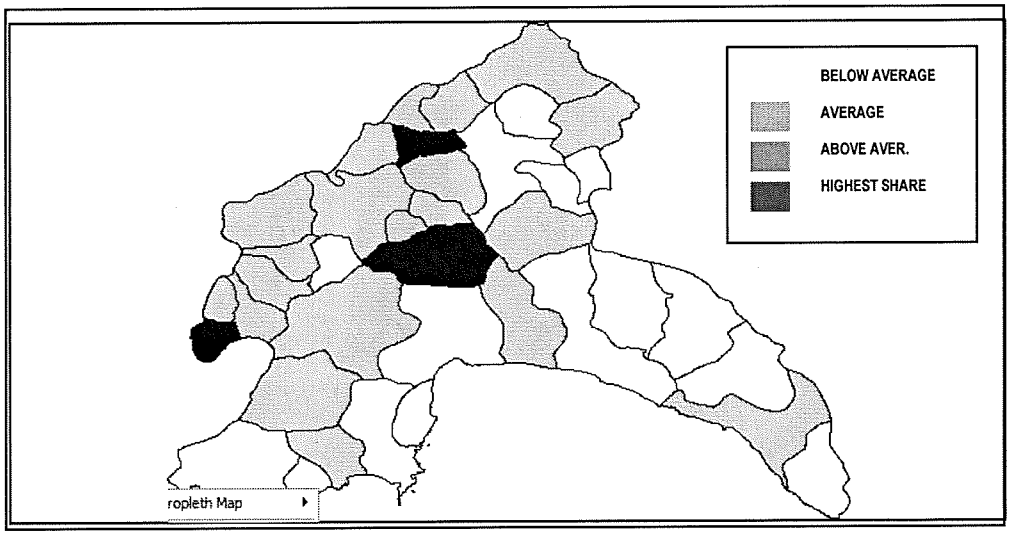


Figure 4.3: The Localization Curve

If we consider the overall specialization pattern of the region (Figure 4.3), Agriculture and Mining activities have a significant structure of specialization. Additionally, social services, trade electricity and construction sectors do not provide a significant specialization pattern, and can be considered as the base sectors.

Having obtained the patterns of specialization in general, it is useful to determine the pattern of each settlement. In this sense, Table 4.6 below displays the shares of economic activities in each sector.

Beginning with the specialization of agricultural activities, (Map 4.16) inner parts of the region reveal a highly specialized pattern in agriculture although they are far from dominance in the total economic activities among region. In other words, similar to İzmir City-region, Antalya City-region again gives a predictable pattern of agricultural specialization with the higher shares of agricultural employment occupied in undersized settlements. The settlements with the highest share of their total employment in agricultural sector are districts of Ibradi, Kemer, (of Burdur) Kumluca and Gelendost provide a highly specialized pattern including more than 50 percent of their total employment in agricultural activities. Moreover, some other districts in the inner part of the region such as Ağlasun, Çeltikçi, Karamanlı and Gazipaşa also reflect specialization in agriculture with more than 30 percent of their total employment engaged in agricultural activities.

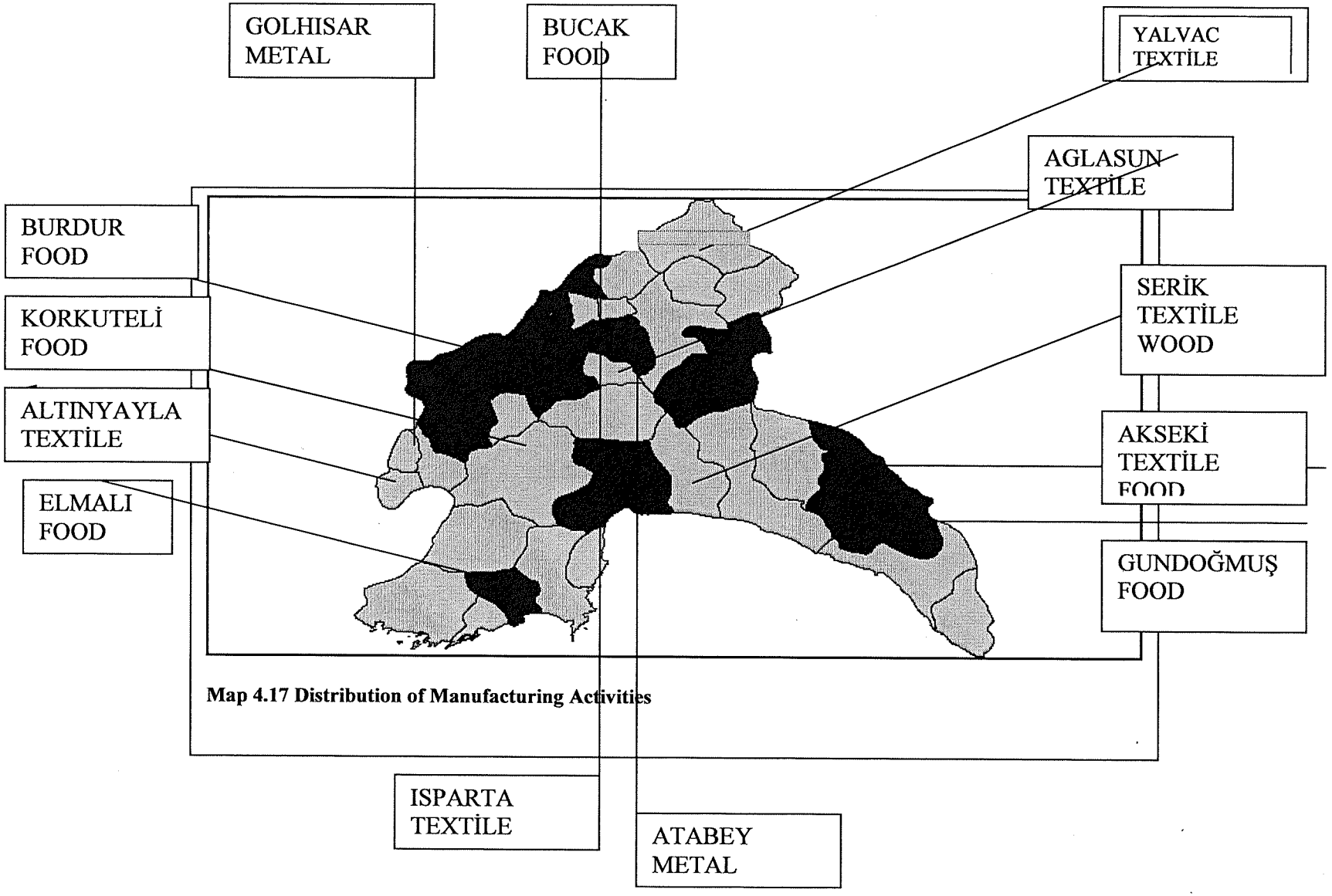


Map 4.16: Specialization of Agriculture

Another important observation is the settlements specialized in **manufacturing** (2nd and 3rd columns of Table 4.6.) Here, Bucak, Altınyayla, Gönen and Atabey districts reveal a clear pattern of specialization in manufacturing activities with a proportion of more than 20 percent of their employment engaged in manufacturing. At this point, one thing to mention is the relatively small proportion of their population and the low contribution to overall manufacturing activities Following these settlements, Yalvaç, Burdur, Isparta and Elmalı districts also indicate a significant pattern of specialization in manufacturing activities by employing almost 15 percent of their total employment in that sector, which are also dominant settlements in the overall industrial activities of the region as we have discussed.

When we further detail the specialization pattern of manufacturing activities taking into the account the different categories of industrial activities, a large number of the settlements have a tendency to specialize according to LQ values obtained. Overall, the dominant industrial categories among region can be stated as food and textile industries in which most of the settlements reveal a high proportion of employment. Additionally, some rare examples of high values of LQ and high shares of employment in metal, wood and basic metal industries can be achievable.

Map 4.17 below illustrates the specialization of manufacturing sector. Accordingly, some of the highly specialized districts in food industry can be stated as Elmalı, Gündoğmuş, .Karamanlı, Korkuteli, Bayındır, Sütçüler, Bucak and Yeşilova . Yeşilova is also specialized in textile industry as well, together with Serik, Aglasun, Altınyayla and Isparta City center. Additionally, Gölhisar and Atabey districts reveal a specialization in metal industry.



Map 4.17 Distribution of Manufacturing Activities

Table 4.6. Percentage Shares of Each Economic Activity In Districts 1990-2000

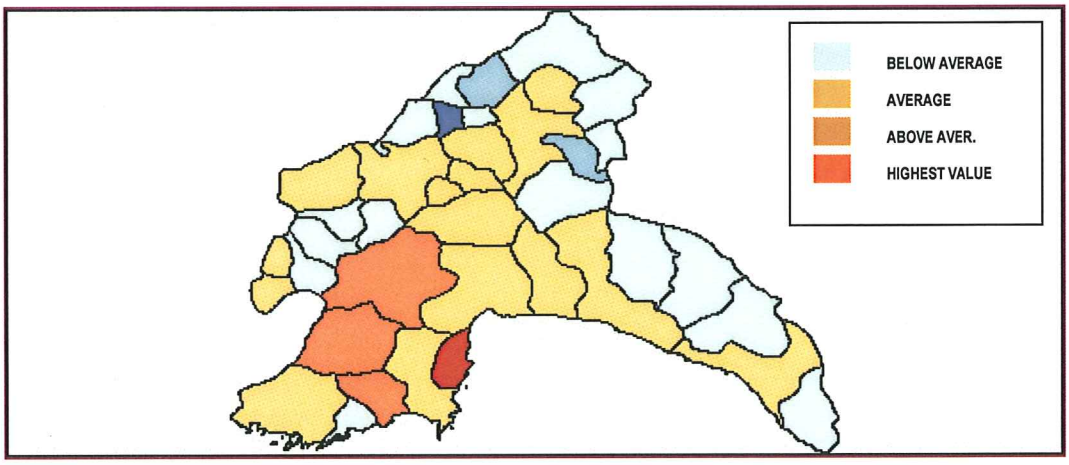
	AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY		CONTRUCTION		TRADE		TRAS. COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
AKSEKİ	24,11	23,83	0,00	1,52	4,15	4,86	0,73	1,31	12,18	28,66	18,46	12,17	4,10	4,51	5,86	3,64	30,43	18,5
ALANYA	2,24	6,51	0,05	0,04	7,98	8,8	0,30	0,3	7,33	16,96	41,81	36,18	6,86	6,15	7,75	5,52	25,68	17,36
ELMALI	18,07	12,5	0,03	0,03	14,28	14,5	0,24	0,77	7,47	7,81	19,88	19,82	5,11	6,15	4,14	3,95	30,78	33,38
FİNİKE	17,07	17,78	0,04	0	7,93	6,65	0,86	0,97	8,96	11,3	19,50	18,84	4,11	5,55	7,43	6,22	34,11	32,13
GAZİPAŞA	30,90	52,92	0,14	0,46	5,74	4,56	0,31	0,15	6,91	7,78	18,97	11,19	4,52	3,31	4,66	2,45	27,85	16,91
GÜNDOĞMUŞ	24,67	65,59	0,00	0	6,02	2,41	0,60	0,33	3,97	3,28	12,27	5,03	7,34	4,38	4,09	1,26	41,03	17,61
İBRADI	47,47	55,99	0,00	0	3,48	2,36	0,48	0,7	11,54	9,01	10,93	8,84	6,35	7,17	3,07	4,02	16,67	10,85
KALE	67,84	80,39	0,06	0	3,09	2,35	0,09	0,11	2,87	3,31	9,28	4,66	2,57	1,29	2,09	0,98	12,11	6,49
KAŞ	3,42	10,03	0,04	0,09	5,75	3,55	0,26	0,24	6,06	13,39	40,35	35,31	8,43	6,86	6,70	4,97	28,98	24,04
KEMER	1,69	7,22	0,04	0	4,17	4,09	0,11	0,52	4,27	13,84	60,56	47,2	5,70	6,51	5,73	2,83	17,74	16,53
KORKUTELİ	11,10	21,83	0,13	0,03	12,14	12,78	0,48	0,7	13,15	6,43	22,48	18,63	6,84	8,01	4,11	2,58	29,57	28,65
KUMLUCA	54,88	66,55	0,00	0	4,96	5,36	0,17	0,17	5,67	5,3	13,42	7,98	1,52	1,45	3,13	1,93	16,25	10,87
MANAVGAT	3,14	15,73	0,03	0,01	6,83	6,44	0,23	0,25	14,83	15,51	47,11	37,32	5,34	4,63	4,69	3,33	17,81	13,47
SERİK	11,63	27,9	0,03	0,04	10,55	12,9	0,41	1,01	10,21	10,26	29,80	15,79	3,82	4,26	4,82	3,61	28,74	22,93
MERKEZ	2,80	6,21	0,14	0,23	17,76	16,06	0,74	0,43	5,45	5,69	13,52	10,21	5,00	4,56	4,73	3,55	49,87	52,43
AĞLASUN	32,34	39,14	0,75	10,72	13,46	10,93	0,37	0,56	6,64	6,55	9,07	8,77	4,21	10,65	3,93	1,18	29,25	10,93
ALTINYAYLA	19,04	47,15	3,31	0	23,25	15,03	0,20	0,35	7,92	3,63	10,82	5,85	8,52	3,93	1,90	2,02	25,05	21,94
BUCAK	6,40	16,71	0,14	0,21	22,32	18,81	0,36	0,36	9,15	13,04	17,77	11,51	9,04	14,93	3,94	2,66	30,88	21,15

Table 4.6. Cont. Percentage Shares of Each Economic Activity In Districts 1990-2000

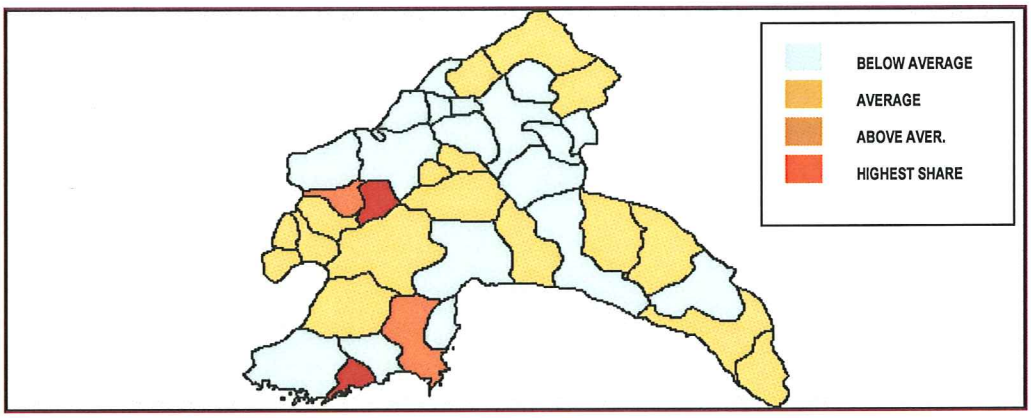
	AGRICULTURE		MINING		MANUFACTURING		ELECTRICITY		CONTRUCTION		TRADE		TRAS. COMMINICAT		FIRE		SOCIAL AND PERSONAL SERVICES	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
ÇAVDIR	56,32	27,14	0,07	0,00	5,46	7,61	0,28	0,28	3,73	8,08	7,46	16,24	5,74	5,45	2,21	4,32	17,28	30,89
ÇELTİKÇİ	60,62	34,96	0	0,63	11,5	8,50	0	0,63	5,13	3,46	3,98	10,24	4,34	6,93	1,42	2,68	12,57	31,97
GÖLHİSAR	41,48	24,08	0,03	0,32	6,37	10,72	0,26	0,47	10,64	11,38	10,12	14,94	4,1	3,21	2,79	3,78	23,49	31,11
KARAMANLI	48,12	28,74	0,05	0,15	5,76	11,56	0,82	0,69	5,49	6,70	7,56	10,71	7,18	5,70	2,45	4,01	22,08	31,74
KEMER	66,99	54,58	0	0,00	4,89	4,80	0,1	0,42	2,78	4,23	3,07	4,80	3,74	2,40	2,21	4,23	15,36	24,54
TEFENNİ	32,23	14,93	0,35	0,00	8,01	10,07	1,45	1,35	4,07	9,80	8,07	14,48	4,7	2,79	5,23	6,65	34,84	39,93
YEŞİLOVA	16,94	7,97	3,87	0,28	11,3	11,39	0,31	1,40	5,65	12,65	17,37	20,75	5,16	4,12	4,48	6,15	34,38	35,29
IPARTA	2,38	0,99	0,11	0,07	18,83	16,92	0,94	0,65	7,2	6,43	11,45	12,83	4,28	4,31	3,29	3,42	50,21	54,37
AKSU	49	18,72	0	0,18	9,65	6,61	0,58	0,92	7,9	11,56	4,49	10,09	3,99	4,40	2,08	5,87	21,38	41,65
ATABEY	17,33	10,65	0,06	0,47	30,49	27,50	0,7	0,26	8,67	18,69	5,5	5,82	4,3	2,87	2,15	2,48	29,66	31,27
EĞİRDİR	29,12	5,56	0,09	0,01	4,93	4,88	0,4	0,45	4,05	3,73	7,38	8,93	3,66	3,26	2,01	1,97	46,26	71,21
GELENDOST	53,39	63,69	0,04	0,00	9,29	3,66	0,18	0,28	5,43	2,99	6,99	7,55	4,19	4,05	2,02	2,01	17,84	15,77
GÖNEN	34,09	20,43	0	0,00	13,33	54,05	0,17	0,09	6,72	5,40	4,29	2,62	3,19	1,46	1,33	1,25	36,52	14,69
KEÇİBORLU	4,87	10,15	26,45	1,02	7,76	14,07	0,7	0,84	6,36	16,12	7,31	13,41	5,97	8,94	7,41	3,87	30,28	31,58
SENİRKENT	20,25	14,06	0,07	0,00	8,29	10,09	0,79	0,30	6,85	10,51	8,22	13,80	8	6,39	6,2	4,76	40	40,08
SÜTÇÜLER	20,86	4,34	0,5	0,00	13,2	10,63	0,5	0,75	4,37	6,74	17,24	15,42	9	9,28	6,81	7,19	26,49	45,66
ŞARKİKARAA	14,03	14,40	0,33	2,04	12,37	7,61	0,39	0,27	31,71	8,59	11,05	18,88	3,59	3,18	3,35	5,22	21,91	39,82
ULUBORLU	26,3	19,17	0,24	0,18	9,44	8,77	0,54	0,68	5,58	7,28	9,74	11,21	5,31	6,56	4,87	6,83	35,88	39,33
YALVAÇ	16,59	6,52	0,04	0,05	20,62	17,73	0,42	0,47	13,7	19,91	14,41	16,67	4,13	3,39	3,61	3,88	25,35	31,38
YENİŞARBADE	43,67	24,10	0,05	0,00	7,87	3,35	0,31	0,52	19,97	18,30	3,68	8,25	2,4	2,45	2,86	4,77	18,79	38,27

4.2.2 Antalya City-region Distribution of GDP Entrepreneurship

The spatial distribution of entrepreneurship and GDP in Antalya City region can be seen as a homogenous pattern as evidenced from the previous and following standard deviation maps. (Map 4.18 and Map 4.19) Both indicators reveal a strong spatial formulation, but the values in this formulation are all around average rather than the extreme ones. When we consider the map 4.19 below regarding **entrepreneurship** and Map 4.18 regarding GDP per capita, we can see the remark of moderate proportion of entrepreneurship areas surrounded by low values in northern part of the region



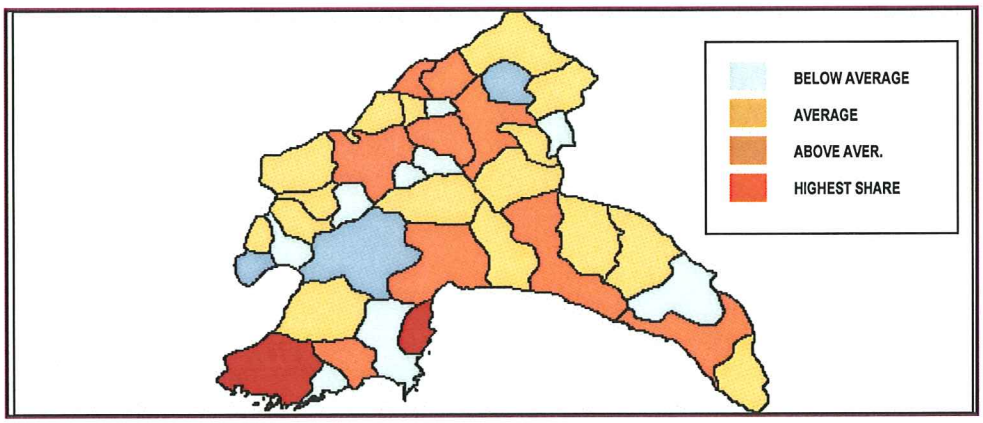
Map 4.18: Distribution of GDP per capita



Map 4.19: Distribution of Entrepreneurship

4.2.3. Antalya City Region The level education and innovative activity

Another important issue defining the region's characteristics can be stated as the level of education. When the level of education considered among region, we can observe that besides an arbitrary placement of high proportion area parallel to coast, another high education cluster is situated around Isparta city center.



Map 4.20: Distribution of High Education

As can be observed from the following table, the highest values in education are obtained for Kemer, (of Antalya) Kaş and Alanya, three coastal tourism centers of the region. These settlements are followed by Eğirdir, Uluborlu, Burdur and Antalya City Center, which may be mainly due to existence of higher education institutions in the settlements.

When we consider the patenting values of the Antalya City-region, we can not make an indication of these values since the only patent applications for the entire region belongs to Antalya city center, with a value of 1 application in both the years of 1995 and 2000.

Deriving from these two indications, we can conclude that the level of knowledge and innovation among region is limited in terms of value, as well as in terms of spatial association.

Table 4.8: Distribution of High Education

UPPER		ABOVE AVERAGE		AVERAGE	
KEMER	0,17	MANAVGAT	0,09	¦BRADI	0,05
KAÌ	0,17	F¦N¦KE	0,08	SER¦K	0,05
ALANYA	0,13	SEN¦RKENT	0,08	AKSEK¦	0,05
E°¦RD¦R	0,13	ISPARTA	0,08	ELMALI	0,05
ANTALYA	0,11	GAZ¦PAÌA	0,07	YALVAÃ	0,05
ULUBORLU	0,10	ŞAKİKARAAGAC	0,06	KEÃ¦BORLU	0,05
BURDUR	0,10	GİNEN	0,06	AKSU	0,05
		YEÌ¦LOVA	0,06	S-TÃ-LER	0,05
		TEFENN¦	0,06	BUCAK	0,05
				KARAMANLI	0,05
				GİLH¦SAR	0,05

BELOW AVERAGE	
G-NDO°MUÌ	0,04
KUMLUCA	0,04
KALE	0,04
ATABEY	0,04
YEN¦ÌARBADEML¦	0,04
A°LASUN	0,04
ÃELT¦KÃ¦	0,04
KEMER	0,04
ÃAVDIR	0,04
GELENDOST	0,03
ALTINYAYLA	0,03
KORKUTEL¦	0,00

CHAPTER 5

THE ANALYSIS OF SPILLOVER EFFECTS IN IZMIR AND ANTALYA CITY REGIONS

The aim of this part is to investigate the process of spatial spillovers in innovative activity and economic performance in Antalya and İzmir City Regions. While making the evaluation, three research questions have been in consideration (1) to define whether the effects of proximity and spillovers evident or not (2) to assess the extent of proximity in the area which may affect the occurrence of such spillovers (3) whether these two type of spillovers have a parallel pattern of not.

The analyses have been carried out thanks to an original data set on Census of Population across districts of İzmir and Antalya City Regions in the years of 1990 and 2000, GDP values obtained from TURKSTAT and a data set obtained from Turkish Patent Institute. In conclusion, according to global and local indicators of spatial association there are clear signs of spatial correlation and distribution of innovation and economic performance, but the existence and extend of them varies in two city regions respectively. Overall, the analyses show that, especially in the formulation of innovative activity externalities, İzmir City region give much more evident conclusion than Antalya City Region whereas the opposite holds true in the formulation of income spillovers.

If we further detail the focus of this part, a twofold classification can be done. In the first part of the study, which can also be labeled as methodology part, some important choices affecting the empirical result of analyses have been

tried to enlighten such as selection of relevant indicators for each category and the choice of appropriate methods in the measurement of the spatial autocorrelation, and in the second part, empirical results obtained from expiatory spatial data analyses explained in detail.

5.1.Methodology:

5.1.1 Alternative Ways of Measuring Spatial Autocorrelation:

While considering the alternative methods for measuring spatial dependency or specifically spillovers two sub categories are defined. The first one is the discussion of all models available, in order to figure out the different features of each model, and the second one is the difference and strength of each model while evaluating the local spatial dependency. In other words, in the first part, several distinctive models ranging from widespread Moran's I and Geary Coefficient to relatively rarer examples such as SARMA and LM-LG is figured out and in the second part of methodology the application boundaries of each model defining the study area, namely local and global measures of spatial association is given.

5.1. 1.1. Models of Measuring Spatial Dependency:

The measurement of spatial dependence can be carried out according to several different models in which the null and the alternative hypotheses hold the same for all. Hence, it is worth considering the underlying hypothesis of all spatial autocorrelation models before evaluating the differentiating ones. As indicated in Anselin and Florax edt. (1995), **the null hypothesis** of all tests regarding spatial dependence is given as "no spatial dependence" whereas the alternative hypothesis can be in the form of "positive spatial dependence" and "negative spatial dependence". (See table 1 below)

In this sense, rejection of null hypothesis and obtaining the signals of spatial dependency makes us to infer the relevance of spatial dependency and but more importantly, the sign of this spatial dependence pattern (negative or positive) makes us to decide whether these spatial pattern indicate the spillovers or not. That is, if the pattern of spatial dependency occurs in "negative spatial association" form, we can interpret that adjacent or close proximity areas tend to cluster in a way divergent to each other, and if the pattern of spatial dependency is in "positive spatial association" form, we can infer that the areas with close proximity tend to have similar values. As a result, while evaluating spillovers, significance of spatial autocorrelation is a must but not adequate to, we shall also determine that the sign of such spatial autocorrelation should be positive in order to adequately define the spillovers.

Table 5.1: Characteristics of Underlying Hypothesis in Spatial Autocorrelation (Author's own elaboration adopted from Anselin (1999-2001))

Null Hypothesis	Alternative Hypothesis:
No Spatial Association • values observed at a location do not depend on values observed at neighboring location • observed spatial pattern of values is equally likely as any other spatial pattern	**Positive Spatial Association** • like values tend to cluster in space • neighbors are similar **Negative Spatial Association** • neighbors are dissimilar • checkerboard patter

Having analyzed the common underlying hypothesis of all autocorrelation tests, making a diversification of models is meaningful to better underline the main differences of these models. Analyses of spatial autocorrelation and spatial effects can be incorporated into two distinct ways according to focus of interest during the analyses, spatial lag and spatial error models. Although trying to give the formal econometric definition of each modeling[6] category is much more beyond the aim of this chapter, making a general discussion of the main research interest between two model groups is meaningful especially to understand the relevant choice of model groups for the focus of our study. As indicated in Anselin (1988, 1999 and 2002), a spatial lag model is mainly integrated with the dependency of spatial lattice data, whereas the spatial error term incorporates more with the spatial heterogeneity of the data set. Moreover, the emphases of two distinct modeling ways also differ in the sense of the aim of the assessment. The former, spatial lag model, mainly deals with the assessment of the existence and strength of spatial interaction whereas the later, spatial error models' concern is with correcting for the potentially biasing influence of the spatial autocorrelation. (Anselin, 1992) From such a difference in the approach of two methods, it can be interpreted that our model choice should be a test in which measurement is also available besides error correction.

If a general conclusion of all models regarding both spatial lag and spatial error terms, ten main models of spatial association can be concluded given in the Table 5.2 .The last three rows in the table includes the models emphasizing the spatial lag ones, and the first seven rows indicate the spatial error models.

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[6] For a more detailed formal econometric definition of spatial error and lag terms, please refer Chapter 6 in

Anselin 1988 or Kelejian and Prucha 1999 among others.

Table 5. 2: A Conclusion of Tests Regarding Spatial Autocorrelation (Author's own evaluation adopted from Cliff and Ord 1972, Anselin 1988, 1995, 1992, 1994)

TEST	SPECILIZATION OF THE TEST	SOURCE
MORAN 'S I	ERROR +LAG	In Cliff and Ord (1972),- Moran (1950)
GEARY COEFFICIENT	ERROR +LAG	In Haining, 1990 – Geary (1954)
MENTEL' S R	ERROR	Mantel (1967) -in Hubert et al. (1981)
LAGRANGE MUTLIPLIER _ERROR	ERROR	Buriddge (1980)
K-R TEST	ERROR	Kalejian and Robinson (1992)
LAGRANGE MULTIPLIER TEST OF BERA	ERROR	Berra and Youn (1992)
LAGRANGE MULTIPLIER TEST FOR SECOND ORDER	ERROR	Anselin (1994)
SARMA	LAG	Anselin (1988)
LAGRANGE MULTIPLIER _LAG	LAG	Anselin (1988)
LAGRANGE MULTIPLIER SPATIAL MOVING PROCESS	LAG	Berra and Young (1992)

With seminal contribution of Cliff and Ord (1972) interaction and spatial autocorrelation have came into practice. Beginning with a formalization of relationship among spatial units by using a weighting matrix, most usually termed with W [7] distance and contiguity relations are defined in the form of sets. Then, these are coded in the form of a weights matrix W, and often scaled to sum to unity in each row [8] hence, the relations are constituted with

$$W_{ij} = c_{ij} / \sum c_{ij} \qquad \textbf{(5.1)}$$

Where cij = 1 if i is linked to j and cij = 0 otherwise. The result is a matrix with a zero diagonal and non-zero off-diagonals The application examples ranges widely such as some regarding only contiguity or neighborhood linkages with only direct neighbors, or others including second-order relationships or set relationships.

Using this information, most commonly used global measures of spatial autocorrelation (Cliff and Ord, 1973) can be constructed. As explained above, the first one is, **Moran's *I*:**

$$I = \frac{N\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij} z_i z_j}{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij} \sum_{i=1}^{N} z_i^2} \qquad \textbf{(5.2)}$$

---

[7] There are some alternative ways of constituting weightened matrixes besides seminal work of Cliff and Ord. Examples are given below in more detail.

[8] Row-wise summation is an often used method since in order to sustain standardization and simplicity, but it is not a must.

taking differences from the mean: $z_i = x_i - \bar{x}$, and the second one is **Geary coefficient**:

$$C = \frac{(N-1)}{2(\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij})} \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}(x_i - x_j)^2}{\sum_{i=1}^{N} z_i^2}.$$

(5.3)

In addition, a global measure of correlation Γ introduced by Mantel (1967), and developed by Hubert et al. (1981):

$$\Gamma = \sum_{i=1}^{N}\sum_{j=1}^{N} \omega_{ij}\xi_{ij}.$$

(5.4)

The Moran and Geary coefficients are constructed heavily depending on neighborhood effects and dependency conditions, hence can be applicable for data observations which includes linkages among observation and applicable for lattice data sets.

Other methods of measuring spatial association are rarely preffered tests with joint charecteristics used in the measurement of both spatial error and lag. These tests are namely the SARMA and Lagrange Multiplier tests as indicated in Anselin (1994).

The first one is the Lagrange Multiplier Principle (LM) which constitutes the bases for both error and lag (LM-ERR) dependance (LM LAG), SARMA and

K-R test with some adjustments. The original form of the test is suggested in Burridge (1980) for error as follows:

$$LM\text{-}ERR = \frac{(e'Wie/s^2)^2}{T_1} \qquad (5.5)$$

where $s^2 = e'e/R$ and $T_1 = tr(W_1'W_1 + W_1)^2$ in which tr is a matrix trace operator.

Having evaluated the general characteristics of each model briefly, I will try to discuss the appropriate model choice for our study, namely Moran's I. While deciding the relevant test as Moran's I for our study, the evaluation made via a former evaluation of the literature regarding power of the each test concerning the lattice data studies. Overall, these tests can be defined as simulation experiments or Monte Carlo Experiments[9], which provides approximate solutions to a variety of problems by performing statistical sampling experiments on a computer. Beginning from King's (1981) early experiment in issue, Moran's I have been shown to be locally best invariant and has performing stronger results in the power simulations. [10] Other examples of this type of lattice data studies based on the same format also extensively conclude the power of Moran's I in comparison with other tests of spatial dependence. (See Anselin and Rey 1991; Anselin and Florax ;1995), Kelejian and Robinson (1998) As a result, in order to be get the most comprehensive results from our study, Moran's I have been used instead of other mentioned alternatives.

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[9] For a more detailed explanation on the technical definition and characteristics of Monte Carlo experiments, please refer **Kleijnen, J.P.C., 2004 or Zeigler eds, 2000**

[10] One of the self- critiques regarding the relevance of simulation experiments comes from Anselin in Anselin and Florax eds. (1995) , indicating that the generality of the results obtained from these experiments are limited in the design of the simulation, but still, these type of generalizations have been found as the best way of practice while comparing alternative models.

In the Moran's I, another important point after the selection of appropriate model comes in the form of weighted matrix choice. Although the weighted matrixes are exogenous to model, different choice of weighted matrixes concludes varying results. (Anselin, 1999) Typically, they are indicated as based on the geographic arrangement of the observations, (distance based matrixes) or contiguity.. However, in most of the times this definition is too general and alternative terms of the spatial weights can be seen (Anselin, 1980) such as on the structure of a social network (Doreian, 1980), economic distance or trade-based interaction measures in Aten (1996, 1997). Within this wide range of options, three generalizations of all matrixes can be made in the form of distance and contiguity matrixes and non-distance measures.

- **Contiguity Matrices**

As indicated in Anselin (1988) the original measures of spatial association is measured in the form of a binary matrix which advanced by Moran (1948) and Geary (!954). Those contiguity weights have based on the binary contiguity, in which only border relations of spatial units have taken into consideration to define the weighted matrix. According to this notion, the relation of neighborhoods have expressed in 0 and 1 values. If two spatial units share a common border, they considered to be contiguous and a value is assigned in the matrix for them, and if two spatial units does not share a common border the relationship between them is neglected and a 0 value is assigned for them. Although the definition of contiguity weights has found to be useful, it has been criticized as being too straightforward especially in irregular arrangement of spatial unit.

Holding the basic rule for all contiguity matrixes, actual formulation of the matrix depends on the definition of neighborship accordingly. Alternative notions of neighborhood defined in the contiguity matrixes are:

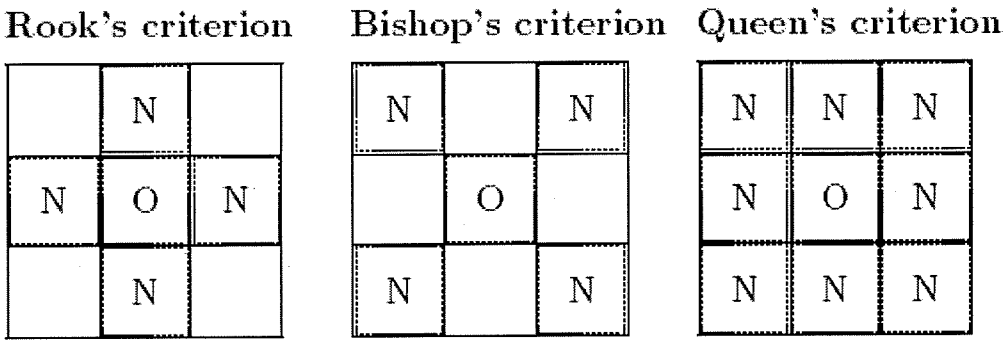
(i) Rook's criterion: Adjacent areas are neighbors if they share

nonzero-length boundaries.

(ii) Bishop's criterion: Adjacent areas are neighbors if they share zero-length boundaries.

(iii) Queen's criterion : Adjacent areas are neighbors if they share zero-length or nonzero-length boundaries

The neighboring schemes of each matrix can be exemplified as follows:



iv. Buffer distance: besides these neighbouring schemes, definition of neighbors can also be made according to a certain distance or radius, in which all objects lying in this radius are considered as neighbors.

- **Distance Matrixes:**

Distance matrices are similar to contiguity matrices, but they are non-binary. They are also symmetric *n* by *n* matrices, and the elements are measured by using the inverse distances between the locations. That is, a distance decay function is used in the formulation of distance matrixes, in which observations which are geographically further distant are down weighted. (Badinger et al., 2002).Again the elements on the main diagonal are zero by definition, since the distance

between an object and itself is always zero. In spatial econometrics usually contiguity matrices are used, whereas in spatial statistics the analyses are typically based on distance matrices. (Bivand, 2001)

- **Non-Proximity Matrixes:**

Another type of matrix worth noticing is the ones neither distance- nor contiguity matrices. According to research question, we can also use some other kind of characteristics to formulate an adequate distance or connectivity measurement. Besides different measures like economic or network indicators, another example of such a situation can come from Up and Lim in the form of measuring proximity and metropolitan area effects together. In this seminal study, Up and Lim includes the role of population dynamics besides proximity, and defines the weighted matrix as directly proportional with the population of corresponding settlement.

As can be understood from the below alternatives of spatial weighted matrixes, one can make more than one choice to underline the spatial dependency, and can also get more than one comparable results changing accordingly. The appropriate choice of a specific weights matrix is still one of the most fundamental and determining methodological issues in spatial statistics and econometrics. According to Le Gallo and Ertur (2003) the choice of weighted matrix can be made in an ***inter alia* perspective** regarding the geographical characteristics of the spatial area as the size of the observations in the sample (Le Gallo and Ertur, 2003). In other words, the most appropriate way of choosing among alternative weight matrix is to try several matrixes from simple contiguity and nearest-neighbors matrices with different orders to distance based matrixes. As a result, while analyzing İzmir and Antalya City Regions, following such an inter alia perspective, both contiguity and distance alternative methods of weighted matrixes have been applied. The distance matrix specified by the bird eye distances between the center of two districts and contiguity matrixes are used in both Queen and Rook form from 1st order contiguity to 3rd order.

5. 1.2. Alternative Boundaries of Measuring Spatial Dependency:

The examples of models given above are useful to define whether a significant interaction in the formulation of observation in the space is relevant or not, but they do not give a clue about how these interaction or association is linked in the space. Such lattice data studies which does no directly enable us to estimate the source of interaction is termed as **Global Measures of Spatial Association.** In this respect, another measure of spatial association is needed to cover the misleading spatial formulation of autocorrelation, which is **Local Indicators of Spatial Association.**

As well as the existence of spatial association regional and local structure of this association is worth taking into consideration, Moran's I does not enable us to take into consideration this spatial structure. As Getis and Ord point out (1992), there are many reasons for examining patterns of spatial dependence at a more local scale. While global measures permit us to test for spatial pattern over the whole study area, sometimes autocorrelation among smaller sections are important. Examples of such a situation can be seen in Anselin (1995), Getis and Ord, (1996) which uses a separate part of study area. The choice of this separate part varies, but it usually uses a particular distance or contiguity from a selected point or zone.

Hence, deciding which regions is the core of this global spatial association and which regional clusters contribute most to global association is another research interest. In this sense, local indicators of spatial association come into practice detect these core or "hot spots" (local clusters or local outliers) and to give the local instability (local deviations from global pattern of spatial association) (Anselin, 1999-2001) As indicated in the previous part in more detail, there are more than one way of measuring the spatial association, and additionally each global spatial association measure has its own local indicators, which can be applied accordingly In other words, each Global Statistic has its own LISA forms like local Moran, Local Geary or Local Gamma. (Anselin, 1995) Here, in our analyses since the selected measure of spatial association is Moran's I value, a local Moran's I value is the proper one.

As mentioned in Anselin, (1995, 1996) two tools can be carried out to define local spatial association: the Moran Scatter plot and Local Indicators of Spatial Association (LISA). In Moran scatter plot, spatial lag values are plotted to a scatter diagram in order to visualize which values are higher or below the original z values. The outcome of this method is a four quadrant scatter graph indicating

- High High (HH) quadrant: locations with high value surrounded by high value neighbors
- High Low (HL) quadrant: locations with high value surrounded by low value neighbors
- Low Low (LL) quadrant: locations with low value surrounded by low value neighbors
- Low High (LH) quadrant: locations with low value surrounded by high value neighbors

As can be understood from the definitions of each quadrant, HH and LL quadrants correspond to positive spatial autocorrelation where the values are clustering with similar values in close proximity, whereas LH and HL quadrants are indicating negative spatial autocorrelation with adjacent units are possessing unlike values.

Visualizing these quadrants on a Moran Scatter Plot Map is a useful method to capture the similarities and differences in the local spatial association, but making inferences about the significance of these "hot spots" are not possible. Hence, the need for accurate significance of these spatial clusters still exists. Local Indicators of Spatial Association (LISA) is the tool which used to evaluate the significance of spatial clustering of similar values in observation. Additionally, the sum of all LISA gives us the global Moran's I value. (Anselin, 1996)

5.1.3. Practical Problems and Shortcomings of the Methods

The most common problem while using a spatial analyses technique is the definition of borders and boundaries regarded as modifiable unit of analyses (MAUP) problem. This problem firstly set by Arbia (1989), while studying a wide range of linkages between unit of analyses and autocorrelation. Such a work indicates that, changing different boundaries of study area would also make significant changes in the results, hence to decide the optimum level in the study area has vital importance.

This problem includes two parts, the problem of scale, and the problem of alternative allocations. The problem of scale mainly deals with combination or separation of different units and finding the optimum scale for the analyses. This side of the problem deals with significance of results obtained from the tests, since it would make another conclusion with another spatial combination. Additionally, it completes the meaningfulness of the study in terms of theoretical bases since the values explained are changing accordingly with the change in spatial unit.

The second side of the measurement problem is alternative allocations, mainly appropriate for local indicator analyses. Again, changes in parts of spatial units or constitution of them make a significant difference in estimations. This part of the problem is also known as gerrymandering. The solution of both problems are summarized in Openshaw (1996), by stating that many of the technologies now available for choosing zoning systems to optimize results. These relatively new software packages make the most appropriate type of zoning or scale choice available.

Although, within spatial analyses methodology, most of the work is derived from province level data, and attention is paid to dependency in national level, for spatial dependency issues, as indicated in Anas et. al (1999), the best way is to conduct the spatial scale in (urban) sub-centers. While cities have been regarded as the most common scale in the relevant literature, the reason of such a choice does mainly result from the data limitation, in other words, due to the fact that the only way

of collecting relevant data is available at province level. In this respect, where available using below metropolitan level scales give better insides than "space neutral" province or regional levels.

5.2. Selection of Indicators to Measure the Spillover Effects

Having analyzed the choice of appropriate model for our study, another important issue is considered, that is choice of appropriate data while evaluating each type of spillovers The choice of indicators used in the analyses made according to two reasons, first of all recent theoretical literature regarding the best indicators for both knowledge and income have been reviewed, and secondly, availability of data in the regional level have considered.

When we move to relevant indicators for the choice of analyses, the indicators or measurement variables used in the analyses have been chosen according to recent informative surveys regarding the extent of reliability of indicators in both knowledge and income issues.

The first set of measurement variables have been chosen for the measurement of **income**. The evaluation of a proper income indicator has been a widely discussed issue, and the outcomes of the analyses regarding the reliability of the income indicators have set in two extreme sides. The first part of the evaluation comes from Levine and Renelt (1992) with a three indicator conclusion. They define the reliable indicators of income as share of investment, international trade and GDP growth as a result of analyses with a quasi experiment. The results of such a limitation in the reliability of variables have been discussed by many researchers and the findings of Levine and Renelt have been considered to be extra sensitive and conservative.

A second bunch of analyses have evolved counter to Xavier and Salai Martin's analyses covering a much more higher proportion of the variables used in the

growth analyses with up to 27 findings. These variables have been analyzed in the example at 95 percent significance level, with Bayesian approach methodology and the results include a wide range of indicators from GDP per capita to black male population, and criticized as being to much inclusive and insensitive.

The last part of literature comes from the followers of a more midway approach which I will also try to follow, aiming to balance the extreme sides of both two approaches. The findings Florax eds. in a meta analyses study concludes that, significant results can be obtainable with more that these three variables but one thing to bear in mind is that rather than statistical significance of the variables, economic meanings and economic significance should also be kept in mind.(Ziliak, (1996), Florax eds. (2002)

With the light of these resources, the indicators of income spillovers are determined as *GDP per capita, entrepreneurship, employment and population increases*. "GDP per capita" has measured by proportion of GDP obtained from TURKSTAT for 1996 to relevant population. The proxy of "entrepreneurship" has been used as the proportions of entrepreneurs in the economic activity, finally employment and population increases have been calculated via average increase in a ten year period, namely between 1990 and 2000.

When we consider the indicators of innovative performance, the most common one used in the literature, namely the patent citations have been chosen as the first variable of knowledge spillovers. Some of the seminal examples of empirical studies regarding patent citations can be given as Paci and Usai (2000), Jaffe, (1996), Sonn and Storper,(2003) and Paci and Piglareu (2002) among others. Although there are some limitations of patent citations as a proxy of knowledge spillover in the literature, still the relevancy and strength of it when compared to other sources of knowledge is inevitable. One of the most common critiques of patent citations as an indicator of knowledge comes from Jaffe edt. (1993, 2000) , Trajtenberg (1993), Henderson (2005) indicating that using pure number of

patent citations is a useful, but they also can be misleading due to fluid characteristics. The reason of such a fluid characteristic can be corrected by using an average value of patents for a decade, in which by using the average value possible misleading increases or decreases in patenting can be corrected. Other seminal alternatives of innovative capacity indicators can be used as balancing measures such as Anselin's number of research activities per population or Magrini's number of laboratories per person, but availability of such a data in the regional scale is not possible. In our case, the complementary indicator for innovative activity is defined as the share of high educated population.

5.3. Findings:

Spatial dependence refers to the fact that one observation in a spatial unit is associated with observations from other locations and the results of the observation are dependent to its surroundings. (Varga, 2000) Anselin defines the sources of spatial association mainly due to two reasons, the first one is that spatial interaction is the result of such spatial effects; hence the existence of spillovers or factor mobility leads spatial association. Secondly, there may be a measurement problem in the boundaries of the spatial units which will result in administrative borders may not coincide with the borders of economic activity (Anselin 1988).In our analyses, focus is on the first reason of spatial association, in which we assume that the resulting spatial association is an indication of spatial interaction and can be regarded as the evidence of the spillovers. As explained in the pervious chapter in more detail, there are various alternative methods of measuring spatial association and among them the most powerful and widely known one to evaluate dependency of spatial units is the Moran's I. (Cliff and Ord 1981) To recall, Moran's I value can be given for each period of observation as follows:

$$I = \frac{N\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}z_i z_j}{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}\sum_{i=1}^{N} z_i^2}$$

(5.6)

where n is the number of regions, denominator is the sum of the elements in the spatial weight matrix W which normalizes the spatial effects between regions, (Anselin, 1995) ij w are the elements of the spatial weight matrix W corresponding to the regions i and j. Moran's I statistic can take values between –1 and 1. In Von Oort (2004) these simplified ratios of spatial cross products to variance have been indicated as similar but not equivalent to a correlation coefficient.

Conclusion of a Moran's I value is based on a significance test, in which a standardized z value of I computed by subtracting the theoretical mean and dividing the result by the theoretical standard deviation or permutation procedure. In our analyses, the Moran's values have been obtained by using Geoda and to assess the significance of the Moran's I statistic against a null hypothesis of no spatial autocorrelation, permutation procedure is used. The obtained results give the pseudo significance value and summary statistics (the observed Moran's I, the theoretical expected value, the mean of the reference distribution and the standard deviation of the reference distribution). (Anselin, 2003) In order to assess the "stability" of the pseudo significance value; observations from 99 permutations to 999 permutations have all been practiced.

Having obtained the significance for the results of Moran's I, the inference of values can be made accordingly. Positive values of Moran's I indicate positive spatial autocorrelation in which similar values are more likely than dissimilar values between neighbors and vice versa. In other words, positive spatial association occurs when areas with high values are agglomerated with high

values and low values are agglomerated with low values, whereas negative spatial association occurs when areas surrounded by low value areas.

As well as the existence of spatial association regional and local structure of this association is worth taking into consideration. In this sense, global value of Moran's I does not enable us to take into consideration this spatial structure. Hence, deciding which regions is the core of this global spatial association and which regional clusters contribute most to global association is another research interest. In order to achieve this interest, local indicators of spatial association come into practice detect these core or "hot spots" (local clusters or local outliers) and to give the local instability (local deviations from global pattern of spatial association) (Anselin, 1999-2001) As indicated in the previous chapter in more detail, each global spatial association measure has its own local indicators, which can be applied accordingly In other words, each Global Statistic has its own LISA forms like local Moran, Local Geary or Local Gamma. (Anselin, 1995) Here, in our analyses since the selected measure of spatial association is Moran's I value, a local Moran's I value is used.

As mentioned in Anselin, (1995, 1996) two tools can be carried out to define local spatial association: the Moran Scatterplot and Local Indicators of Spatial Association (LISA). In Moranscatterplot, spatial lag values are plotted to a scatter diagram in order to visualize which values are higher or below the original z values. The outcome of this method is a four quadrant scatter graph indicating

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Visualizing these quadrants on a Moran Scatter Plot Map is a useful method to capture the similarities and differences in the local spatial association, but making inferences about the significance of these "hot spots" are not possible. Hence, the need for accurate significance of these spatial clusters still exists. Local Indicators of Spatial Association (LISA) is the tool which used to evaluate the significance of spatial clustering of similar values in observation. Additionally, the sum of all LISA gives us the global Moran's I value. (Anselin, 1996)

5.3.1. Income Spillovers in İzmir City Region

As we have seen in the previous second and third chapters in more detail, the level of income and growth is not a bounded fact and neighborhoods' potential is an effective factor to promote the development of a region In a city region context, it is understandable to expect a spillover effect in the growth of territorial units occurring from the central area to its hinterland; as long as the high levels of interaction generating the city-region applies to the social and economic factors within the region as well

In our case, the content of this interaction and its outcomes are discussed by evaluating the occurrence and extend of this income spillovers among four different indicators. These indicators are employment and population growth, (log) GDP and finally the level of entrepreneurship. As indicated in the former methodology part, firstly a global spatial autocorrelation measure is used to define which of these indicators reveal a significant spillover effect in our region. Then , the discussion of whether this significant spatial auto-correlated pattern

continues to keep its significance in the different levels of proximity is again the discussion of this global ESDA part quested, and finally the high value oor low value clusters of each significant indicator defined.

For İzmir City Region, among four of the applied indicators only employment increase gives significant results regarding spatial association. (See Table 5.3) That is, the advantages captured in neighborhoods in terms of population growth, entrepreneurship and GDP does not provide a spatially dependent structure among region, on the contrary they are only effective within the boundaries of their own territorial units. The raw spatial distribution of these three variables as in figures in the following page 110 supports this finding with an obvious arbitrary pattern in the distribution of all three indicators.

Table 5.3: Global Spatial Association Values Izmir City-Region

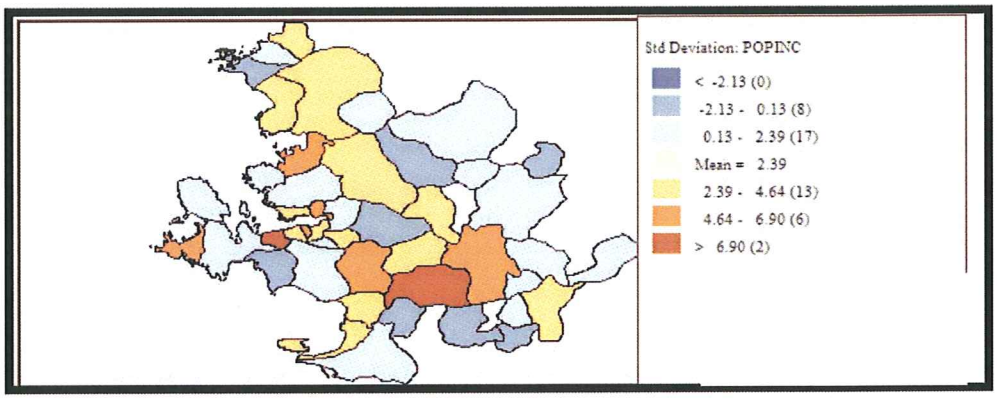
		Contiguity Type					
		Rook			Queen		
Indicator	Dist	1st	2nd	3rd	1st	2nd	3rd
Employment	0,2921	0,3197	0,1909	0,0834	0,3175	0,1904	0,0826
GDP	*	*	*	*	*	*	*
Population	*	*	*	*	*	*	*
Entrepreneurship	*	*	*	*	*	*	*

Beginning with the distribution of GDP per capita among region, it is quite obvious that the distribution of GDP per capita among region has almost a homogenous pattern where a total of 38 of 46 settlements placing around the mean value. The mean value for the (log) GDP for the entire region is 3,55, 18 of the

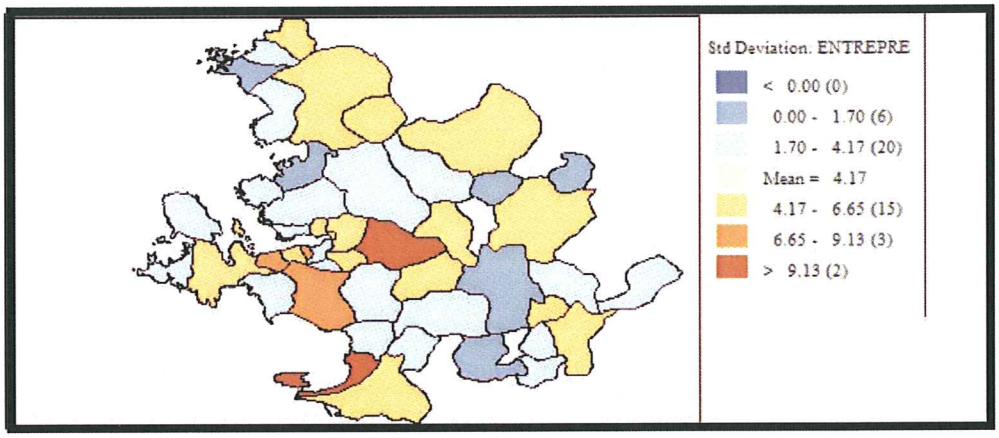
settlements lay between the values of 3,50 and 3,55, and 20 of the settlements take their place between 3,55 and 3,80.. These findings conclude an almost homogenous distribution of income in terms of GDP per capita.

This homogenous pattern is destructed with only four higher level settlements, Bornova, Kuşadası, Aliağa and Kemalpaşa and four lower level settlements, Bergama, Kınık, Sarıgöl and Yenipazar

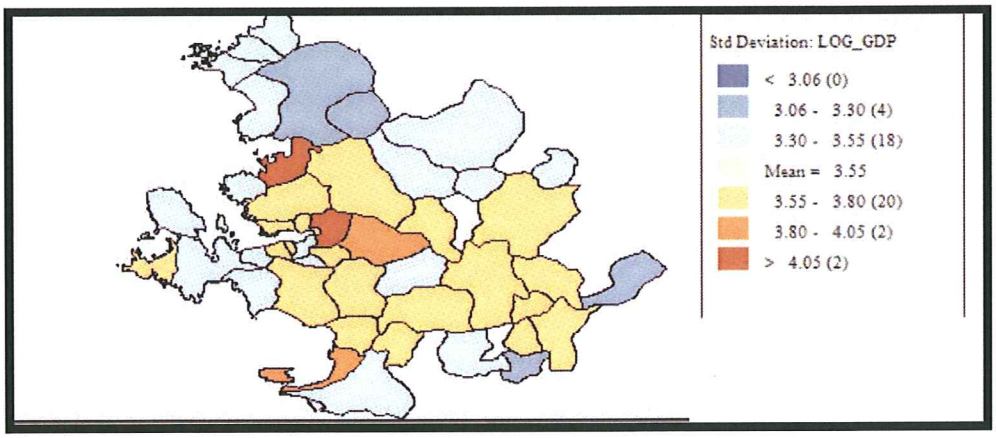
When we turn back to the findings of previous chapter 4, this spatially independent pattern of GDP per capita is an atypical situation on one hand. When we recall the results of the analyses in the chapter four, in terms of economic indicators a highly centered and clustered pattern could be observable in which core metropolitan area seems to dominate the economic activities in the region, and followed by a ring shape periphery and moving towards the inner parts of the region with a decreasing level of economic activity. On the other hand, when we consider the deviations from mean and the specific features of these deviating settlements, the results are typical. The higher level settlements in terms of GDP per capita are the highly specialized



Standard deviation of population increase



Standard deviation of entrepreneurship



Standard deviation of GDP

Map 5.1: Spatial Distribution of Insignificant Income Indicators

areas of the region. All of the four settlements have are occupying more than 25 percent of their active employment in manufacturing, while two of them Kuşadası and Bornova supporting this figure with a highly specialized social and individual services sector by occupying more than 30 percent of their employment in this sector. [11] **Overall, we can say that there are some centers of high income generation in terms of GDP per capita, but the spillover effects are not evident yet. In other words, these high level income generating centers are not sprawling beyond their territories yet.**

When we consider the spatial dependence in the level of entrepreneurship and population growth from the table 5.3, again we can not observe significant values for autocorrelation. When we consider the spatial distribution of these two indicators, (Map 5.1) we can see that the distribution of the values are not homogenous contrary to the case in the GDP per capita. The standard deviation maps reveal 14 extreme cases in each of the indicators, either much lower or much higher than the mean values. As a consequence, the spatially independent features of entrepreneurship and population growth in the region are not outcome of around average distribution of the indicators; rather it is a direct product of the arbitrary spatial pattern..

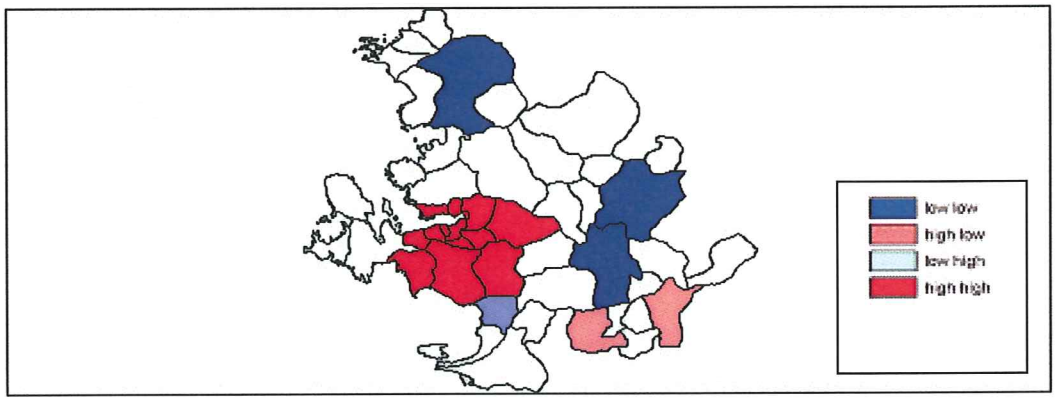
In this sense, another important implication made relates the varying spatial behavior of the all four income indicators within the region. Having not observed a strong correlation among the indicators in previous chapter 4 without including their spatial pattern, we can further support this independent pattern when we add the spatial side. Hence, we can conclude that the correlation between the four indicators of income is fairly weak for İzmir City Region.

Besides these insignificant indicators, employment increase reveal significant results for spatial association. As can be seen from the preceding table 5.3, employment growth has revealed in positive spatial dependency in all levels of

[11] For a more detailed discussion of the settlements and sectoral distribution, refer the previous chapter 4.

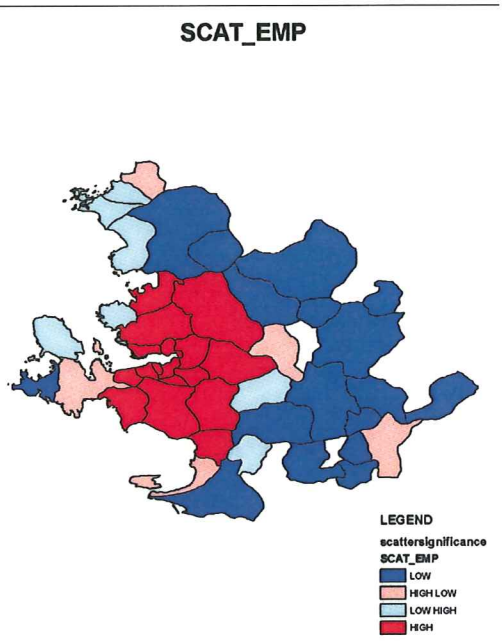
contiguity substantially up to third order contiguity. Moreover, the highest degree of spatial dependency is obtained in the first order contiguity with a 0, 3197 Moran's I value, and followed by a 0, 2921 Moran's I value for distance. Such an indication reflects that while considering the employment growth as an indicator of income spillovers in İzmir City Region, neighborhood relations has a more powerful effect on the spillover distance has. Additionally, when we move one step further and include the second order neighborhood relations the results support the power of distance rather than contiguity As a result; the most powerful form of interaction in İzmir City region exists in the form of adjacency and followed by the average distance of the settlements when employment growth is considered.

The LISA map below represents the spatial distribution of significant clusters in the employment growth. The higher degrees of spatial autocorrelation are present around core metropolitan area and the coastal side of the region. Konak, Karşıyaka, Narlıdere, Güzelbahçe, Çiğli and Balçova surrounded by a belt up to third neighborhoods constituting a large positive High High spatial autocorrelation pattern.



Map 5.2: LISA map for Employment Growth, İzmir City Region

One thing to consider in this step is that, LISA and significance of the cluster maps obtained from it are useful, but analyzing accordingly may need an additional concern since the significance method is randomization. That is to say, the significant clusters obtained in LISA is not constant since the significance methodology applied uses a randomization method in varying degrees from 99 to 499 permutations and the results can be variable according to number of permutations as well as within the permutations. As a result, it is worth considering mapping the statistics including all observations regardless of their significance in the randomization test. Completing this pattern with including both significant and insignificant values, we can see that a quite high value of settlements (40% of all settlements) reveal in the higher employment increase areas surrounded by higher employment increase neighborhoods. . Following this inner-city positive autocorrelation pattern, again 17 settlements reveal a low value employment increase surrounded by low value neighborhoods in the eastern periphery of the region.



Map 5.3: LISA map for Employment Growth (All settlements)

These results indicate that regardless of the sign of the change, that is when both employment growth or employment loss is in consideration, an obvious pattern of spillover effects are evident. The pattern of these spillover effects have a divergent nature. . In order to illustrate this divergent nature better, the conceptual map below created from the high and low clusters of the region.

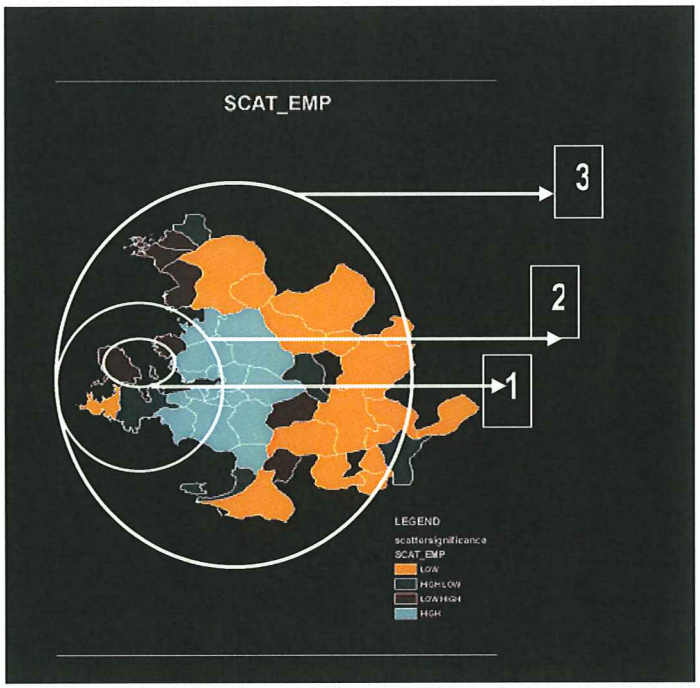


Figure 5.1: A Conceptual Summary of Income Spillovers in İzmir Cityregion

According to this conceptual map, we can observe 3 groups. These are a core area labeled in (1) which is dominant with a strongly centered pattern as a location of the major groups. It is followed by its neighborhood as a sprawl area indicated in (2) which undergoing a significant transformation with the effect of positive externalities resulting from the core center. And finally, in the periphery, the

third (3) group of settlements show a declining pattern.

Finally, integrating these results to our former analyses in the region reveals some overall conclusions in income spillovers as follows:

- the pattern of income spillovers is a single centered sprawl pattern moving to hinterland from the metropolitan area
- the significantly declining territories are the boundaries of the region
- a quite obvious and centered pattern of income spillovers is evident. But the effects of income spillovers is only evident in employment increase,
- sprawl of increase in employment have not yet made a meaningful contribution to change in GDP per capita,
- the income spillovers are not evidenced by a parallel demographic expansion yet
- the level of entrepreneurship is not a significant determiner of the change in income among region

5.3.2. İzmir City Region Knowledge Formation and Spillovers

The aim of this part is to investigate the process of spatial formation of knowledge in Izmir City Region and to assess the extent of spillovers. The analyses have been conducted with reference to two main indicators, average value of patent applications and the proportion of higher education across 46 districts of city region which are the lowest meaningful level where the data is available.

According to global indicators of spatial association, there are clear signs of spatial autocorrelation in the distribution of knowledge. The following Table 5.4. shows the relevancy of this spillovers with the help of Global Moran's I values. Both indicators show a significant spatially autocorrelated pattern when the entire region is in consideration. The Moran's *I* value is 0.36 for patent applications and 0,45

for high education. As a consequence, when we consider the power of spatial dependency of two different indicators, we can see that proportion of high education have stronger implications of spatial effects than the patent applications.

Here, it is meaningful to detail the relative strength of each indicator in the effects of spillovers. The lower degree of spatial association of patent applications relative to the spatial association the proportion of high education is a typical result. That is to be expected, since education level is more inclusive than the patent applications. Especially when we include the residential areas in the analyses, the relevancy of education is more than the patents since patents are specific to industrial or educational purposes.

Another important point in this step is the relative extend of these As can be seen from different rows of table 5.4, the evidence of positive spatial association is relevant in varying degrees of distance for both patents and high education. The significance continues to hold true from the first contiguity up to third order contiguity with a decreasing degree. Such an inference show that, as expected from the nature of spatial dependency, the level or degree of autocorrelation is decreasing with increasing distance, but at least up to second order effects of spatial dependency of knowledge remains visible for İzmir City region.

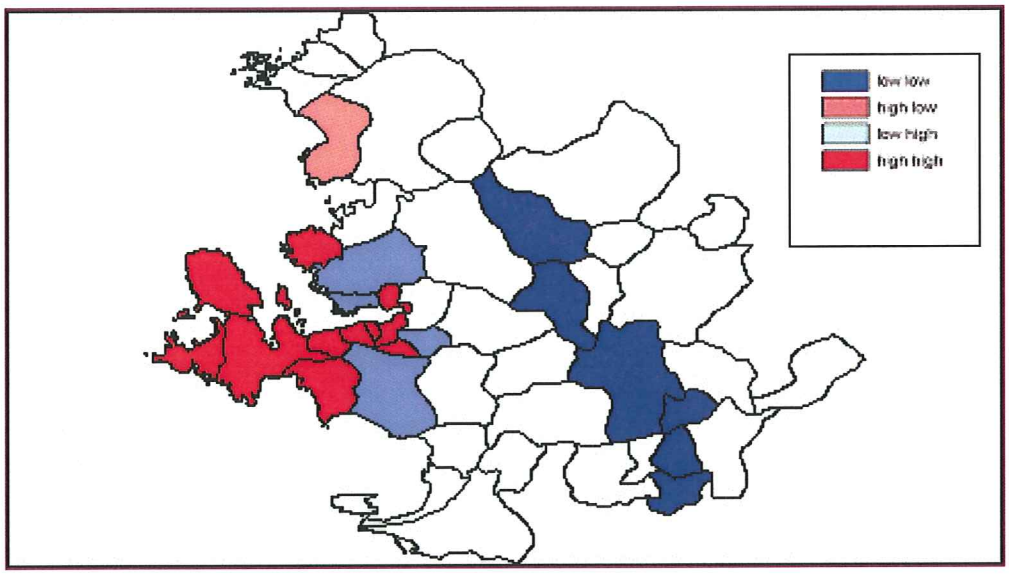
Table 5.4: Moran's I values for knowledge spillovers- İzmir City Region

		Contiguity Type					
		Rook			Queen		
Indicator	Dist	1st	2nd	3rd	1st	2nd	3rd
Patents	0,3619	0,2927	0,2068	*	0,2987	0,2078	0,0464
High Education	0,4554	0,3094	0,4214	0,3032	0,3088	0,4209	0,3034

A conclusion of high levels of interaction among region in terms of knowledge and strong evidence of spillover effects resulting from this interaction is relevant up to that point. When we consider the extend of these spillovers, we know that the patent applications are more bounded than the high education, but the spatial distribution of them, whether two knowledge indicators are in a parallel setting or not is still a question mark. In this sense, to make an evaluation of the patent and high education spillovers with the help of LISA maps is meaningful.

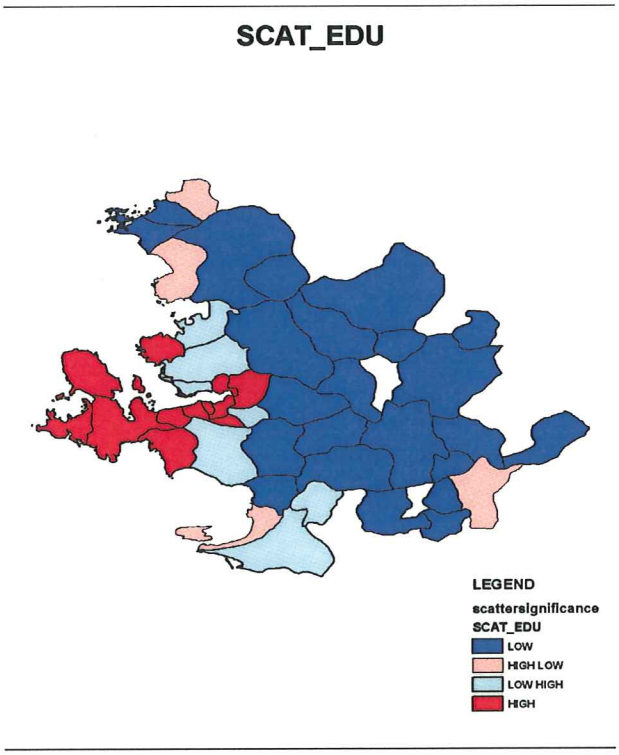
The below LISA map (Map 5.4.) illustrates the statistical significant clusters of this pattern in knowledge distribution by using Local Indicators of Spatial Association. We can see that the "hot spots" or the centers of observed spatial association reveal in the form of clustering both for higher and lower values

When we analyze the spatial distribution of high education, single the western coastal areas and core metropolitan area are the centers of the knowledge spillovers. As can be seen from the figure, (Map 5.4.) Karaburun, Foça, Karşıyaka, Konak, Gaziemir, Narlıdere, Balçova, Güzelbahçe, Seferihisar, Urla and Çeşme reveal as the settlements with high education values surrounded by high education ones. This means that the single centered structure of the city region keeps its formation in knowledge spillovers as well as in the income spillovers, but the center where the knowledge sprawls from slightly differs. As can be seen from the plot of these settlements in the following figure, the core metropolitan area of the region is still a hotspot for knowledge spillovers with high- high values, but contrarily to the case in income spillovers, the periphery of the core metropolitan are remains in low-high values. This low high value indicate that they do not benefit from the positive externalities generated, or the knowledge sprawling from the center. As a result, the core metropolitan area is again a cluster for knowledge creation, but the main center where the sprawl of knowledge comes from moves to the western coastal area of the region instead of the core metropolitan one.



Map 5.4: LISA Map for high education- İzmir Cityregion

Another important implication from this figure is the existence of low clusters in the inner part of the region, namely Saruhanlı, Turgutlu, Ödemiş and Seferihisar. They show a belt of low proportion of high education cluster surrounded with low proportion of high education values. The full limits of such a low-low cluster in the inner sides of the region and the limits of positive externalities can be seen more clearly with the help of a scatterplot where all settlements are plotted regardless of the significance. With this motivation, all values obtained in LISA have mapped to see the complete figure of entire region in map 5.5 below.



Map 5.5: The LISA map for knowledge spillovers– (All settlements)

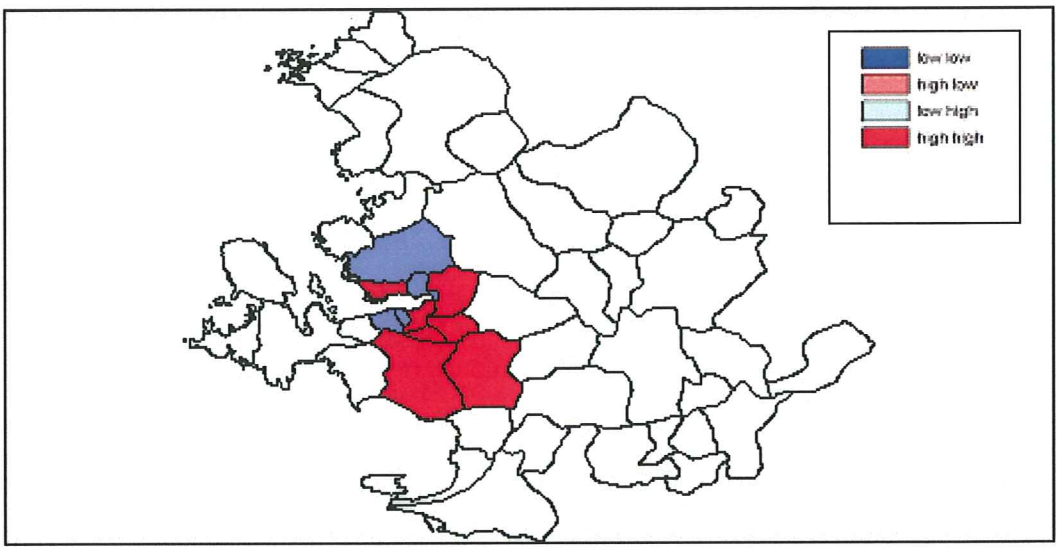
The results obtained from LISA values regardless of statistical significance again indicate that the distribution of education tends to follow a clear spatial pattern. First, there appears a quite large high education cluster linked together around the coastal areas in the west, as we have seen from the LISA map with significance (Map 4.4) and besides other relatively high education proportion areas appears when we concern the LISA map without significance. (Map 5.5.) These are four high- low districts, Dikili, Kuşadası, Burhaniye and Nazilli. This finding seem quite acceptable when settlement patterns of these districts have considered relative to their surroundings.

Apart from Nazilli, the three settlements are again the coastal tourism centers of the region and it is quite common to have higher proportion of high education relative to their surroundings. Another important implication of the map is the existence of 23 of 46 low-low districts with a continuous pattern in the eastern part of the

region.

Overall, these figures show that the high degree of spatial autocorrelation among region in terms of the level of high education reveals a distinct pattern in the distribution of knowledge. The formation of this pattern is highly distinct with a sharp east and west separation. Moreover, indicating exactly half of the region as the low knowledge areas with low surroundings, the effects of knowledge spillovers in a behavior of positive externalities is rather limited, and most of the region is spatially dependent due to low values. In other words, among İzmir City region, a strong dependent pattern of interaction in terms of knowledge share is evident, but the boundaries of this strong pattern are not adequate to support the inner parts of the region. As a consequence, the inner parts of the region still remain unaffected from the knowledge created in the central parts and remain to keep their relatively low knowledge capable features.

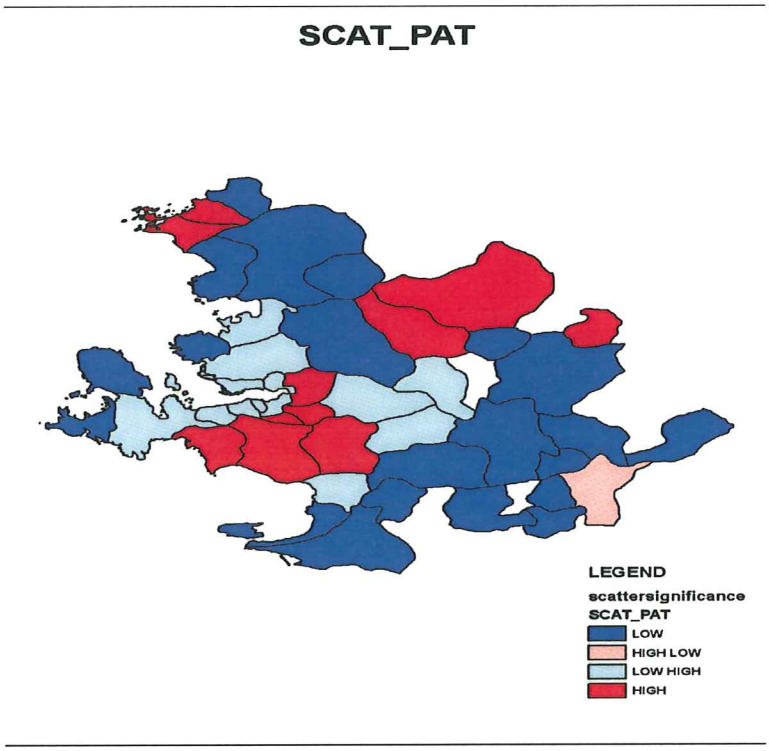
When we turn back to **second indicator of knowledge spillovers** in the region, namely the number of **patent applications**, as explained in the former global index of spatial association, patents has a less powerful but still significant spatial dependency. The distribution of high number of patent applications obviously has a different model than the level of education. As can be seen from the map 5.6, the high numbers of patent applications are clustered around the inner central area of the region. These significant high value patent application areas with high value surroundings are including Bornova, Buca, Konak, Çiğli, Torbalı and Gaziemir Additionally, two low-high clusters are evident including (1) Balçova and Narlıdere and (2) Karşıyaka and Menemen.



Map 5.6: LISA MAP for Patent Applications – İzmir City Region

However, the results obtained in this LISA maps are again subject to significance issues mentioned in the former parts of this chapter, hence results from the scatterplot regardless of significance again may be more interpretable to comment on the general framework of knowledge. In this sense, when we consider all settlements, as can be seen from below Map 5.7., some other relatively smaller hotspots also exist in the inner parts of the region. These are (1) Ayvalık-Burhaniye, (2) Akhisar-Saruhanlı and (3) Köprübaşı clusters with high-high values. Additionally, although none of them was not visible in the former LISA map with 0,05 significance level, 21 settlements constitute a low-low cluster followed by 13 low high settlements.

What can be concluded for the patent applications for the knowledge spillovers in terms of patenting is that, it follows a multicentered pattern. The inner parts of the region leads the knowledge creation and spillovers in terms of patenting. Other relatively smaller sub-centers occur in the hinterland. .



Map 5.7: LISA Map for patent application, İzmir City-region (All settlements)

When we integrate the results of two different knowledge indicators, there is an obvious distinctive pattern in the formulation of each other. This different pattern can be better realizable when we analyze the centers and limits of each indicator in the same framework. The whole picture of two knowledge indicators give a multi-centered framework, where the patent and high education determined spillover effects behave in a complementary manner. This complementary behavior instead of a parallel spatial structure can be attainable to complementary multi-sectoral organization of the region. The significant clusters of patent applications are mainly the manufacturing centers of the region, as expected by the nature of the indictor, since it is more reasonable to pretend higher values of patenting from working area dominant places. With the addition of high education areas, we can conclude the complementary structure of the city region, since they reveal in more service oriented coastal areas and the core metropolitan area.

Finally, if we incorporate the results obtained for knowledge spillovers in İzmir city region, some conclusions drawn can be stated as follows:

- The structure of knowledge flows in terms of high education is a single centered matter, clustered in the western coastal part of the region
- Flows regarding patent applications are multi-centered, resident in the inner part and periphery of the region, parallel to sprawl of manufacturing
- These two indicators have a complementary pattern rather than a parallel formation
- The regions of the low-low cluster or the relatively knowledge lagging parts of the region are southeastern and northwestern parts
- When the spillover effects of income and knowledge together in consideration among region, two different types follow a totally different pattern
- Income spillovers have a more strongly centered and higher extend types of flow than the knowledge spillover

5.3.3. Antalya City Region Income Formation and Spillovers

The formulation of income spillovers and the effects of them have vital importance in a city-region context as we have discussed in the 2nd and 3rd chapters of this thesis. Having obtained insignificant results in three of four indicators in İzmir City region, the pattern of income formulation and spillovers in Antalya City region have been discussed in this part. In the evaluation of four different indicators regarding income, three of these measures reveal significant and positive results, namely GDP per capita, population increase and entrepreneurship. These results indicate that, Antalya City-region reveals a strong evidence for the income spillovers, and this strong spawl is a result of three facts, increase in entrepreneurship, population and GDP per capita as a whole. (Table 5.5.)

Table 5.5 gives the results of Moran's I values for income spillovers in Antalya city region. Having obtained significant spatial association or the evidence of spillovers in three different measures, it is useful to discuss the strength of each spillovers. In this sense, two different discussions can be meaningful, first which of the indicators have a more powerful implication of spatial dependency, and second what are the boundaries of the spillover effects in each indicator.

As seen by the following table 5.5. of global spatial association measures, the positive spatial association values obtained in three indicators tend to differentiate in the different levels of contiguity. Considering the general limits of the spillover effects among region, we see that the extend of the spillovers for each indicators vary considerably. Overall, the extend of income spillovers measured by entrepreneurship is wider than the population increase and GDP per capita.

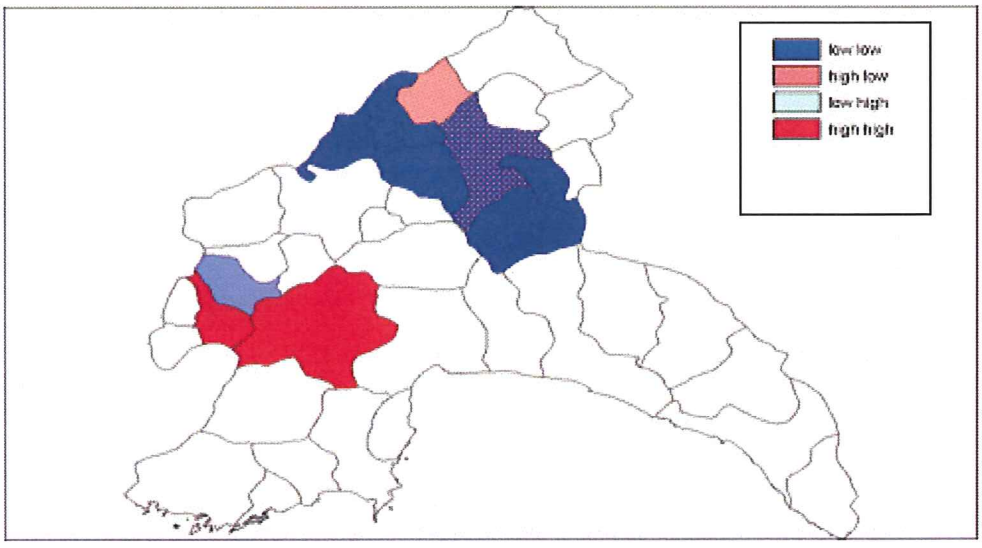
All of the three indicators reveal positive and significant results, and we can conclude that all three indicators refer a spatially dependent pattern. But when we further analyze in different proximity measures, we see that the picture changes considerably in contiguity measures. For population growth and GDP per capita, the significant value of population increase reveals up to 3rd order contiguity in Queen Type of contiguity, whereas it has an extension up to 1st Rook degree in Type. This is an expected issue as mentioned in part 1 of this chapter, since the rook type of contiguity measure is much stricter in this sense

Table 5.5. Global Measures of Spatial Association- Antalya City-region

		Contiguity Type					
		Queen			Rook		
Indicator	Distance	1st	2nd	3rd	1st	2nd	3rd
Employment	*	*	*	*	*	*	*
GDP	0,3430	0,364	0,223	*	0,227	0,225	*
Population	0,3050	0,271	0,140	0.06	0,270	*	*
Entrepren.	0,2089	0,268	0,016	0,070	0,260	0,150	0.070

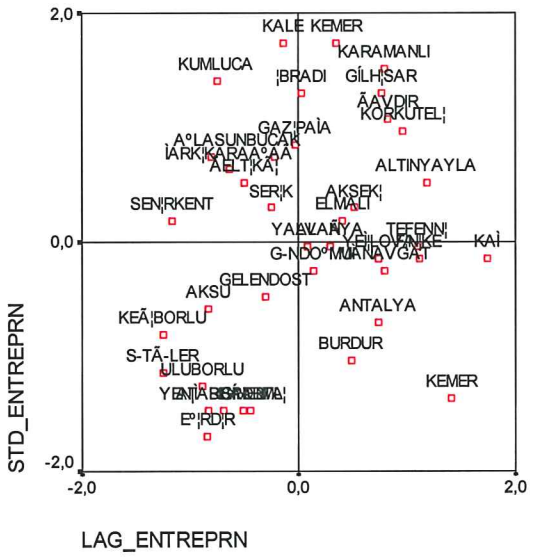
When we consider the power of dependency of each indicator, the strongest evidence of spatial association belongs to GDP per captia population increase reveal stronger results with a 0,3050 Moran's I value, and entrepreneurship follows with a 0,2089 Moran's I value when distance is the measure for the proximity. When we move to the strength attained to contiguity type of measures, we again see the relative strength of the GDP per capita, population increase and entrepreneurship respectively. Integrating the power of each indicator to the extend of spatial association, these results indicate that whereas overall spatial dependency of GDP per capita and population increase has more powerful results,

according to relevant distance measures the significant results obtained in entrepreneurship has greater extends. In other words, although the power of GDP and population increase has stronger signs of spillovers in general, the relevancy of spillovers in entrepreneurship is more extensive and keeps up to third order contiguity. One thing to recall in this step is that, as indicated in Chapter 2 in more detail, the positive Moran's I values are the indicator of the spatially dependent pattern of both low and high values. That is, the observation of such positive spillovers reminds us the fact that the formulation of income spillover in Antalya City region is evident in a directly proportional manner and has a spatial clustering tendency in **both low and high income areas**. In this sense, it is vital to make an evaluation of these low and high clustering tendencies in more detail. The details of such a clustering tendency can be seen more evidently from the LISA results regarding each indicator**.** When we consider the LISA map below regarding **entrepreneurship**, we can see the remark of low proportion of entrepreneurship areas surrounded by low values in northern part of the region indicating a significant low low cluster. As well as this low cluster tendency, in the southern part of the region a cluster of high proportion of entrepreneurship surrounded by high value areas can be achievable.



Map 5.8 LISA Map for entrepreneurship

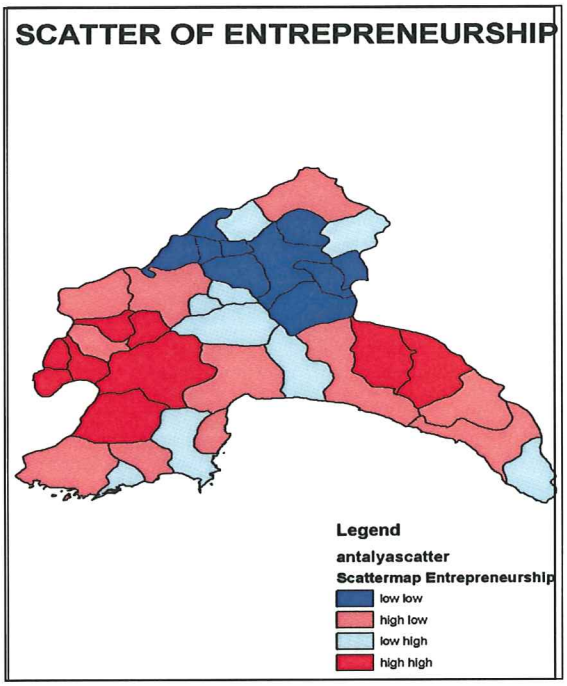
Again, it is useful to make an evaluation of all settlements regardless of the significance of the local indicators. When we consider all cases directly from the scatter plot, we can see that a significant 23 percent of all observations (9 settlements) placed in high-high and 25 percent (10 settlements) of all observations set in low low quadrant. This result indicates that, in Antalya city region almost half of the settlements place either in the high-high or low-low clusters of the region, and provide a spatially dependent pattern.



Graph 5.1. Entrepreneurship Moran Scatter Plot

The global Moran's I with a significant value of 0,208 obtained in the previous analyses (Table 5.5) indicate that, the high values of entrepreneurship obtained in these high-high areas are an outcome of the high value of entrepreneurship in their surroundings. That is, when these settlements with high share of entrepreneurship considered, the value obtained is affected by the high proportion of

entrepreneurships in the surrounding areas. When we consider the spatial distribution of these hot spots we can see two clusters of high- high values one in the western part of the region including Korkuteli, Kemer (of Burdur), Karamanlı, Elmalı , Altınyayla, Gölhisar,Çavdır and in the eastern part İbradi and Akseki.

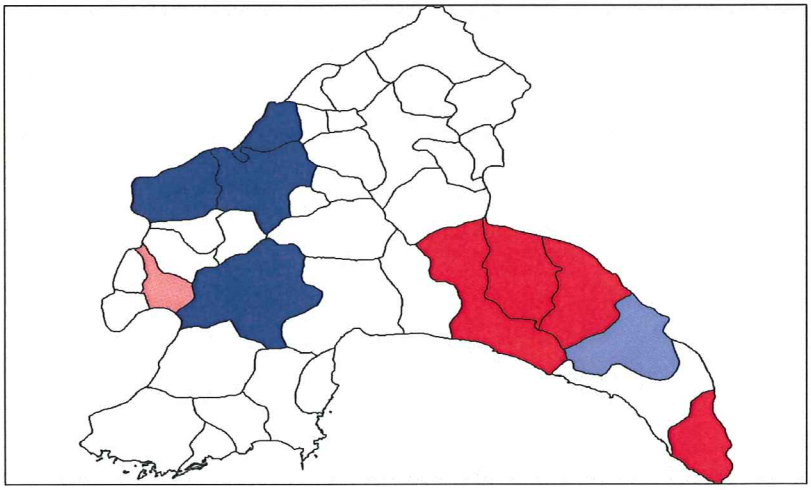


Map 5.9 LISA map for entrepreneurship (All settlements)

This case is also evident in the low proportion areas as well. Apart from these two hot spots, a large low-low cluster is evident in the inner part of the region including Uluborlu, Gelendost, Eğirdir, Keçiborlu, Gönen, Atabey, Yenişarbademli, Isparta, Aksu and Sütçüler. As a conclusion , we can say that the places with a low level of entrepreneurship are mainly the inner parts of the region. Additionally, contrary to the case in İzmir City-region where a single center is dominant, in Antalya City-region we can find evidence for the spillover effects of two different centers, one located in the eastern coastal part of the region and the other is in the west.

For Antalya city region, the higher values are concentrated on the coastal side of the region in two different centers. This two centered pattern in east and west of the region can be explained via the sectoral dynamics in the region. As we have seen in former Chapter 4, Antalya City Region has a tourism oriented structure. The growth in terms of entrepreneurship indicates new investments and as a result of the tourism based structure of the region it is quite acceptable to find out high levels of growth in the coastal side.

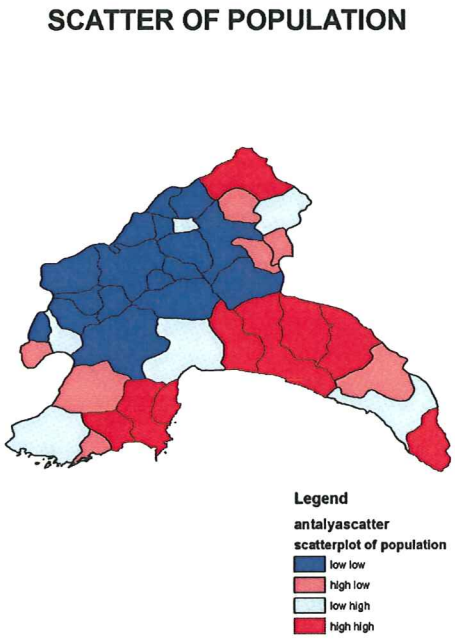
The second significant income indicator, the **population increase** again reveals similar results in terms of LISA values obtained with a low low cluster in the nort-eastern part of the region and high high cluster in the eastern part of the region



Map 5.10 LISA map for Population increase

As in the former cases, it is again necessary to detect the whole settlements' pattern regardless of significance. The valid results support the strong pattern of spatial dependency and indicate that the highest frequency belongs to low-low areas

with 17 settlements and followed by the high-high areas with 9 settlements. This result is parallel to the spatial organization of entreprenoırsip increase. Areas in the northern part of the region have a low population growth rate, or we can say that these inner parts of the region are population losing areas. When we add the hotspots or high level of population increase settlements surrounded by the high level of population increase, a total 70% of the all settlements are in a highly spatially dependent pattern by being placed in either low low or high high cluster. Besides, as can be seen from the following scattermap, a totally diverse pattern is obvious with a coastal and inner side division

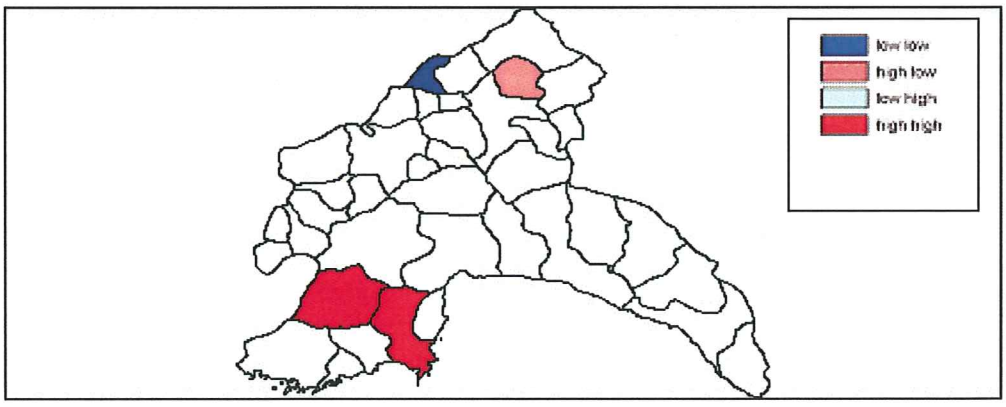


Map 5.11 LISA map for Population increase (All settlements)

As a final indicator for the income spillovers we will consider the spillover effects of the **GDPper capita values**. The recognition of positive and significant values for GDP per capita is important and in a way different than the other

indicators. As explained in the former 2nd part of this chapter, GDP values have been obtained from a single year of time (1996) and reflect the initial situation rather than the increase. This static characteristic of GDP per capita is contrary to population growth and employment growth. Hence, the spillover effects obtained from GDP per capita directly represents the income spillovers, rather than the growth. Because of this different but complementary pattern, it is important to make the discussion of the spillovers in the form of GDP per capita with reference to other indicators.

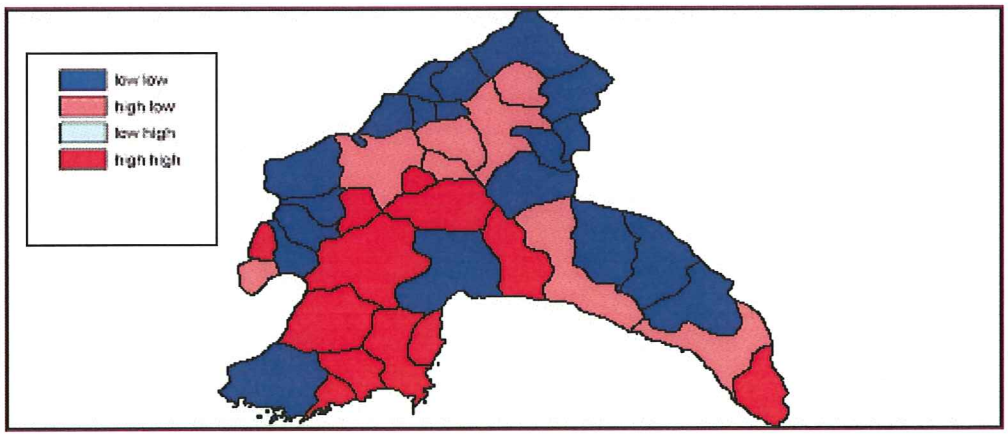
The following LISA map shows the spatial association of GDP per capita. The high levels of GDP settlements surrounded by the high level neighbors arise in the western part of the region. When we consider the significance of these settlements, the settlements with a statistically significant pattern are only Kumluca and Finike. But as we have discussed, the real framework of the spillover effects are beyond the, significance and worth discussing without the significance.



Map 5.12 LISA map for GDP per capita

Map 5.13 below displays the pattern for the spillovers in GDP per capita without taking into consideration the significance. In this sense, a larger cluster of

settlements as a hotspot for GDP per capita can be seen in the western part of the region.



Map 5.13 LISA map for GDP per capita (All settlements)

As well as the high value of settlements, the low-low clusters of GDP per capita are important. As we can see from Map 5.13, the low low clusters of GDP per capita are in the periphery of the region, which almost coincides with the boundaries of Antalya City region.

As another step for the discussion of income spillovers in Antalya City-region, integrating the three significant indicators would provide some conclusive results. The pattern of income spillovers can be seen as a whole from the following conceptual map.. We can group the settlements into three according to this conceptual map including all three significant indicators of income.

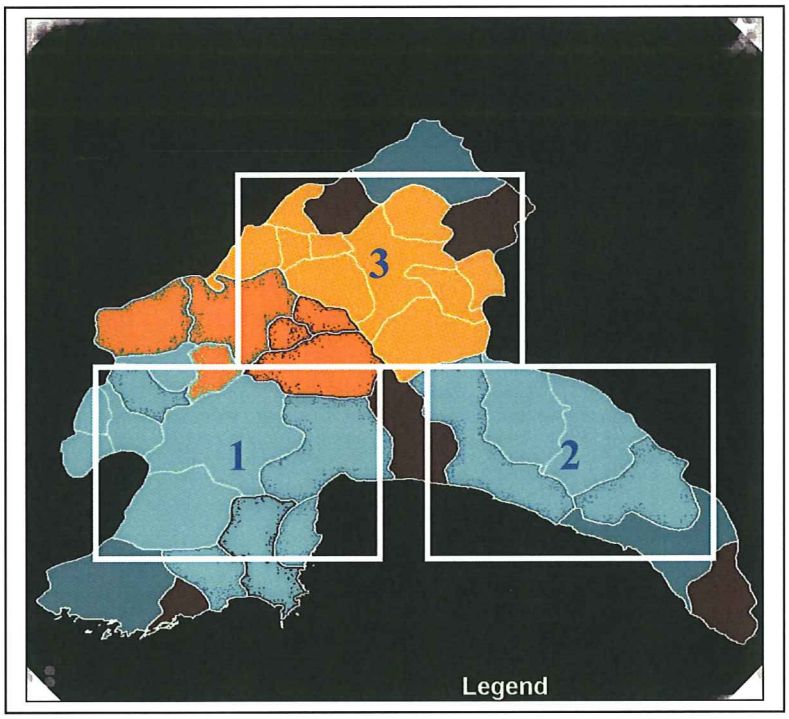


Figure 5.2: The conceptual map of income spillovers in Antalya City-region

Within these three nodes, a core area, indicated in (1) is dominant with a evidence of high-high clusters of both growth and initial income. This part of the settlements owns the hotspots for both initial level of income (GDP per capita) and the growth (population & employment growth), and can be seen as the most competitive part of the region.

It is followed by a second center, indicated in (2) which undergoing a significant transformation with the effect of positive externalities resulting from the population growth. But in this second category, we can not find evidence for the spillover effects of GDP yet. The third (3) group of settlements in the periphery show a declining pattern for both the initial income levels and the growth patterns.

Finally, integrating these results to the discussion of our former analyses in the region reveals some overall conclusions in income spillovers as follows:

- the income spillovers in the region can be seen as a dual phenomenon, and represented in two different centers.
- It has a significant pattern which is supported by three different indicators in a parallel manner
- both including static and dynamic features, a quite obvious divergent pattern is evidenced among region
- the significantly declining territories are the boundaries of the region
- spillover effects of the increase in population and high levels of entrepreneurship makes a meaningful contribution to change in GDP per capita up to a certain extend
- the income spillovers are evidenced by a parallel demographic expansion

5.3.4. Antalya City Region Knowledge Formation and Spillovers

When we consider the knowledge spillovers in Antalya Cityregion, the formation of knowledge does not show enough evidence to evaluate the spillover effects Unfortunately, as can be seen from the following table, the number of patent applications was not adequate to discuss spillovers in Antalya City region, since there is only one settlement (Antalya City Center) and two patent applications during past ten years. However, only proportion of high

education is considered as an indictor of knowledge spillovers and formulation in Antalya City region, which again revealed in insignificant results.

Table 5.6: Number of patent applications for Antalya City Region

	Antalya		Alanya	
	2000	2005	2000	2005
Patent	1	1	0	0

Table 5.7 : Global Spatial Association of Knowledge

		Contiguity Type					
		Rook			Queen		
Indicator	Dist	1st	2nd	3rd	1st	2nd	3rd
Patents	NA	NA	NA	NA	NA	NA	NA
High Education	*	*	*	*	*	*	*

The insignificant results obtained above indicate that, the spatial pattern of knowledge and knowledge formation in Antalya City region is in an arbitrary pattern rather than following a spatial associated structure and we can conclude that the knowledge spillovers in Antalya City region are not evident.

5.4. A Conclusive Summary

The effects of knowledge and income spillovers have discussed in a comparative way with the city regions of Antalya and İzmir. . The results are in a unique for each case, and reveal a case-specific pattern of the effects and the extend of

spillovers. Borrowing the methods of spatial econometric techniques; among different alternative ways of measuring the spatial dependence, Moran's I values have been in use. Since the main discussion of interaction in our case was in the form of physical proximity, alternative distance and contiguity matrixes have been applied and the extend of spillovers have measured.

The more recent literature in growth has been emphasizing on the importance on the parallel phenomenon of knowledge and income, in the form of Specialized regional economies fostering knowledge spillovers, thereby helping to raise the rate of innovation, and to promote long-term growth (Antonelli, 1994; Audretsch and Feldman, 1996; Jaffe et al., 1993;).On this sense, a parallel pattern is expected to be experienced in knowledge and income sprawls in our cases. However, when we incorporate the results achieved, either in t İzmir or Antalya City-regions this predicted corresponding pattern of knowledge and income flows could not be achieved.

The existence of knowledge flows could only be obtainable in İzmir City-region, whereas no relevant discussion of knowledge spillovers could be achieved in the case of Antalya where strong signs of income spillovers is evident relevant to Antalya. This opposing character is not only limited to the general framework of the spillover effects in the cases, but it is also evident in all indicators of the different types of spillovers as can be seen from the following summary table.

Table 5.8: The significance of indicators in both cases

	IZMIİR	ANTALYA
	KNOWLEDGE	
PATENTS		
HIGH EDUCA		
	INCOME	
ENTREPRENOURSHIP		
POPULATION GROWTH		
EMPLOYMENt GROWTH		
GDP		

If we incorporate this contradictory patterns of knowledge and income spillovers for both of the cases, a conclusion of the general trend and role of the both city-regions in the recent global trends can be obtainable. Both city-regions incorporate divergent patterns of knowledge and income spillovers by hiring either one or the other. In this sense, the transformation of the regions to a knowledge based economy is still a question mark, and the relevancy of more capital intensive industries can be more interpretable.

However, the strong interaction among different units accomplishing the city-regions cannot be ignored. Both of the regions, even in the just one dimension of the spillovers reveal strong linkages between different territorial units which create a harmonizing pattern. One important implication of these high but limited levels of interaction can be in the policy side, where the relations in the lagging part of interaction, either in the form of knowledge and income can be promoted. Along with the new kinds of policy interventions based on this concept, can be

physical institutional. (Mishan, 1981) This for example, in the form of skills training, labor market information, technological research would enhance the synergies, (Maskell, 1998).

CHAPTER 6

CONCLUSION

One of the most fundamental question of the recent literature have been on defining the edges of competitiveness, growth and development especially with an emphasis on the geographical foundations of them. Focused on the new territories of the success in the globalizing world, a fundamental role is assigned to the effects of spillovers and externalities which intended to generate a virtous circle of success and competitive advantage. Deriving from the ultimate role of proximity, collaborative roles that achieved together by different units of settlements has a vital importance. The ideal unit for these collaborative and proximate agents was the city-region, which inherently included the two crucial requirements of this new era: (1) A complex and diverse organization that able to catch up all flexible requirements of the new flexible social and economic organization and (2) a floating and formless "beyond the limits" spatial organization which will effect ahead of the formerly defined traditional administrative boundaries.

Together with new spatial organization, an underlying economic structure is defined as well. Using knowledge as the most important strategic resource, a knowledge based economy (KBE) has defined as the key answer for the further questions of development. It is assumed that the growth and development is dependent mainly upon the creation and application of economically useful knowledge, and the policies and institutions have gradually begin to create a knowledge based organization that will at least follow, if not lead the changing world structure in a successful manner.

This thesis aims to contribute to this discussion with a comparative approach from two similar but apparently not identical city regions namely, İzmir and Antalya City Regions. The main question of this thesis is how far space, growth and innovation are parallel in two different city regions with different characteristics and modes of development. Within this main hypothesis, some other relative questions were also in discussion as put forward above, such as, the effects of differentiating levels of entrepreneurship, education or sectoral formation in the process of spillovers.

The detailed evaluation of the spillovers in these city regions derived important conclusions. **First of all, both cases imply the presence of strong proximity effects.** This is an expected but also an important outcome of our analyses, especially regarding the structure of the city-regions. When we recall the Part 1 of Chapter 2, an important aspect of measurement in the spatial interaction is a boundary problem, in which if the selected boundaries of the region in consideration is not adequate and suitable, the definition of the spatial dependency would become misleading. In this sense, by achieving the full extend of different types of spillovers in both of the cases we can re-conclude the appropriateness of selected boundaries of our city regions. The obtained positive and statistically significant results in terms of spatial dependency release that, in both of the city-regions there is a strong interaction amongst the smaller units within their boundaries. This is an important and decisive outcome to verify the limits of the city-regions in our case, and implies the existence of city-region formation for both Antalya and İzmir. Obviously, the measurement of the spatial interactions is not the only way to define or validate the boundaries of the city-regions, but on the other hand, it has an inevitable contribution since the main rationale of the complementary relationships is evidenced by these interactions.

The strong relationships built among regions also evidence another important issue, besides the existence of proximity dynamics which is the presence of strong social interactions and a consistent trust pattern. If we recall Storper in this sense,

distance decay is an expected, but not always achieved phenomenon, especially in the form of large units such as regions and districts. What defines the observation of a distance decay function is not only limited to accessibility and proximity measures, but also other important factor that determine the relevance of interactions, one of the most important ones being trust and reciprocity relations. In other words, some other factors during the realization of proximity dynamics are necessary, that is the absence of boundaries in terms of social relations as well as the physical ones. When we consider the evaluation of these dynamics in our cases, a continuous interaction pattern in both of the cases is appropriate with the results obtained by the Global Moran's I. As a result, this continuous interaction pattern is an indication of borderless social relations as well as the physical ones and in this sense, **having obtained a uniform pattern sensitive to proximity, we can make an inference of a well built trust and reciprocity schema within the regions as well.**

The analyses regarding the overall dependence of spatial units reveal important and conclusive results, but the evaluation of the effects of spillovers is not achievable by only considering the dependent structure of the spatial units. Further analyses regarding the spatial outcome of these depe3ndent pattern is necessary. Along with this line, Local Indicators of Spatial Association (LISA) have been applied used that led to important conclusions in terms of the spatial distribution of these spillover effects. The synthesis of analyses reveal , effects and centers of spillovers for both cases is revealed. Revealing strong presence of metropolitan areas, each case has a different extension for the effects of the spillovers. Overall, a single and strong node as the hotspot of the spillover effects in İzmir City-region and a multi-centered structure with two significant hotspots in Antalya City-region can be conceptualized when the total effects of spillovers is in consideration. This multicentered pattern in east and west of the Antalya city contrary to ring shaped single pattern of İzmir city region can be explained via the sectoral dynamics. Antalya City Region has a tourism oriented structure where the new developments are expected to be in a coastal manner. On the other hand, in İzmir city region

we observe a manufacturing oriented structure, where the new developments tend to move towards the periphery of the region.

Another major finding regarding the effects of spillovers is related to the evaluation of relatively lagging parts of both city regions. There is a clustering tendency among the settlements with lower levels of income and knowledge in both regions, as well as the effects of spillovers in the high level areas. As evidenced by the localization of both income and knowledge, in both of the regions a superior condition of coastal areas can be observable and common observation in the spatial organization of regions is not only the typical "core- periphery" but also or more properly a "coastal and inner" distinction The implication of strong low-low cluster in the inner parts of the regions is a remarkable result, and divergent pattern of these settlements keeps its importance when the trends in the spillover effects are considered. Again the underlying rationale in the relatively lagging formation of these settlements may be due to the presence of a cumulative process. In fact, some settlements adjacent to the metropolitan areas and located along the coastal lines seem to benefit from the growth process generated and, the inner parts of both regions which do not have such inherited capabilities are not able to use advantages of these spillover effects yet.

Besides these structural and spatial features, some important implications can be made in the form of social and economic tendencies of the cases, mainly emphasizing the integration to the global economy. Most of the theories emphasize the importance of the knowledge, especially in the relation of knowledge in the potentials regarding the growth performance. Beginning with the 1980s with the recognition of endogenous growth theories, knowledge and dynamic knowledge externalities is seen as one of the most important factors for the success and the growth performance of the regions. Along with these lines, the existence of the knowledge and knowledge spillovers have defined as the key factor determining the competitiveness and the bases of the Knowledge Based Economy (KBE) constructed.

There is no question that the innovativeness and knowledge generates vital advantages. As literature suggests the implications of economically useful knowledge may become limited even in the most economically advanced and globally integrated cases. In this sense, when we consider the almost different patterns of knowledge and income generation in our cases, it is possible to reject the hypothesis of that income and knowledge spillovers are parallel.

What is driven from our cases is that, in the İzmir City-region high levels of knowledge production and spillovers of knowledge can be achievable, whereas the income spillover were not evident yet. On the other hand, in Antalya city-region a strong pattern of income spillovers is evident, while it was not possible to identify knowledge spillovers..

As we have detailed in chapter 4 of the thesis, manufacturing activities plays a crucial role in the reconfiguration of the İzmir city-region. Additionally, a clear spread out of these manufacturing activities from the core of the region towards periphery is evident. As a result of this floating pattern in the manufacturing activities, and due to historically knowledge intensive character of the region the spillover effect of the knowledge becomes increasingly important. On the other hand, the lack of income spillovers in this sense does not directly imply the irrelevancy of the relation between knowledge and the income; it indicates the necessity of some other factors determining the combination of knowledge and income spillovers. One of would be the time gap needed to see the effects of knowledge spillovers in the incomegrowth. Another important implication would be the sector specific characteristics of the knowledge spillovers, especially in a case like İzmir City-region where industry has a leading role, an evaluation within the categories manufacturing is relevant as well. The sector specific features of industry in İzmir City Region is important in knowledge spillovers. Numerous case studies even from the most advanced parts of the globe (i.e. Anselin, 1998 Anselin and Varga 2004, Canniels 2002) concludes the sector-specific feature of

knowledge implications, indicating that, the economically useful knowledge spillovers is evident mostly in the "high tech" industries, that is the main competitiveness of firms is based on their innovativeness. In case of İzmir City-region the manufacturing industry mainly depends on more traditional categories, such as food, chemical or wood instead of high-tech ones where the knowledge spillovers have less contribution to the growth of income.

When we consider the Antalya city-region, knowledge spillovers is not evident yet, but findings indicate a strong pattern of income spillovers. The tourism and agriculture based economy of the region explain of this situation. In the application of both of the dominant sectors, the intensity of knowledge is rather low in comparison to the other knowledge intensive activities.

Agricultural sector, at least for the case in Turkey, is not a knowledge intensive production sector and the utilization of knowledge is limited, expect some specific examples. In tourism sector the picture is a little bit more complex. The education level required in the tourism sector vary considerably and it has rather in a divergent and dual pattern Firstly,, the labor in the tourism sector is comprises a small number of highly educated employees at the upper levels of administrative categories, whereas a large proportion of labor force with less skills is essential.. This does not directly mean that the sector is knowledge independent, but tacit knowledge is more relevant. Most of the employees are the ones who have strong knowledge on issue but from an intrinsic way. Therefore the measurement of this type of knowledge and spillovers is very difficult. Tacit knowledge used by the lower segments of the workers, which constitute the higher proportions of the employment among region means immeasurable knowledge spillover structure. Similar to many studies in this study knowledge is defined through the level of education and patenting numbers, which obviously do not obtain the spillover of tacid knowledge.

This attention on the integration to global economy and KBE also led some other questions related to the effects of differentiating levels of entrepreneurship, education or sectoral formation in the process of spillovers. The findings on the relation between these indicators reveal that each indicators has a unique spatial pattern which fosters new dimensions. The first one is that, the income spillovers revealed in terms of employment growth is not evidenced by the population growth, and we can say that the sprawl of employment did not create a parallel demographic expansion. This outcome of the research indicates commuting networks among region, which in turn shows the differentiation of work place and residential areas. On the other hand, the level of entrepreneurship, increase in the employment and the level of GDP per capita have divergent patterns. In this sense, the size of the firms is one of the the major reason of these different patterns While middle or large size firms which contribute to the overall employment structure have significant employment and GDP per capita increase the ones with smaller size and somehow immature structure do not have the capacity to induce the changes in the other indicators.

In summary, the findings on the strong relevance of spillovers have been an important outcome of the analyses carried out in this thesis. As well as strong proximity dynamics, the unbroken pattern of the spatial dependency revealed the absence of social barriers as well as the physical ones for both regions. Having verified the complex and interrelated structure of general city-region tendencies among literature for our regions, the strong relations among territorial units have been detected. Actually, the unparallel pattern of knowledge and income spillovers among region is important to show that the generalization of the existing theories needs to be critically evaluated. The existing study shows that the relationship between the growth of income and knowledge is conditional and the structural characteristics of the economy and territorial units as well as the newly emerging activities which have different locational features are important.

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