

SPATIAL PATTERNS OF THE TURKISH MANUFACTURING
INDUSTRY IN THE CONTEXT OF ECONOMIC INTEGRATION:
AN ANALYSIS FOR THE POST 1980 PERIOD

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Abstract

The dynamics of industrial agglomeration across the regions and the reasons for such agglomeration have been the focus of interest particularly in exploring the effects of economic integration of regions on the spatial distribution of economic activity. In this context, following the predictions of the literature on New Economic Geography, Turkey's integration with the European Union as a candidate member is a likely cause of changes in spatial concentration patterns of the economic activity over the years. The major objective of the study is to complement the findings of the studies on industrial agglomeration in Turkey's manufacturing industry by exploring whether regional specialization and geographical concentration patterns have changed over time and to expose the driving forces of geographical concentration in Turkey's manufacturing industry, particularly during Turkey's economic integration process with the European Union under the customs union established in 1996.

Geographical concentration and regional specialization are measured by GINI index for NUTS 2 regions at the 4-digit level for the years between 1980 and 2001. To investigate which variables determine geographical concentration, the systematic relation between the characteristics of the industry and geographical concentration is tested. A regression equation is estimated, where the dependent variable is GINI concentration index, the independent and control variables are the variables that represent different determinants of agglomeration identified in the competing theories.

The major finding of the study is that Turkey's manufacturing industry has a tendency for regional specialization and geographical concentration. Increase in the average values for regional specialization and geographical concentration support the predictions developed by Krugman that regions become more specialized and industries become more concentrated with economic integration. As for the answer to which variables determine geographical concentration, the analysis supports the the predictions of New Trade Theory which states that the firms tend to cluster in regions where there are economies of scale. The findings also support that economic integration with the EU has been a significant factor in determining the geographical concentration of industries.

TÜRKİYE İMALAT SANAYİİNİN EKONOMİK ENTEGRASYON KAPSAMINDA MEKANSAL ÖRÜNTÜLERİ: 1980 SONRASI DÖNEMİN ANALİZİ

Özet

Ekonomik faaliyetin bölgeler arasındaki dağılımı, sanayinin mekansal konumu, endüstriyel kümelenmeler ve bu kümelenmelerin nedenleri, ekonomik entegrasyonun mekansal yoğunlaşmaya etkileri konusunda yapılan araştırmalar kapsamında üzerinde önemle durulan konulardır. Bu kapsamda, Türkiye'nin Avrupa Birliği'ne aday ülke olarak entegrasyonunun, "Yeni Ekonomi Coğrafyası" (New Economic Geography) teorisi beklentileri doğrultusunda, ekonomik faaliyetlerin zaman içinde coğrafi alana yayılmasında görülen değişimlerin bir nedeni olması beklenebilir. Bu çalışmanın temel amacı, bugüne kadar Türkiye imalat sanayisinin endüstriyel kümelenmesiyle ilgili yapılmış olan çalışmaların bulgularına katkı sağlayacak şekilde, sanayinin bölgesel dağılımının ve bölgesel uzmanlaşmanın zaman içinde nasıl, ne yönde ve hangi unsurlara bağlı olarak değiştiğini, Türkiye'nin entegrasyon sürecinin etkilerini de gözönüne alarak incelemektir. Süreç, yani 1980-2001 dönemi, Türkiye'nin Avrupa Birliği ile gümrük birliği anlaşmasını yaptığı ve Avrupa Birliği ile entegrasyonun yoğun olarak yaşandığı zaman dilimini içermektedir.

İmalat sanayi kapsamında yer alan sektörler, ISIC Rev 2 kodları ile dört basamaklı olarak sınıflandırılmış ve NUTS 2 düzeyindeki bölgeler kapsamında 1980-2001 dönemi içinde uzmanlaşma ve yoğunlaşma Gini katsayıları ölçülmüştür. Coğrafi yoğunlaşmanın hangi nedenlere bağlı olarak gerçekleştiğini bulmak üzere sanayinin özellikleri ve coğrafi yoğunluk arasındaki sistematik ilişki, ekonometrik yöntemlerle test edilmiştir. Bağımlı değişkenin GINI yoğunluk indeksi, bağımsız ve kontrol değişkenlerinin diğer teorilerde tanımlanan sektörlerin özelliklerini belirleyen değişkenler olduğu bir regresyon denklemi tahminlenmiştir.

Çalışmanın önemli bulgularından biri Türkiye'de imalat sanayinde bölgesel uzmanlaşma ve coğrafi yoğunlaşmanın ortalama değerinin yükselmiş oluşudur. Ortalama değerdeki artış, Krugman'ın öngörüsünü doğrulayıcı yöndedir. Açıklayıcı değişkenler arasında, sektör içinde yer alan firmaların istihdam bakımından ortalama büyüklüğünü ölçen değişken anlamlı ve beklenen yöndedir. Bulgular, firma ölçeğinin yüksek olduğu sektörlerin coğrafi yoğunluğunun yüksek olduğunu, yani aynı sektörde faaliyet gösteren büyük firmaların aynı bölgelerde yoğunlaşma eğiliminde olduğunu göstermektedir. Bu sonuç Yeni Ticaret Teorisinin açıklamalarını doğrular niteliktedir. Bulgular ayrıca Avrupa Birliği ile olan ekonomik entegrasyon sürecinin sanayilerin coğrafi yoğunlaşmalarını belirlemede etkin olduğunu doğrulamaktadır.

To my parents

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List of Abbreviations

CEEC.....	Central Eastern European Countries
DİE.....	Turkish Statistical Institute
DPT.....	State Planning Organization
GAP.....	Southeastern Anatolia Project
ISIC	The International Standard of Industrial Classification
KÖY.....	Priority Provinces for Development
NACE.....	General Name for Economic Activities in the EU
NUTS	Nomenclature of Territorial Units for Statistics
TUSIAD.....	Turkish Industrialists' and Businessmen's Association

CHAPTER 1

INTRODUCTION

There is an increased emphasis on geographical side of economic activity in the academic literature mainly shaped around the concepts such as spatial proximity, specialized regions, geographical concentrations and industrial agglomerations. These concepts have come forward as a result of increasing economic integration process in several areas in the world in the second half of the twentieth century. The relationship between integration and geographical space is observed enthusiastically in the academic literature because trade blocks such as the European Union, NAFTA which began the process of integration have created a recognition that industries are organized in places rather than national spaces (Feldman, 1999). The consequences of this paradigm change can be observed in increased geographical mobility of goods, services, information and capital across regional and national borders. Technological and political changes in the world economy fostered by the integration process have led to reduced costs of economic transactions across region and country borders which caused economic activities to become increasingly volatile. As a result of these developments, new theories have been developed in the 90s that model location forces based on the relation between market forces and distances in homogeneous space. The validity of the new theories are tested through empirical studies in integrating areas, especially in the European integration area.

In the EU integration process, Turkey as a candidate of European Union membership, attracts a special interest with its unique spatial features and integration process. Turkey's borders lie between European and Asian growth

centers and the scale and spatial structure of Turkish industry is exceptional compared with the other member countries. Concerning the integration process from the viewpoint of the EU, Turkey is the only country to enter the customs union without being a member. As a consequence, it could be expected that most of the economic effects which could be observed in the other member countries only after they joined the union, have already been realized for Turkey after the agreement of Customs Union in 1996.

Answering the question of whether the ongoing economic integration process of Turkey causes economic geographies to change or not is essential because the answer will give us a reliable foresight of what can be expected in the economic integration period to start with the possible membership of Turkey. Therefore in the course of this discussion whether the ongoing economic integration process of Turkey has caused economic geographies to change or not constitutes the main motive of this research.

1.1 Background Information Regarding Manufacturing Industry in Turkey

Ever since the foundation of the Republic, one of the main objectives of Turkey has been the “industry based growth”, although the strategies followed and instruments used varied substantially before and after 1980. Until 1980, the main strategy was to achieve the objective through industrialization by import-substitution, the main instruments were massive state investment in heavy industry such as production of iron and steel, a policy of trade protectionism and fixed exchange rate. In the period after 1980, major changes have been observed in the economy and politics in Turkey which affected the industrialization efforts considerably. The main strategy changed to establishing the principles and fundamentals of a market economy through the introduction of export oriented industrialization and the main instruments changed to trade liberalization, export promotion, price deregulation and a more flexible exchange policy. (Kepenek and Yentürk, 2000; Şenses and Taymaz, 2003).

After 1980 which constitutes the study period of this research, structure of the Turkish industry has changed tremendously due to economic and political developments. On the economy side, during 1980-2000 period Turkish industry was continually under the influence of high inflation and policies to prevent inflation, it can be said that the period has been characterized with economic and political instability. The economic crisis in 1994 has caused the manufacturing industry to experience some adverse outcomes for long years. On the political side, one of the most important factors that affected industrialization in Turkey in the 90s is the Customs Union Agreement. Turkey had to make improvements in order to establish the conditions of a competitive environment in Turkey, prevent unfair competition both in internal and external markets and prepare the institutional infrastructure necessary to realize a fast and discriminative integration between Turkey and EU countries (Türkkan, 2001).

As a result of the efforts to adapt to the requirements of the industrialization strategies, structure of the industry has changed substantially after 1980. Until the 1980s heavy state intervention was applied systematically in every phase of the industrialization period. The share of public sector in the manufacturing industry has decreased through privatization after 1980. As a result of these efforts share of production realized by the private sector which was 57 % in 1980 increased to 80 % in 2002 and share of gross fixed investment which was 63 % in 1980 increased to 90 % in 2002 in the manufacturing industry (DPT, 2003).

Another important development after 1980 that affected structure of the industry in Turkey has been the increasing share of direct foreign investment in the Turkish economy. Amount of foreign direct investment in Turkey has increased from 33 million US dollars in 1980 to 3.045 million US dollars in 2001. Although the share of manufacturing industry in direct foreign investment has decreased from 66 % in 1980 to 46 % in 2001, the increase in the total amount has caused the structure of the manufacturing industry to change. The share of foreign firms (with more than % 10 shares) in private sector has increased from 1.4 % to 3.5 % ,

the share of manufacturing employment in foreign firms has increased from 6.2 % to 11.1 % , the share of value added has increased from 10.5 % to 23.9 % between 1984-2001 (Şenses, Taymaz, 2003).

The results achieved during the 1980-2001 period have proven that average share of agriculture in GNP has decreased from 41.5 % in the 1945-1949 period to 13,5 % in 1995-2001 period. Share of manufacturing has increased from 14.3 % to 27,9 % and share of services has increased from 44,1 % to 58,6 % (Şenses, Taymaz, 2003). In terms of employment, share of industry has increased from 11,6 % in 1980 to 19,5 % of the 20,3 million employment in 2002 (DPT,2003). Annual value added increased by 1,1 % in agriculture, 4,4 % in services whereas it increased by 5,2 % in the industrial sector between 1980 and 2002 ¹.

Most important achievements of the industrialization process after 1980 are observed in increase in exports and the increasing share of manufacturing industry in total exports. Total value of exports increased from 2,9 billion USD in 1980 to 35,8 billion USD in 2002 and the share of manufacturing goods within total exports has reached to 93 %. As a result, highest shares in manufacturing industry exports in 2002 are as follows; 37 % textiles and clothing, 11 % automotive, 8 % iron and steel, 5 % food products. The share of major sectors in the manufacturing industry in 2002 are as follows; 22 % textiles and clothing industry, 21 % food industry, 7 % chemicals industry, 7 % petroleum products, 5 % automotive industry and 5 % iron and steel industry. Natural resource and labor intensive industries still have dominance in the manufacturing industry as they constitute the highest shares of 27 % and 40 % respectively in 2000 (DPT,2003).

As the results of Şenses and Taymaz study (Şenses, Taymaz, 2003) imply, export structure has focused on sectors that have gained comparative advantage on the basis of low cost and low price such as labor based textile sector or iron and steel

¹ Source: State Planning Organization-General Directorate of Annual Programs and Conjunctural Evaluations. <http://ekutup.dpt.gov.tr/ekonomi/gosterge/tr/tmeg/2002.xls>

industry characterized with high price elasticity. Especially in the early 80s when export-based industrialization policies have been adopted there has been a shift of manufacturing towards low technology industries (Kılıçaslan, Taymaz, 2006). One of the most important results of the export oriented manufacturing industry is that the structure of the manufacturing industry has been shaped on the basis of existing comparative advantages as a result of the policies that aim to integrate with the world markets after 1980.

1.2 Existing Empirical Evidence on Spatial Concentration Patterns of Turkish Manufacturing Industry

Existing empirical evidence on spatial concentration patterns of Turkish manufacturing industry reveal that concentration is seen mainly in four metropolitan areas and some emerging regions such as Çorum, Denizli, Gaziantep and these regions make up nearly 73 % of the total manufacturing labor force (Eraydın, 2002). Akgüngör (2006) points out the importance of newly developing centers near the periphery of Ankara as well, such as Çorum, Kayseri, Konya, Samsun and Eskişehir. It can generally be stated that Marmara region has been the focus of economic dynamism as the core region of Turkey until the first half of the 1980s because firms have not considered the choice of location as a component of their competitiveness. After facing increasing external and internal competition firms realized that it has become important for them to locate in places that help them gain comparative advantages (Türkkan, 2001).

These findings are confirmed and developed with a study of changing patterns in Turkish manufacturing industry by the State Planning Organization (DPT, 2003). Spatial distribution of industry in Turkey is examined using the development index which reveals that there are four main tendencies in the spatial distribution of industry in Turkey. First is that industry spreads to nearby cities from traditional centers such as İstanbul, Ankara, İzmir and Adana. The second is that industries are concentrated in cities such as Kocaeli, Sakarya, Tekirdağ, Manisa, Mersin which are neighbor to traditional cities. The third is that cities like

Zonguldak and Kırıkkale which are characterized with heavy public investment are losing their industrial strength. Fourth is that some cities in Anatolia such as Çorum, Kahramanmaraş, Denizli and Gaziantep have developed as new emerging regions, depending on their own capacities and by specializing on certain sectors (DPT, 2003). Türkkan (2001) mentions the reallocation of small and medium sized firms from city centers to Industrial Zones after 1980.

Another line of study that relates the manufacturing industry with spatial patterns is the one that identifies industry clusters and their distribution on the geographical scale. Using the 1990 Turkish input-output tables, Akgüngör, Kumral and Lenger (2003) identify six industry cluster templates² in Turkey among which engineering and textile are the largest templates with respect to the number of establishments and employment. Using the 1996 Turkish input-output tables Akgüngör (2006) has identified six industry cluster templates³ of Turkey for all manufacturing sectors in the economy and also identified the clusters that are significant for each region's economy. Some of the studies that have examined clusters or regions in detail at the regional level are; Öz (2003b) studying the towel/bathrobe cluster in Denizli, Eraydın (2002) studying Bursa, Denizli, Gaziantep districts .

Another attempt that focuses on identifying industry clusters in Turkey is the "Competitive Advantage of Turkey" (CAT) project, in association and consultancy with Center for Middle East Competitive Strategy (1999).⁴ The identified industry clusters in the first phase of the project are, tourism industry (focusing on Sultanahmet cluster, Fethiye cluster and Kuşadası cluster), textile and ready wear sector (focusing on undergarment cluster and ready wear cluster in Çorlu), construction and household sector (focusing on ceramics cluster and construction cluster) and information technologies clusters in Ankara and Istanbul.

² Identifiable cluster templates obtained from 1990 I-O table are; "food and agriculture", "mining", "vehicle manufacturing", "textile and home accessories", "leather" and "chemical".

³ Identifiable cluster templates obtained from 1996 I-O table; "engineering", "textile", "production and processing of field crops", "furniture", "packaged food" and "stone based industry".

⁴ For further information, see, <http://www.competitiveturkey.org>

Regional specializations and geographical concentration patterns of Turkish manufacturing industry are examined recently by TUSIAD and DPT (TUSIAD and DPT, 2005). The cross-sectional study covers the year 2002, based on NUTS II regions. Using the Location Quotient Index first it measures the concentration of employment in regions compared with the area of regions with regard to the area of the country and verifies the previous studies' findings that the production facility is concentrated above the average in İstanbul, its surrounding cities Kocaeli, Bursa, Zonguldak, Tekirdağ, and Ankara, Gaziantep, İzmir, around the average in Balıkesir, Manisa, Aydın, Adana, Hatay and below the average in Trabzon, Samsun, Konya, Antalya, Kayseri, Kırıkkale, Şanlıurfa, Malatya, Kastamonu, Mardin, Erzurum, Van and Ağrı. To measure regional specialization and geographical concentration indexes the study uses the Herfindahl index as a measure of concentration. Its main findings are that the highest specialized regions are Gaziantep, Trabzon, Zonguldak, Aydın, Ağrı and Şanlıurfa and regions with the most diversified industry structure are found to be Kocaeli, Ankara and İzmir. Highest concentrated industries are; office, accounting and computing machinery and manufacture of radio, television and communication equipment and apparatus (TUSIAD and DPT, 2005). An early study on the geographical concentration of industries reveal that in 1990 highest concentrated industries based on sales figures were chemistry, petroleum products (ISIC 35), automobiles (ISIC 38), food products, tobacco (ISIC 31), knitting, textile products (ISIC 32), Basic metals (ISIC 37) (Kaytaş et al, 1993 as cited in Kepenek and Yentürk, 2000).

Öz (2004) studies the relationship between spatial distribution of economic activities and their competitive structure. Öz first identifies the most geographically concentrated economic activities classified according to NACE as; 2465 (Manufacturing of tapes and recording devices), 6210 (airline transportation), 3541 (motorcycle production), 6603 (Insurances except life insurance), 6521 (Financial Leasing) for the year 2002. Among the biggest twenty cities, the ones

with increasing employment and with increasing tendency to concentrate are İstanbul, İzmir, Bursa, Antalya, Kocaeli, Tekirdağ, Muğla and Denizli. It is also mentioned that regional concentration is observed mainly in Marmara, South Ege and West Mediterranean regions. Concerning the competitiveness of the sectors in Turkey, it is emphasized that relatively competitive industrial agglomerations of Turkey in international markets have been mainly in four areas; textile, food, home appliances and basic metal. This picture has remained very much the same since 1970s. Despite the fact that after the trade liberalization there has been an increase in market share of Turkish exports in world markets and a deepening in some of these industrial agglomerations, the general picture has not changed much (Öz, 1999 and 2003a). The main finding of the study is that sectors that have competitive advantage are also the sectors with high geographical concentration and there is a positive correlation between geographical concentration and competitive power (Öz, 2004).

Manufacturing industry studies related to the EU integration process of Turkey mainly focus on competitiveness of Turkish industries compared with the other candidate countries or EU member countries (Yılmaz, 2002 and 2003; Burgess, Gules, Gupta, Tekin, 1998; Akgüngör, Barbaros, Kumral, 2002). In the context of European integration, Akgüngör and Falcioğlu (2005) have examined the specialization and concentration patterns of Turkish manufacturing industry between 1992 and 2001 and found that there is a tendency for regional specialization but there is no evidence for increased geographical concentration in the Turkish manufacturing industry. In general, leather industry (19), basic metals (27) and engineering related and medium level technology industries (31 and 34) are geographically concentrated industries across the country. The NUTS II regions with highest specialization coefficients are Trabzon, Gaziantep and Zonguldak in 2001.

As evidenced by the existing literature, previous empirical studies draw only a baseline in examining the specialization and concentration across Turkey but

don't make much causal analysis on the dynamics of these patterns and on the factors that explain the observed patterns, especially in the context of Turkey's economic integration. In the next section I discuss why such an analysis needs to be done for Turkey and derive the research objectives from this discussion.

1.3 Research Objectives

Economic integration efforts in the world have led to an increasing number of empirical studies dealing with the effect of integration on spatial concentration patterns in integrating areas particularly in the European Union, NAFTA. This study aims to study the integration process of Turkey and investigate whether the ongoing economic integration process has caused economic geography of Turkey to change. The effect of economic integration on the spatial concentration of Turkish manufacturing industry should be explored empirically because the effects observed after the agreement of Customs Union in 1996 will increase after the possible membership of Turkey into the EU.

This research partly aims to complement the findings of the studies on spatial concentration patterns of economic activity in Turkish manufacturing industry, identified in section 1.2, particularly by analyzing the integration period based on the assumptions and predictions of New Economic Geography Theory. The New Economic Geography Theory which has been developed in the 90s due to increasing integration efforts in the world explains the relation between integration and spatial concentration. Although details on the subject will be given in the context of the theoretical background in Chapter 3, New Economic Geography mainly proposes that spatial concentration increases as a result of economic integration. Consequently, the first research question derived from this discussion for Turkey is;

Has economic integration process with the EU caused regional specialization and geographical concentration levels of the Turkish manufacturing industry to increase?

Another prediction of the New Economic Geography Theory widely discussed in the literature is that linkages formed between firms are significant determinants in the increasing geographical concentration of industries. Second research question derived from this discussion for Turkey is;

Are supply and demand linkages accross industries significant determinants of geographical concentration of the Turkish manufacturing industry?

Recently, emphasis on the subject of spatial change caused by integration has increased in Turkey because there is an increasing concern that economic integration may be associated with increased inequality between regions. There exist great disparities between Turkish regions which make it more important to identify and define the reasons and mechanisms of change in concentration patterns during the integration period. Based on the results of the studies that explore issues of integration and spatial concentration patterns it will be possible to state the appropriate public policy implications to be imposed in integrated regions.

Therefore the importance of answering the research questions of this study is that the answers will help in planning effective distribution of public and private sources to priority areas throughout Turkey. State Planning Organization has started to conduct studies on new regional development policies to form a basis in establishing an incentive system that focuses on regional and industrial differences in Turkey (DPT, 2006a, 2006b). Consequently, Ninth Development Plan determines new instruments of regional development policies for the years 2007-2013. The plan focuses on integrated analysis of local production structures

so that different policies can be developed for different regions. Other instruments are defined as cooperation between firms and local governments particularly in innovation, local knowledge accumulation and knowledge sharing in regions (DPT, 2006b). This study aims to contribute to recent discussions on the new regional development policy in Turkey.

1.4 Outline of the Study

The remainder of the thesis is organized as follows. Second chapter covers the relationship between spatial dimension of industrial activity and integration in the light of both the theoretical and the empirical literature. The reasons behind agglomeration, integration effects on concentration patterns are examined based on explanations of different theories. In the third chapter, the theoretical framework based on New Economic Geography theory is drawn, the hypotheses derived from this framework are determined and the variables used to analyze industrial patterns are defined. In the fourth chapter, method and the data are explained. In the fifth chapter, empirical analysis is conducted and findings are discussed. Finally, in the sixth chapter, the main conclusions of the research are presented and suggestions for future research are discussed.

CHAPTER 2

LITERATURE REVIEW

2.1. Spatial Dimension of Economics

The study of the geography of production involves determining where specific goods or services are produced, in other words determining the location of industries. Contributions to this line of study can be found throughout the literature in a wide range of disciplines some of which are microeconomics, regional economics, economic geography, location theory, international trade, labor economics, urban economics and public finance.

The notion of location and its relation to economic activities have been studied as early as in the studies of Adam Smith and David Ricardo. According to Smith and in a similar way to Ricardo the determinant of the location of production is absolute advantage. Ohlin (1933) mentions that international trade theory is nothing but international location theory and in the Heckscher – Ohlin model location of production is determined by national endowment of the factors of production. However, in Neo Classical models space is treated as a homogeneous and unbounded entity. All locations are equally situated with respect to other locations, eliminating any competitive advantage due to relative location (Sheppard, 2000).

Other efforts to integrate location as a determinant in economic analysis are the works of Von Thünen (1826) on “isolated state”, Weber (1909), Lösch (1940), Christaller (1933), Hotelling (1929) who try to make micro-economic analyses of the optimal location of economic activities. Meanwhile, Walter Isard (1956) questions the economists’ approach to the world as a place without spatial dimension. In the 60s Alonso and Isard were in the process of inventing a new hybrid discipline combining elements of economics with elements of geography (Alonso,1960, Isard,1956). Their central objective was to rewrite neoclassical competitive equilibrium theory in terms of spatial coordinates so that all demands, supplies and price variables could be expressed as an explicit function of location (Scott,2000).

Recently as economic activities became more mobile in the real world and there became not much reason for them to rely on specific locations, new theories emerged in explaining the observed movements of industries. In order to be able to define the geographical location of a firm a market with imperfections was needed to be modeled. Because in an ideal model, one with no transport costs, the decision of location choice would be easy. Firms could be of any size and operate in all locations since no cost disadvantage was charged on them. However, in an imperfect market firms or industries would have to prefer a least-cost geographical location for production or emphasize demand revenue ratio (Jovanovic, 2001). Once geography is introduced, the countries and regions are no longer dimensionless points and factors of production have to make location decisions depending on spatial location of regions where transportation costs, agglomeration rents, economies of scale become variables of particular importance(Krugman, 1991b).

Starting from the beginning of the 90s, it has been recognized that although trade affects locational pressures there is in fact not a seamless interrelationship between location and trade. Trade and location have been ‘two sides of the same coin’ and a successful merger of trade and location theory has occurred under the

label ‘New Economic Geography’ (Brülhart, 1998b). New Economic Geography approach tries to link geography and economics by introducing more geography into economics and in this way emphasizes the importance of role of regions in economic analysis. (Paluzie, Pons, Tirado, 2000). The inclusion of transport costs and market imperfections in theoretical considerations expanded the classical concept and moved it closer to reality.

The most striking feature of the geography of economic activity is the concept of *concentration*⁵ as pointed out by Krugman (1991a) and what makes the phenomenon of location important for the objectives of this research is that the consequences of involving location into theory helps explain the reasons of agglomeration on the geographical scale.

2.2. Reasons of Agglomeration on the Geographical Scale

The concept of agglomeration and reasons of agglomeration have long attracted the attention of academics. Different theories have been developed to explain the reasons behind agglomerations. Early theories referred to as Neo Classical Theories explain agglomeration related directly with the benefits of locating in areas endowed with natural advantages. The steel industry in North America Great Lakes Region, the coal industry in Zonguldak were initially concentrated in these regions largely because of the presence of natural endowments. Industries that make use of natural endowments such as presence of raw materials, type of climate or proximity to natural ways of communication, choose to locate close to particular places because of the access those places offer to the sources of production.

⁵ Other concepts that can be found in the literature used interchangeably or as synonyms of concentration are “specialization”, “agglomeration”, “clustering” and “localization” (Brülhart, 1998a, p.776).

Neo Classical Theories state that comparative advantage arises from differences in technologies (Ricardo) and differences in factor endowments (Heckscher-Ohlin). The Ricardian Theory maintains that a country or region, even if it has advantage in all of the goods over the others, specializes on the ones that it has the most comparative advantage. The comparative advantage mechanism in Neo Classical Theory works without any mobility of productive factors across nations. The only factor of cost is labor and comparative advantage is a result of technological differences between regions. The greater the relative productivity differences the higher the degree of specialization of regions and the higher the level of geographical concentration of industries (Paluzie, Pons, Tirado, 2000).

An extension to the Ricardian Theory is the Heckscher-Ohlin Theory. The theory states that developed countries or regions specialize based on factor concentration. The theory says that regional specialization takes place according to the availability and concentration of the factors of production. Regions will specialize in industries that are intensive in their relatively abundant factors. The model assumes that production functions are identical in all countries and does not consider market structure, demand conditions and trade costs. Patterns of regional specialization and geographical concentration of industries are often created by historical accidents. Consequently the theory cannot explain the location of industry in regions with high mobility of factors or in countries with similar endowment of factors (Jovanovic, 2001).

Shortcomings of Neo Classical theories discussed in the literature mainly focus on the idea that these theories do not tell the reasons why industries agglomerate in particular places although there may be a lot of other equally sensible locations elsewhere in the country in terms of the same natural endowment. Moreover, Neo Classical Theories do not explain the reasons behind agglomerations of industries that do not depend on natural advantages (Ottaviano, Puga, 2000 ; Ottaviano, Thisse, 2004).

Von Thünen (1826) and Marshall (1920) had long recognized that there are specialization forces which are independent from country endowments. Von Thünen (1826) described both the centripetal and centrifugal forces in his model and even predicted high degree of specialization of the respective areas. Marshall (1920) has shown that spatial concentration can increase efficiency by pooling inputs other than material ones such as industry specific labor and supporting services and by facilitating technological spillovers. Marshall (1920) suggests three sources of agglomeration economies; sharing of inputs, labor market pooling and spillovers in knowledge⁶ and in his later studies contends that industries tend to cluster in distinct geographical districts and that knowledge is the most powerful engine of production (Marshall, 1949).

New Trade Theory of the 80s has evolved due to differences between the predictions of Neo Classical Theory and real world trade flows. One difference was due to the observation that trade was growing fastest between industrial countries with similar endowments of production factors and countries with similar economies. Trade flows in many industries showed no specific and clear advantage on factor endowments for any country and trade consisted mostly of similar goods. Increasing returns to scale turned out to be essential for explaining the uneven geographical distribution of economic activity and why regions without significant comparative advantage with respect to each other can develop different production structures on the basis of their different market access (Ottaviano, Puga, 1997; Puga, 2002).

Therefore, the focus of New Trade Theory is on issues that Neo Classical theories have neglected and it questions the assumptions of imperfect competition and increasing returns to scale⁷ in explaining the reasons behind agglomeration in the

⁶ Krugman (2000) states that in modern terminology these concepts are now described as backward and forward linkages, thick markets for specialized skills, and technological spillover. Recently, Duranton and Puga (2004) propose a different taxonomy: matching, sharing and learning.

⁷ The idea relies heavily on the monopolistic competition in consumption goods and on putting increasing returns to scale in a general equilibrium setting, put forth by Dixit and Stiglitz (1977).

studies of Dixit and Norman (1980), Krugman (1980) and Helpman and Krugman (1985).

A key contribution of these studies to New Trade Theory was the introduction of the interaction of increasing returns and transaction costs to international trade. In this model with increasing returns to scale in the monopolistic sector the production of each good is undertaken in only one location but sold in both large and small market/ country thus leading to divergent production structures among markets/countries without relying on comparative advantages. Thereby the degree of concentration in one country depends negatively on the transaction costs and positively on the difference in size between countries⁸. New Trade Theory assumes that there are countries with large and small markets but fails to explain why this division arises and it does not explain why firms in particular sectors tend to locate close to each other (Ottaviano, Puga, 1997).

Another assumption in New Trade Theory is that individuals prefer to consume the widest possible variety of products. But fixed costs in production limit the number of goods that can be produced. In response to consumers' desire of variety, firms differentiate their products such that each good is produced by a single monopolistically-competitive firm. Given fixed production costs firms prefer to concentrate production in a single location and given transport costs firms prefer to locate their plants near large markets. Firms are thus drawn to densely concentrated regions by the possibility of serving a large local market⁹ from a single plant at low transport costs (Hanson , 2001).

Ethier (1982) later extended the model to differentiated inputs. The general equilibrium setting offered new insights to trade theory, growth theory and recently New Economic Geography theory.⁸ For the following discussion on New Economic Geography theory it is important to mention that the home market effect leading to concentration applies even in the absence of any cumulative process of agglomeration (Lehner, Maier, 2002).

⁹ The relation between agglomeration and growth has been a subject of debate of new growth theories as well. In Romer (1990) an increase in the size of the economy leads on the one hand to the concentration of production and allows on the other hand the larger economy to grow faster (Lehner, Maier, 2002).

The basic model of the New Economic Geography theory introduced in 1990s is one that is familiar from New Trade Theory (Krugman, 1980) but also complements the aforementioned shortcomings of New Trade Theory. New Economic Geography extends the basic model to a regional setting and to similar situations where there are scale economies in producing non-traded intermediate inputs (Fujita, 1988), or where industries have vertical stages of production in which firms produce both consumer and industrial goods (Venables, 1996). Therefore New Economic Geography theory points out the importance of local markets and horizontal and vertical production relations between firms, besides scale economies in telling the reasons of agglomeration.

The assumption that production factors are mobile distinguishes the New Economic Geography from Trade Theory, at the heart of the theory there exists locational decisions that shape the regional division of labor and the industrial concentration of regions (Brakman et.al, 2005). Two types of location choices are studied, location choice of production units (market size) by firms and location choice of individuals through migrations.

Firms make production unit decisions based on the interaction of fixed production costs and transportation costs. Fixed production costs imply that firms prefer to serve consumers from a single location, while transport costs imply that firms prefer to locate near large consumer markets. These two effects create demand linkages within a region that contribute to spatial agglomeration. Firms are drawn to densely concentrated regions by the possibility of serving a large local market from a single plant at low transport costs (Hanson, 2000). Therefore the demand linkage rests on market size issues. Firms want to locate where they will have good access to a large market in order to reduce trade costs. Firms want to be in the big market but in moving to the big market they tend to make the big market bigger. Firms affect market size directly since firms buy “intermediate inputs” from each other. Firms also affect the market size indirectly because workers tend to go where the firms and jobs are located. Since workers tend to spend their

salaries locally they also cause the market get bigger. The circular causation process caused by demand linkages is presented in Figure 2.1.

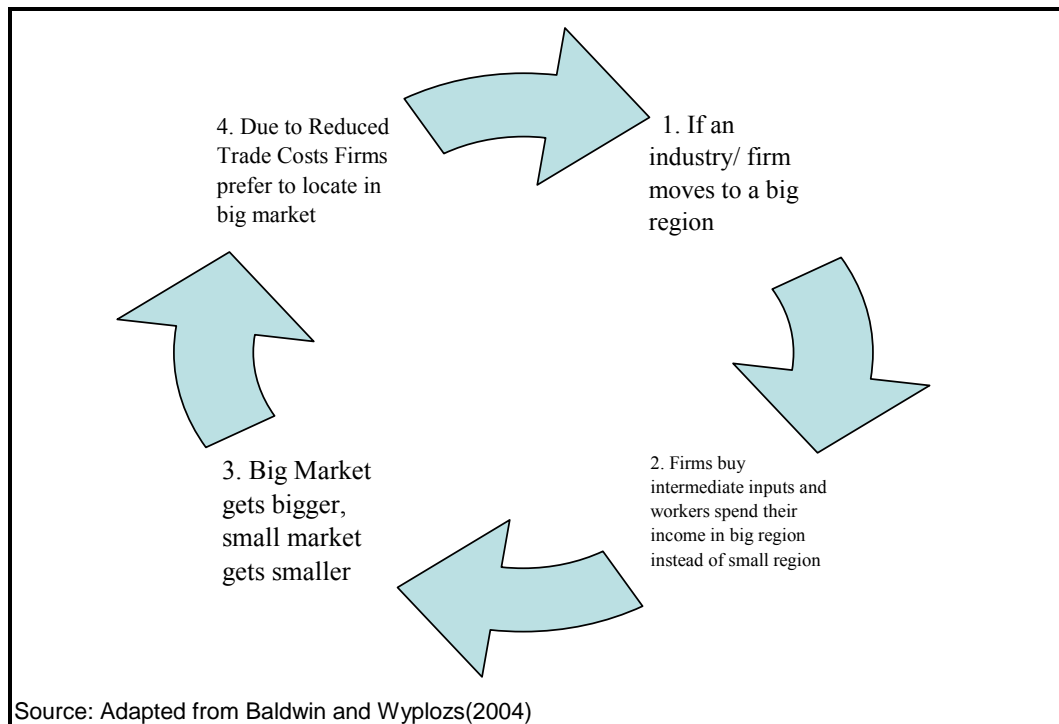


Figure 2.1: Circular Causality and Demand Linkages

The supply linkage works in a similar fashion but rests on the issue of the cost of production. Interactions between an input-output structure create incentives for firms to locate close to supplier and customer firms (Puga, Venables ,1996) especially if an industry is characterized by extensive input output linkages. In the presence of positive trade costs a firm will be able to reduce its costs by locating together with other firms within the industry; most firms buy inputs, raw materials, machinery and equipment. Due to trade costs these inputs tend to be cheaper in locations where there are lots of firms making these inputs. Thus the supply linkage works by encouraging firms to locate near their suppliers, but since firms also supply other firms, moving to a low cost location for intermediates tends to lower the cost of intermediates in that location even further. Spatial clustering of economic activity creates forces that encourage further clustering. The circular causation process of supply linkages is presented in Figure 2.2.

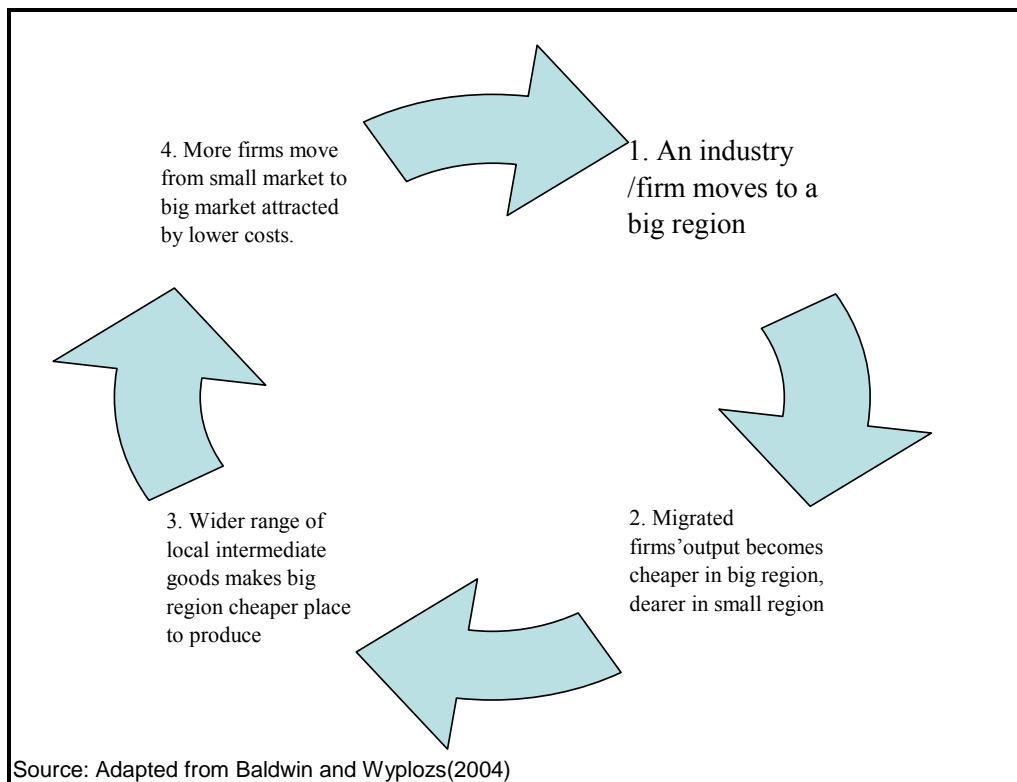


Figure 2.2: Circular Causality and Supply Linkages

In the literature there is a considerable compromise that another contribution of New Economic Geography is to bring together both convergence and divergence forces in a common analytical framework and to tell in general equilibrium how the geographical structure of an economy is shaped by the tension between the centripetal forces that cause the industrial activity to agglomerate or the centrifugal forces that cause the industrial activity to disperse (Fujita, Krugman, 2004; Puga, 2002; Brülhart and Traeger, 2005). The core model developed by Krugman is a general equilibrium model with a market structure that is consistent with increasing returns to scale and the model explicitly includes transportation costs and location decisions of mobile factors of production as modeled in Krugman (1991) and Fujita, Krugman and Venables (1999).

In the theoretical literature centrifugal forces are forces that discourage further agglomeration of industries. The forces that lead firms to disperse are high rents and land prices, high costs of other non-traded services, pollution, congestion, sewage, waste disposal, factor immobility, and increasing local competition as a result of increasing number of new entrants. For instance, Von Thünen (1826) described centripetal forces in terms of high yield per acre, high transport intensity of certain goods, and centrifugal forces in terms of scarcity of land in his model. Alonso (1973) mentioned the tendency for people and businesses to retain advantages of being based in smaller settlements such as less congestion and lower rents. New Economic Geography focuses on local competition since it is clearly related to trade costs and the integration process (Baldwin, Wyplosz, 2002). In New Economic Geography the centrifugal force that keeps industries dispersed is the strong competition in the local product or factor markets due to firms producing in locations with many firms. An increase in the number of local firms reduces the demand for a firm's good through an increase of cheap substitutes and an increase in the number of local firms increases production costs through a higher local wage rate. These reasons tend to make activities dispersed in space (Brakman et al., 2005).

Centripetal forces that lead firms to agglomerate are technological spillovers, labor market pooling and linkages. New Economic Geography focuses on linkages since they are clearly affected by lower trade costs and integration (Baldwin, Wyplosz, 2002). As stated before, the centripetal force in New Economic Geography that keeps industries agglomerated is the combination of increasing returns to scale and decreasing trade costs which encourages firms to locate close to large markets. An increase in the number of local competitors reduces a firm's production costs through access to more locally produced cheap intermediate inputs and raises demand for a firm's variety insofar it is used as an intermediate input. These centripetal forces create economic externalities which favor the agglomeration of economic activities.

The final result depends on the balance between these two forces and barriers to the reallocation of resources. New economic geography states that the strength of concentration forces is directly related to the strength of linkages and the potential for scale economies in industry. Agglomeration forces and mechanisms as explained in the way New Economic Geography does were in fact described in earlier studies.

New Economic Geography formalizes the cumulative process of agglomeration central to the work of Myrdal (1958) and Hirschman (1970). The term of linkage was firstly introduced in the study of Hirschman (1958) where he states that an industry creates a backward linkage when its demand enables an upstream industry to be established. Forward linkages are defined by the ability of an industry to reduce the costs of potential downstream users of its products. Hirschman's discussions on linkages suggested that development efforts could focus on a few strategic industries and appropriate key industries could be identified by examining input-output tables (Krugman, 1995). Myrdal in explaining regional disparities using the concept of cumulative causation states that "a "growing point" established by the location of a factory or any other expansional move, will draw to itself other businesses, skilled labor, and capital "(Myrdal, 1970, p. 280).

Another researcher who further complements to the discussion of agglomeration of industrial activity through linkages is Perroux (1970). Perroux explains economic development with "growth poles". Industries that generate profit opportunities in other industries as they expand are "propulsive industries," constituting "poles" of growth in economic space. Geographical agglomeration, production linkages with the key industry are necessary for the growth of a pole. Poles exert both centripetal and centrifugal forces. In Perroux's system "the profit of a firm is a function of its output, of its inputs, and of the output and inputs of another firm and what has been said of the interrelations between firms can also be said of the interrelations between industries " (Perroux, 1970, p. 96).

The analysis done by Myrdal, Hirschman and Perroux was not precise enough to facilitate serious empirical work since they did not formalize the analysis into a model that could be accepted by economic theory (Paluzie, Pons, Tirado, 2000). In the literature it is argued that the success of New Economic Geography depends on the formalization of this analysis into a model (Ottaviano, Thisse, 2004; Brakman and Garretsen, 2003; Meardon, 2001).

As evidenced by the literature, explaining the reasons behind the existence of agglomerations and production location decisions of industries has been one of the most important concerns of regional and development economics. Recently, considering that today almost every country in the world has been involved in some form of economic integration¹⁰ makes it crucial to explain the effects of economic integration of regions on the spatial distribution of economic activity which constitutes the theme of section 2.3.

2.3. The Relation Between Economic Integration and Agglomeration

The relation between integration and agglomeration is a common theme for various theories and each offers quite divergent views on this relation. Each theory has different methods in explaining the effects of economic integration on the spatial dynamics of the industry. The focus of recent stream of research is to question the effect of economic integration on the spatial structure of economic activity with particular emphasis on introducing new models in the international trade, economic geography and trade theory (Traistaru, Nijkamp, Longhi, 2003; Suedekum, 2006; Paluzie, Pons and Tirado, 2001; Petersson, 2002). In the following sections how do theories explain this relationship will be given based on the main assumptions of the Neo Classical, New Trade and New Economic

¹⁰ In defining the concept of economic integration various forms can be taken, in which it may occur as a result of the reduction or elimination of trade barriers between countries involved, with or without maintaining some trade barriers with the rest of the world, as in the EU and NAFTA case or it may occur as a result of the interaction of multiple distortions, as in the case of economic integration of a sub-set of countries, for example, a customs union. Other regional integration agreements are MERCOSUR, ASEAN, SADC, COMESA, EAC, SACU etc.

Geography Theories. In section 2.3.1 integration effects on the level and direction of spatial concentration will be explored while in section 2.3.2 integration effects on the locational pattern of spatial concentration will be explained.

2.3.1. Integration Effects on Regional Specialization and Geographical Concentration

When trade is liberalized, according to Neo Classical Theory, regions and countries specialize according to their comparative advantage which is determined by differences in technology or in factor endowments. As mentioned in section 2.2., since Neo Classical Theory is characterized by perfect competition, homogeneous products and non increasing returns to scale in production, industrial activity is spread or concentrated over space according to the spread or concentration of factors of natural endowments and technologies. Assuming that factors and consumers are spread out in space, a geographically dispersed structure of industrial production is expected. Therefore, increasing integration should result in increasing regional specialization and geographical concentration when industries relocate according to comparative advantages of regions. Constant returns and perfect competition should allow countries to exploit their comparative advantage more fully so we expect to see land abundant countries to become increasingly specialized in agricultural products.

Since the 1980's the emerging New Trade Theory has put the opportunities and risks associated with the integration process in a new perspective. The integration process is expected to produce a shift of increasing returns activity towards large countries. As mentioned in section 2.2., since the model of the New Trade Theory introduces imperfect competition, differentiated products and increasing returns, industrial activity concentrates in locations which offer best access to product markets. In the New Trade Theory all goods enter final consumption, factors are immobile across countries and factor prices are equalized. Hence the more the industry becomes concentrated in one country the larger is the scope for scale economies and the lower are trade costs. New Trade Theory hypothesizes that

regional concentration is determined with the existence of scale economies and as the differences in existence of scale economies across the regions increase, industrial concentration increases (Krugman, 1980). Models of trade with imperfect competition predict that in the presence of increasing returns and trade costs, firms and workers tend to locate close to large markets. Increasing returns to scale industries make it worthwhile to concentrate the production of a certain variety at one location and supplying all other locations from there. Therefore, when trade barriers are removed specialization of regions will increase and geographical concentration will increase at the level of varieties (Krugman, 1980).

Recently, expansion of the European Union into consisting of 25 members as well as the dynamic effects of North American Free Trade Association on the economics of industrial location has been a topic widely discussed particularly in the New Economic Geography literature (Krugman, 1991; Fujita, Krugman and Venables, 1999, Krugman Venables, 1996). Krugman (1991a) studies the integration process in two phases making a distinction between the early stages and final stages of integration process. Before integration process starts the incentives to specialize are low due to high transport costs. Hence regions do not specialize in this stage.

At early stages of integration, because of the decrease in transportation costs concentration forces start to dominate because industry clusters in the larger country are attracted by lower factor costs. In this stage, economic integration can decisively affect the spatial location of industrial activity by affecting the balance between dispersion and agglomeration forces, mobile factors choose their location according to existing centripetal and centrifugal forces. Being at the same time consumers, they add to the market size of this location and by these vertical linkages they become the engine of a circular cumulative process driving at agglomeration (Krugman, 1991a). In the context of integration Krugman (1991a) shows that the interaction of labor migration across regions with increasing returns and trade costs creates a tendency for firms and workers to cluster together

as regions integrate. Changes in the spatial distribution lead to the concentration of distinct industries in distinct regions. Following the predictions of Krugman hypothesis, regions will become specialized and industries become concentrated as a result of integration (Krugman, 1991a).

As transportation costs decline even further agglomeration stops being advantageous as scale economies can be exploited from any place in space which leads to dispersion of industries. As transport costs decrease both the home market effect and wage effect decrease. However, the home market effect decreases faster than the wage effect. The reason is that agents substitute local manufactured goods for foreign manufactured goods so the value of local sales decreases as transport costs decrease. Local wages decrease but at a lower rate since part of the agents consumption is in agricultural goods. This implies that as transport costs decrease the incentives to move to the agricultural region decrease. Eventually it becomes unprofitable for firms to deviate. If transport costs are even lower the loss in higher wages becomes less and less important as does the gain from higher sales. Eventually when transport costs are zero the wage and market effect will cancel out and there will be no incentives to deviate. This means that there will be no specialization or concentration (Aiginger, Rossi-Hansberg,2003).

In summary Neo Classical, New Trade and New Economic Geography Theories predict increasing geographical concentration and regional specialization due to economic integration. Hence various theories supply us with various predictions of likely effects of integration on the specialization patterns of regions and concentration of industries on the geographical space. In the next section how the spatial location of industrial activities is shaped and how they are distributed on geographical scale in case of economic integration will be evaluated.

2.3.2. Integration Effects on the Location and Spatial Distribution of Agglomerations of Industries : Core Periphery Pattern

In section 2.3.1. integration effect on the spatial concentration level and direction of change have been discussed without mentioning any integration effect on the locational concentration patterns on the geographical scale. In this section integration effects on the change in locational concentration patterns will be added to the discussions made in section 2.3.1.

As mentioned in previous sections in Neo Classical models space is treated as a homogeneous and unbounded entity, all locations are equally situated with respect to other locations thus eliminating any competitive advantage due to relative location. This causes actors to be spatially separated from one another in space with no central or peripheral locations (Sheppard, 2000). However, in the New Economic Geography literature spatial distribution of economic activity is described basically by core and periphery patterns asking how sectoral location patterns are affected by the centrality and peripherality of regions and how integration process can be associated with changes in core and periphery within country location patterns. Spatial differentiation occurs due to the spatial interactions between economic actors. Core and peripheral locations exist in the absence of any advantages or disadvantages of relative location (Sheppard, 2000).

Krugman (1991a) supports that cost and demand linkages between firms are one source of the interrelationship between the level of economic activity in different regions and input output linkages lead to the development of core-periphery structures between regions. The core consists of rich regions with a large demand for all products, a larger supply of qualified workers, more efficient infrastructures, a larger circulation of ideas and innovations among the firms in the districts but higher wages. Peripheral regions are far from the center of demand, have much lower domestic demand but offer the compensating wage differential. Therefore firms' location decision depends on the interactions between the benefits from increasing economies of scale in the core and the benefits of cheaper factors of production in the periphery. Spatial general

equilibrium models of New Economic Geography mainly try to identify cumulative forces that create polarized economic landscapes featuring agglomerated core locations and hollowed out peripheries (Brülhart, 2006).

Concerning the integration effects, at early stages of integration because of the decrease in transportation costs, concentration forces start to dominate because industry clusters in the larger country are attracted by lower factor costs. Firms and workers cluster together and the cumulative causation process begins. This process results in the emergence of a highly specialized core and periphery (Krugman, 1991a). As the degree of integration increases in this early stage, integration favors a redispersion of some industrial activity towards the periphery. The move from high to medium transportation costs results in a core periphery system where the core gets specialized in increasing returns to scale industries and the periphery in what is left; mainly industries with constant returns, perfect competition, and a low income potential. In his work, Krugman (1991a) models the process in a way that as transaction costs decrease the symmetric equilibrium becomes unstable and a core – periphery pattern with an industrialized core and an agricultural periphery forms.

As agglomeration takes place the prices of local factors and goods tend to rise. The prices of local factors increase especially if they involve certain immobile factors (i.e. labor) that are important for production or non tradable goods that are important for consumption (i.e. housing). As integration increases further, transport costs decrease and more industry spreads to less developed regions. It is suggested that geographical advantage will be greatest at some intermediate trade costs, the relation between location of activity and trade costs has an inverse u-shape.

Puga and Venables (1996) describe a gradual process of industrialization where after a critical mass is reached firms move from the core to other regions some distance to avoid the high wages present in the core, but close enough to it in order to benefit from its advantages in terms of agglomeration economies.

Empirically, Brülhart and Torstensson (1996) find support for the u-shaped relationship between the degree of regional integration and spatial agglomeration predicted by the models when labor mobility is low: activities with larger scale economies were more concentrated in regions close to the geographical core of the EU during the early stages of European integration while concentration has fallen in the 1980s. In general, in contrast with the Neo Classical models the “new” theories mostly conclude that economic integration promotes the concentration of industries in central locations (Brülhart, 1998b). Consistent with the economic geography theory Bramanti and Maggioni (2001) find that scale intensive industries are localized in the core of the EU (Baden Wuttemberg-Parisian Basin- North West of Italy) especially motor vehicles and the chemical sector. The labor intensive industries such as textile related industries tend to concentrate in the periphery, especially in the South of Europe (from Portugal to the east of Spain to the South and center of Italy). High technology sectors like office machinery and instruments show a strong bias towards the regions of Northern Europe (the north Atlantic belt going from Ireland to the region of Oslo passing from Scotland and Denmark) which represent an advanced periphery.

Brülhart (2006) also studies the changing spatial patterns of EU industries associated with the EU integration process. He finds that agriculture is the only sector that exhibits a positively significant bias towards peripheral regions and there are four sectors that are significantly concentrated in the center; manufacturing and energy, transport and communication, banking and insurance and other market services. The sectors that have relocated during the integration period towards peripheral regions are manufacturing, construction, distribution and non-market services. Manufacturing employment has been relocating away from central regions and EU integration process appears to have reinforced the general trend towards dispersion of manufacturing employment from central regions, centrality seems to have lost some importance as a determinant of sectoral location in Europe (Brülhart, 2006). Krieger-Boden (2000) concludes that for the EU - integration progressing from early stages to final stages- the

manufacturing system as a whole seems to have withdrawn from the centers towards the periphery.

Concerning the integration process, the situation of one country that enters a large union of several already internally integrated countries comes forward in the big picture. If integration still drives at the early stage for the accession country we are likely to observe a dominance of the centripetal home market effect and the large market potential of the union's core will attract workers from the accession country's core and increasing returns to scale activities will be concentrated in the union's core. However, when overall integration is driving at the final stage again accession country loses workers in increasing returns to scale industries this time due to dispersion of increasing returns to scale sector to the periphery. The peripheral regions outside both cores are likely to be the latest to profit from the dispersion (Krieger-Boden,2002). As a result it can be said that industrialization takes the form of a sequence of waves with industry spreading from country to country (Mora et al., 2002).

Forslid et al.(2002) conducts a Computable General Equilibrium study incorporating the effect of western European integration with eastern Europe resulting that the peripheral countries of the eastern Europe will benefit from integration but this will not affect the established core to any great degree. Eastern Europe is likely to attract labor intensive sectors as well as a few skill intensive industries.

As a result of the formed core periphery pattern, issues on regional differences rise in the integration period. The Neo Classical Theory does not pay much attention to the subject of regional differences since according to the Neo Classical Theory integration fosters the division of labor according to comparative advantage, raises overall welfare as well as the welfare of each region. Free trade and unconstrained factor mobility results in a uniform geographical distribution of people, skills and economic activity equalizing factor earnings, living standards in

all regions. Poorer regions converge on richer ones. Peripheral regions and countries benefit from integration in terms of an increased inflow of goods and services and from the development of new industries. At the end this process equalizes factor prices (Forslid et al., 2002; Jovanovic, 2001). The theory would not predict that some industries are “more worthy” than other industries (Forslid et al., 2002).

New Trade Theory allows industries to differ and states that due to economies of scale some industries increasingly concentrate in a few large agglomeration centers which results in differing regional opportunities related to different industries. It is predicted that overall net benefit of integration will be positive due to exploitation of scale economies and increased competition resulting in higher efficiency. On the regional level as industry mix of regions determine the welfare of that region the industries with high return to scale should offer high income potentials to their regions (Forslid et al., 2002).

A number of articles in the New Economic Geography literature (Krugman, 1991b; Krugman and Venables , 1995, Hallet, 2000) suggest that economic integration may lead to unequal regional development. Especially in the case of EU, there has been the concern that integration might lead to an over agglomeration of activities in a preferred zone at the expense of a disadvantaged periphery. In the New Economic Geography literature it is generally agreed that integration generates net welfare gains but the distribution of the overall gains is subject to an ongoing theoretical and empirical debate (Brühlhart, 1995). In the case of EU in line with the theory it has been suggested that integration is improving the accessibility of all regions in the EU but it is improving the accessibility of the core regions relatively faster than regions in the periphery (Combes and Overman , 2004).

The advantage of modeling both convergence and divergence forces in a common analytical framework (Puga,2002) gives the chance to relate their relative strength to microeconomic conditions and explicitly study the trade off between the

economic advantages of the agglomerating activity and the inequalities it may bring to regions but in the literature the standard approach is to treat regions as distinct and physically separate small economies ignoring any interregional linkages that may exist. For instance, there is the assumption that regions can import unlimited supplies of workers at a given real wage. However, high employment growth in one region would put forward pressure on wages in that region and in regions from which it attracts workers. The solution to this problem is to move away from using partial equilibrium techniques to test general equilibrium theories (Hanson, 2000).

According to the New Economic Geography Theory, although integration brings overall economic welfare through increasing regional specialization and geographical concentration, at the regional level it may also produce gaining as well as losing regions based on the industries the region has specialized (Krieger-Boden, 2002). Region may be specialized on industries with increasing returns technology (information technology), on industries with localized inputs (mining, iron, steel), on industries with constant returns (food production, textiles). Integration increases the regional specialization and geographical concentration level of regions and causes regional differences, some of the regions benefit from this process while some don't. The analysis of the industry mix in the region is important to be made for the reason that the industry mix realized in a region most likely will influence its income and growth.

Reconsidering the integration process from the viewpoint of the integration effects on regional differences in line with the core periphery pattern discussed so far, it can be said that at early stages of integration as a result of the decrease in transportation costs, concentration forces start to dominate because industry clusters in the larger country are attracted by lower factor costs. This process leads to the emergence of an explicit and highly specialized core and periphery which results in sharp core periphery divide between regions (Krugman, 1991b). Krugman (1995) also emphasizes the cumulative causation process in which firms

want to locate where market potential is high and markets tend to be large where lots of firms locate. The process of circularity leads to the possibility of self reinforcing regional growth or decline.

Concerning the integration process, which increases specialization in certain regions across the nation, integration is expected to increase the economic potential of the region as well. Change in agglomeration leads to radical changes in the economic geography of an integrating region in such a way that customs unions or other forms of collaboration, such as trade liberalization, that reduce market distortions and increase trade are welfare enhancing (Brakman, Garretsen, 2003). In sectors where linkages are important integration will bring massive specialization and concentration according to New Economic Geography (Traistaru et.al., p.4). Economic actors such as firms, buyers, sellers, institutions in a region attract more firms to the same region and this attraction area is formed as a result of common information sources and positive externalities formed by the synergy created. This way locational concentration may generate performance advantages and increase the growth prospects of regionally concentrated enterprises (Kronthaler, 2003). In the final stage, as transportation costs decline even further agglomeration stops being advantageous as scale economies can be exploited from any place in space which leads to dispersion of industries. If transport costs are even lower the loss in higher wages becomes less and less important as does the gain from higher sales. Eventually it becomes unprofitable for firms to deviate and specialization becomes an equilibrium, which means that there will be no specialization (Aiginger, Rossi-Hansberg, 2003). Therefore, in the final stage equalization among regions takes place.

In Table 2.1 three theoretical frameworks are summarized in the context it has been discussed so far based on the discussion each one brings to the subject of integration effects on spatial concentration patterns.

Table 2.1: Three Strands of Location Theory			
	Neo- Classical Theory	New Trade Theory	New Economic Geography
Pioneers	Ricardo, Heckscher, Ohlin	Dixit, Norman Helpman, Krugman	Marshall, Krugman, Venables, Puga, Fujita
Main Assumptions	Perfect Competition Homogeneous products Non increasing returns to scale	Imperfect competition Differentiated products Increasing returns to scale	Imperfect competition Differentiated products Increasing returns to scale Mobility of Production factors
Determinants of Location	Technological Differences Natural Resource Endowments Factor Endowments	Size of Home Market	Input-Output Linkages Labour market pooling Trade Costs
Integration Effects on Reg.Specialization	Specialization of Regions according to their comparative advantages	High Specialization of Regions	High Specialization of Regions in the early stage Diversification of regions at the final Stage
Integration Effects on Geographical Concentration	Dispersion of Economic Activity evenly across space according to comparative advantage of each region	Concentration of Product Varieties	High Concentration of IRS industries in the core in the early stage Dispersion of IRS sector at the final Stage
Integration Effects on Regional Differences	Equalization btw. regions due to equalized factor prices	Differentials btw. Regions	Sharp core-periphery divide btw. regions in the early stage Equalization btw. regions in the final stage
Source: Compiled by the author.			

2.4. Existing Empirical Evidence on Spatial Concentration Patterns in the Context of Integration

In the existing empirical literature, integration effects are tested in two integration areas, which are formed by NAFTA¹¹ and the European Union. The existing empirical evidence for the regional specialization and geographical concentration¹² in the context of economic integration is found in the literature mainly in the context of European Union integration. European Union has become the principal object of this empirical agenda since it presents the closest approximation to a natural experiment of integration effects (Brülhart, 1998a) and since relative factor endowments and tastes are fairly similar across EU countries, the fall in trade costs provides an ideal opportunity to assess new trade theories (Amiti, 1998). Studies generally include the data of the most important phases of the integration; the enlargement in 1973, the south enlargement in 1981-1986, the completion of the Single Market in 1992, the north enlargement in 1995 and the European Monetary Union since 1999.

With respect to European Union integration, Krugman (1991a) can be accepted as the starting point of the literature. Krugman compares four US regions' with four large Europe countries' manufacturing industries' Gini coefficient of geographic concentrations using employment data between 1947 and 1985. He finds that US economy has become less regionally specialized over this period¹³ and traditional, low tech industries are those that are the most strongly localized. Comparing these results with that of the EU he finds that localization has gone much further in U.S. than in Europe, European nations are less specialized than U.S regions. In his

¹¹ One of the studies on this area in the context of integration is done by Hanson. The work of Hanson (1996) on US-Mexican integration reveals that agglomeration is associated with increasing returns and shows that integration with the US has shifted Mexican industry away from Mexico City towards states with good access to the US market. Hanson also points out that the determinants of industrial location are linkages: employment has grown more in those regions that have larger agglomerations of industries with buyer/supplier relationships.

¹² In general terms, regional specialization is defined as the distribution of the shares of the industries in a specific region j and geographical concentration is defined as the distribution of the shares of the regions in an individual industry j .

¹³ Krugman's findings about USA specialization patterns are confirmed by the studies of Ellison and Glaeser (1997) and Kim (1995). Kim (1995) found that US geographical concentration and regional specialization have reached their highest levels in the 1920s, then have started to decrease.

work he explains the reason behind as the existence of barriers to trade in Europe (Krugman, 1991a).

Findings of Krugman have raised the prediction that an integrated Europe would also develop in the same direction as the US did. In the academic literature it is compromised that a large part of European academic interest in agglomeration stems from the question of whether a more united Europe market will lead to more spatially concentrated industry (Head and Mayer, 2004). The main assumptions of Krugman that lead to increase in concentration are maintained in Europe such as the low transaction costs in Europe due to the creation of the Single Market, liberalization, the impact of telecommunications, exploitation of scale economies, deeper division of labor, and establishment of rules, policies to create and sustain integrated markets that lead to a large growth in intra-EU trade.

In order to understand the changing patterns of regional specialization and geographical concentrations of regions in the context of EU integration, many empirical studies have been done either concerning the EU as a whole or dealing with the member countries' integration process into the EU. The studies that have taken EU as a whole have chosen member countries as the level of study and measured concentration indices of member countries. Amiti (1999), Brülhart (1998a,b, 2001a,b), Midelfart-Kvarnik et al. (2002,2003), Aiginger and Rossi-Hansberg (2003), Aiginger, Davies (2004), Aiginger, Pfaffermayr (2004) all present results on specialization or concentration for EU nations. The studies that have taken member countries have chosen regions as the level of study and measured concentration indices of regions. Brülhart, Traeger (2005), Krieger-Boden (2002), Lubenets et.al. (2001), Paluzie et al. (2001), Suedekum (2006), Traistaru et.al. (2003) present results for regions of EU member countries.

Comparing the results of the concentration patterns of these different levels of study has revealed that industries tend to be more strongly localized across regions within countries than across countries (Brülhart, 1998a) and EU

integration appears to have strengthened countries' internal concentration trends (Brülhart and Traeger, 2005). The reason is explained in the literature as the economic integration may have allowed the forces behind concentration and specialization to operate at the country level where they previously had been confined to regions within countries (Gorter, 2001). Davis and Weinstein (1999) find that economic geography effects are significant for regional level but not for international level. The possible reasons are that transport costs are surely lower for trade among regions of a country than among countries and there is greater mobility of factors across regions than countries.

One of the studies that examines the EU at the level of member countries is done by Brülhart (1998b) which investigates geographical concentration for total manufacturing for 18 two digit NACE industries in 11 EU member countries using employment data. He reports that the concentration rose by 21 % between 1980 and 1990. Having observed that in the 80s aggregate EU manufacturing has become increasingly agglomerated, how this general tendency reflects itself in the patterns of the individual industries is also stated. Within the 18 industries geographical concentration rose in 14, with the largest increases in labor intensive industries¹⁴ which are textiles, clothing and footwear. When the absolute values of gini indices are analyzed instead of their change in time, it is seen that all high-technology sectors are among the most localized. Textiles, clothing and footwear sectors with the most significant increases are still among the most dispersed industries by 1990. This finding of Brülhart (1998b) suggests that “neoclassical” factor-cost considerations are likely to dominate increasing returns as the main locational determinant of concentration trends in Europe contrary to his previous findings which support that new trade and new geography theories are relevant (Brülhart, 1995).

In later years analysis done by Brülhart (2001a) which provides a balanced panel of annual employment figures for 32 ISIC manufacturing sectors (two-four digit)

¹⁴ The classification of OECD (1987) is used.

defines the geographical concentration pattern of manufacturing industry in 13 European countries for a longer period. It suggests that the degree of concentration has increased continuously over the 1972-1996 period in employment terms while remaining unchanged in export terms. Production data indicate that scale sensitive industries are localized in the EU core and that labor intensive industries are relatively dispersed. There is also evidence that low-tech industries are the most strongly concentrated industries. Complementing this study Brülhart (2001b) states that although specialization is mostly pronounced in traditional resource and labor intensive based sectors there are signs of increasing clustering in technology intensive industries since the mid-1980s.

Amiti (1999) conducts a study on the specialization patterns of EU countries between 1968 and 1990 using Gini coefficients and finds that there was a significant increase in specialization in Belgium, Denmark, Germany, Greece, Italy and The Netherlands; no significant change in Portugal, and a significant fall in specialization in France, Spain and the UK. Even though specialization decreased for some countries between 1968 and 1990, there was a significant increase in specialization between 1980 and 1990 in all of the countries. Amiti (1999) uses the same time interval and data to measure the Gini coefficients of geographic concentrations and finds that 17 out of 27 industries experienced an increase in geographical concentration with an average increase of 3 percent per year in leather products, transport equipment and textiles.

The findings of Brülhart and Amiti for European data replicate the findings of Krugman (1991) in that the most geographically concentrated industries in the EU are not technology and scale intensive industries but some traditional sectors such as leather products and textiles.

Contrary to the findings of the existing empirical literature explained so far, Aiginger and Pfaffermayr (2004) find that geographic concentration has declined during the post-Single Market period, in years between 1985-1998 for 14 EU

member countries, specifically including the period 1993 to 1998 as the "post-single market period". The main indicators used are Herfindahl and Entropy and data used is value added. Capital intensive and highly globalized industries exhibit a significant stronger tendency of concentration after 1992 while the deconcentration tendency of skill intensive industries remains the same (Aiginger, Pfaffermayr, 2004).

The sub-national studies, meaning studies that take regions as the level of study are mostly the recent ones since they mainly focus on the changes in transition periods of accession or member countries and on the effects of integration in accession periods. Concerning the transition period of member countries at the regional level, a study done about Spain has shown that there is no evidence of increasing specialization in Spanish provinces between 1979 and 1992. Hence, the fall in trade costs brought about by the entry of Spain to the EC does not appear to have affected the geographical concentration of industries in regions of Spain (Paluzie, Pons, Tirado, 2001).

A study about the regional specialization and income dynamics in Estonia during 1990-2000 in the context of trade liberalization and integration with EU has revealed that integration process has been an important factor of increasing regional specialization for Estonia as predicted by geographical economics hypothesis. Specialization is measured using three indicators, Herfindahl index, Krugman Index and Gini Index. As a result it is found that over the observed period, level of region-weighted specialization in Estonia has increased on average by 2-5 % a year (Lubenets, Fainstein, 2003).

This finding about Estonia is supported by another study, which explains the effects of economic integration on patterns of regional specialization of manufacturing in Bulgaria, Hungary, Romania and Slovenia. Evidence of regional relocation of industries leading to higher average regional specialization in Bulgaria and Romania, lower average regional specialization in Estonia and no

significant change in Hungary and Slovenia have been found. As for geographic concentration in all cases the level of concentration of industries seem to be stable or slightly increasing (Traistaru, Nijkamp, Longhi, 2003).

Regions of Spain and France have been the study area for elaborating on the effects of integration in accession periods for the periods 1973-1996 for France and 1981-1992 for Spain (Krieger-Boden,2002). Using Herfindahl index it is mainly found that on the overall, specialization has not changed much in both countries. Increasing return industries' shares decreased in core regions and increased at the peripheries, particularly at the peripheries situated far from the cores.

Reunification effects on regional specialization and geographical concentration in regions of Germany has been studied by Suedekum (2006). The main finding is that the average German region has become less specialized and most industries have become more dispersed on the average. The industries that have become more concentrated are old fashioned and declining industries. He concludes that there is no strong internal specialization or sectoral concentration process in Europe' s biggest economy.

Brühlhart and Traeger (2005) study on 17 EU countries at the regional level in 236 NUTS2 regions for the years between 1975-2000. The study includes agricultural and services industries as well as the manufacturing industry, among them only the manufacturing industry experiences a statistically significant increase in relative concentration of industries and the manufacturing industry has been relocating away from high density central regions. The analysis confirms that European manufacturing is becoming more concentrated particularly since the inception of the Single Market program. The strongest increase is in low-tech and labor intensive sectors such as textile, footwear.

Another study at the regional level in the EU is conducted by Mora et al.(2002) for 180 NUTS2 regions in EU-27 (EU 15 + 10 new members + Bulgaria and Romania). Besides an overall increase in geographical concentration of industries between 1985-1995, regions where low technology industries are located seem to be increasing their specialization (mainly due to increase in food, tobacco, paper, printing sectors but not textile). Sectors with the highest concentration indexes are the sectors depending on the location of natural resources, agriculture, fuel and power products, textile and transport equipment. Sectors with lower indexes are those grouped in high technology industrial classification. Concerning the integration period, Eastern regions are highly specialized in relation to the average and entry of the Eastern regions has increased the gap in specialization levels between old and new member states. A considerable number of regions that entered in the mid 80s enlargement have increased their specialization in labor intensive sectors.

The close relation between regional specialization and geographic concentration is also explored in the literature. Empirical studies often focus either on regional specialization or geographical concentration, generally assuming that these would develop in parallel but this could be possible only in a world where all countries, regions, industries were of the same size, then increased specialization would mean that industries will also become more concentrated (Aiginger and Davies, 2004). The same point is put statistically and stated that specialization and concentration are two perspectives to be derived from a matrix with the columns referring to countries and the rows to industries. Dalum, Laursen and Villumsen (1998) stress the distinction as an important one since the two kinds of processes might not in all cases move in the same direction and are probably going to take place at different speeds, even if the results are more or less by definition two sides of the same coin. For instance, as result of Aiginger and Davies (2004) study at the EU level, countries have become more specialized but industries have tended to become less geographically concentrated between 1985-1998. Since larger industries have tended to grow more rapidly than the small industries,

concentration has decreased and since the smaller member states have tended to grow more rapidly than the larger member states, specialization has increased.

Aiginger and Davies (2004) found that in Europe during recent years larger industries have grown more relative to smaller industries, whilst smaller countries have grown more relative to larger countries. In nearly all the member states specialization has increased. In larger countries this is interpreted as the result of strengthening their position in existing strongholds (cars in Germany, machinery in Italy, chemicals in France and food in UK). Smaller countries however have gained more market share, particularly in some fast growing industries like telecom, medical equipment, but also in some capital intensive industries like basic chemicals and steel. Another empirical finding is the relative importance of linkages as a driving force of these results, there is persistently high specialization of the larger countries in large industries and this may be the result of increasing intra industry linkages in the large industries, which are already located in large countries (Aiginger and Davies, 2004).

Study of Aiginger and Rossi-Hansberg (2003) achieved the same result that regional specialization and geographical concentration work in opposite directions, both for EU and USA¹⁵. Using Gini indexes of value added for the period between 1987-1996, regional specialization and geographical concentration of 50 US states and 10 industries are compared with 14 EU member countries and 23 industries. For the US, average regional specialization is found to be increased by 2.3 %. On the other hand geographical concentration of industries has declined by 2.5 %. For the EU, average regional specialization is found to be increased by 5.7 % whereas geographical concentration of industries has declined by 1 %.

In the US, specialization is increasing since the share of the largest industry, electrical and electronic products, is increasing in many states rather quickly. Textiles, chemicals and machinery increase their share in value added in states

¹⁵ For studies that compare concentration patterns of EU and USA, see Krugman (2001), Aiginger, Leitner (2002), Braunerhjelm et al. (2000), Midelfart-Kvarnik et al. (2000).

where they are already large, indicating increasing specialization in scale intensive industries. The decrease of geographical concentration comes from the trend that the larger states are losing their shares in production in many individual industries. In Europe specialization is increasing since large countries like Germany, France and Italy increase their specialization in medium-tech industries. In general, larger countries are losing their share in production and smaller peripheral countries are increasing their share in production.

Concerning the issue of regional specialization it can be said that what lacks in the empirical literature is the analysis of how differentiated specialization structures, with respect to degree of specialization, affect economic indicators in regions (Krieger-Boden, 2000). In one of the few studies, Mora et al.(2005) finds that faster growth rates are found in regions closer to the core and in regions with higher specialization in sectors with higher levels of technological intensity. In addition, regions with lower specialization in low tech industries show higher growth rates both if they specialize in high tech service sectors and if they are close to the core. In relation with the integration process Gianetti (2002) states that integration and greater exchange of knowledge among countries whose regions have specialized in high tech sectors spur growth and bring convergence among regions.

A general summary of the empirical studies in this field is given in Table 2.2. In general terms, it can be said that this line of the existing empirical literature focuses mainly on specialization and concentration patterns, their change in time and how the industries are distributed on the geographical scale on the basis of core periphery patterns during the integration period. In testing the assumptions and predictions of New Economic Theory, the general approach of measuring the change in spatial concentration over a period of time and measuring the effect of integration in the same period can be seen as a crude strategy because the interpretation of the results as evidence of New Economic Geography relies upon the assumption that trade costs are the only variable changing over time (Head

and Mayer, 2004). However, there also exist empirical studies that investigate the explanatory power of alternative theoretical frameworks.

Reasons of agglomeration has been a study area that attracts the attention of many different study fields, mostly regional and urban economies. Empirically, starting from late 1980s, particularly with the emergence of the manufacturing belt in the U.S. economic geography, the attention of most regional and urban economists was towards studying regions such as Silicon Valley, Orange County, Route 128 , the London-Bristol axis or Emilia-Romagna region in Italy. These regions were shaped by industries with high level of spatial agglomeration, intra local business networking, innovation and growth (Hall et.al., 1987, Malecki, 1980, Markusen et al. 1986, Piore and Sabel, 1984, Meyer, 1983, Kim, 1999).

The reason of agglomeration as stated in the study of Meyer (1983) is local regional demand that triggered industrialization in manufacturing belt in US. Kim (1999) presents alternative evidence for the rise of manufacturing belt based on natural advantages. Acknowledging the emergence of networks among rival firms in Italy's Emilia-Romagna region, Piore and Sabel (1984) demonstrate the merits of vertically disintegrated and locationally fixed production. In Bergman and Feser (1999) it is pointed out that the difference between the model of Marshall and the network model of Piore and Sabel is "trust". Krugman (1991a) also makes a connection with Marshall suggesting that Silicon Valley style agglomerations may be more the rule than the exception. He claims that one may learn about the sources of increasing returns that have appeared in the literature following Marshall and proposes that the manufacturing belt emerged when economies of scale in production rose and transportation costs fell.

These studies have explained the reasons behind agglomeration without considering the possible effects of other factors that are subject of other theories, therefore the most intuitive method to estimate the contribution of various factors is to regress a measure of geographical concentration over a set of determinants

identified in the competing theories (Brülhart, 1998a). Recent studies that have related concentration indexes to proxies of theories such as trade costs, increasing returns and vertical linkages while controlling for other possible sources of agglomeration are the fore mentioned studies of Amiti (1999), Haaland et al. (1999), Paluzie et al. (2001), Akgüngör and Falcıoğlu (2005) and Kim (1995).

In Kim (1995) which is one of the first papers to investigate empirically the relative explanatory power of alternative theoretical frameworks in a panel data setting, Gini indexes calculated for 1880, 1914, 1947, 1967 and 1987 are regressed for twenty 2-digit industries on a proxy for internal scale economies (production workers per plant), a resource intensity variable (cost of raw materials divided by value added) and two sets of industry and year fixed effects. The paper finds support for both theories, the significant positive influence of scale economies can be seen as a support for New Economic Geography Theory.

Amiti (1999) also regresses locational Gini coefficients on a panel with 65 industries in five EU countries on scale economies, intermediate good intensity and factor intensity in order to find the determinants of location and finds that the factors of New Trade Theory and New Economic Theory explain the patterns while the factors of Neo Classical Theory don't. Haaland et al.(1999) confirm that one of the most important determinants of the geography of Europe is intra industry linkages and the magnitude of the impact of linkages has increased between 1985 and 1992 which can be explained in accordance with New Economic Geography predictions, although Heskher- Ohlin and Ricardo's theories are still relevant and scale economies proxy has a negative impact on concentration.

Following the same method and similar proxies Paluzie et al. (2001) finds that the most important determinant of Spain's economic geography is scale economies and inter industry linkages have a negative effect on concentration whereas Akgüngör and Falcıoğlu (2005) find that a significant determinant of the

economic geography of Turkey is the presence of backward and forward linkages between firms within the manufacturing sector supporting the predictions of New Trade Theory and New Economic Geography.

Some of the empirical studies measure the individual effect of economic integration on factors determining location (Brülhart, 2001a, 2006, Haaland et al., 1999, Forslid et al., 2002). Haaland et al. finds that scale economies have a significant negative impact in 1992 with non-tariff barriers. Brülhart (2001a) finds no evidence that concentration accelerated after the implementation of the Single program in 1986. Forslid et al.(2002) simulates the effects of trade liberalization on the location and concentration of manufacturing industries using a large scale CGE model. Results show that locational effects of economic integration are highly region and sector specific, with some sectors being driven primarily by comparative advantage and others by agglomeration forces associated with scale economies and input output linkages. However, on overall terms, the manufacturing sector displays the inverse U-shaped relationship between trade liberalization and agglomeration as predicted by Krugman (1991a). Forslid et al.(2002) also speculates on where Europe could be placed on Krugman's U shaped curve. The results indicate that manufacturing industries with high degrees of economies of scale are close to the peak of concentration while industries more affected by comparative advantage may continue to concentrate.

Empirical support for New Economic Geography theory can be found in studies that examine the relationship between agglomerations and linkages. Davis and Weinstein (1999) examine the contribution of regional demand linkages to spatial agglomeration. They find that there is an excess concentration of production in regions where the demand for a good is relatively high. Such an effect could work through consumer markets –with firms concentrating production near large sources of final demand as in Krugman (1980) or through markets for intermediate inputs- with firms concentrating near their buyers or suppliers, as in Venables (1996). Stronger linkages tie firms tightly to existing agglomerations

whereas weakly linked industries are the first to relocate in response to cost differentials since they benefit less from being close to other industries. Davis and Weinstein (1999) find that the predictions of New Economic Geography theory are not significant for the least skill intensive aggregates for Japanese regions, however they are significant for more skill intensive aggregates. Whereas disaggregated estimation results show that economic geography effects are significant for eight of nineteen industries: transportation equipment, iron and steel, electrical machinery, chemicals, precision instruments, nonferrous metals, textiles and paper and pulp. With the exception of textiles and paper and pulp remaining industries are higher technology industries. Hanson (1998), also found that regional demand linkages contribute to spatial agglomeration.

Another finding on the relation between industrial agglomerations and linkages is that upstream industries face higher costs of market access when they move away from an existing industrial agglomeration but are not heavily dependent on proximity of suppliers of intermediate inputs. Thus upstream industries tend to leave early and have a significant effect in pulling downstream industries along (Puga, Venables , 1996).

Examining the existing empirical literature Brülhart (2001a) concludes that although most of the empirical studies present evidence of increasing specialization and concentration in EU countries over recent decades, it cannot be said that there is a comprehensive and consistent description of specialization and concentration patterns and trends in the EU. On the overall the existing empirical evidence for European countries seem to suggest that EU countries are slowly becoming more specialized (Helpman and Overman, 2004) and that specialization may increase rather than decrease (Krieger-Boden,2000). Helpman and Overman (2004) conclude that most empirical studies find that high-tech, increasing returns to scale activities are more spatially concentrated but results are less clear on resource intensive industries and activities that have strong linkages with other sectors. Head and Mayer (2004) accept that in the empirical literature economic

activity concentrates spatially but they do not interpret this increase in agglomeration as confirmation of the theories that were constructed to explain the phenomenon whereas Brakman et.al. (2005) indicates that the empirical support for the New Economic Geography Theory is growing.

Table 2.2 : Empirical Literature on Regional Specialization and Geographic Concentration Patterns in the Context of Integration

Author,year	Variable	Indicator	Spec./Conc.	Time	Country/ Region / Industry	Results
Amiti,1999	Employment Employment	Gini Gini	Regional Spec. Geo.Conc.	1968-1990 1968-1990	10 eu member 3 digit NACE industries.	Increasing in 6 countries out of 10. Increasing in 17 sectors out of 27.
Aiginger and Rossi-Hansberg,2003	Value Added Value Added	Gini Gini	Regional Spec. Geo.Conc.	1987-1996 1987-1997	10 industries in 50 US states & 23 industries in 14 EU member countries	Increase in regional sp.both in US and EU decrease in geographical conc.both in US and EU
Aiginger,Davies,2004	Value Added Value Added	Entropy Entropy	Regional Spec. Geo.Conc.	1985-1998 1985-1998	14 EU member 3 digit 99 NACE industries	increase in specialization decrease in concentration
Aiginger,Pfaffer.,2004	Value Added	Herf., Entropy	Geo.Conc.	1985-1998	99 industries accross 14 eu member	decreasing during the post-single market period.
Akgüngör, Falcioğlu,2005	Employment Employment	Gini Gini	Regional Spec. Geo.Conc.	1992-2001 1992-2001	26 Nuts2 regions in Turkey ISIC rev3 ind.	increase in regional specialization no evidence of increase in geog.conc.
Brühlhart,1998	Employment	Gini	Geo.Conc.	1980-1990	18 man.ind.across 11 EU member	Increasing in 14 sectors out of 18.
Brühlhart,2001	Emp.and expo	Gini	Geo.Conc.	1972-1996	32 ISIC ind.across 13 eu member	increasing in employment/ decreasing in exports
Brühlhart,Traeger, 2005	Employment	Entropy	Geo.Conc.	1975-2000	236 NUTS2 regions of 17 EU country	Increasing esp.in low tech ind.
Dalum et al.,1998	Exports Exports	st.dev.of export sp.rates	Regional Spec. Geo.Conc.	1956-1992 1956-1992	20 oecd member 60 industries	decreasing in 16 out of 20 countries decreasing in 55 out of 60 sectors
Krieger-Boden,2002	Employment Employment	Herfindahl Herfindahl	Regional Spec. Regional Spec.	1973-1996 1981-1992	21 France regions 35 sectors 18 Spain regions 80 sectors	moderate increase in total,Increase in South regions. moderate increase in total,Increase in South regions.
Krugman,1991	Employment	Gini	Regional Spec.	1947-1985	4 US regions, 4 EU member.	decreasing in US regions
Lubenets et.al.2001	Employment	Herf.,Krugman,	Regional Spec.	1990-2000	5 regions of Estonia (Nuts3)	increasing yearly on average of 2-5%.
Paluzie et al., 2001	Employment Employment	Gini Gini	Regional Spec. Geo.Conc.	1979-1992 1979-1992	50 Spanish provinces 30 industries.	Slight increase in 16 provinces out of 50. Slight increase in 13 sector out of 30.
Suedekum,2006	Employment Employment	Krugman index Gini	Regional Spec. Geo.Conc.	1993-2001 1993-2001	439 nuts3, 40 nuts2 regions in Germany 15 man.ind.	Decrease in regional sp. Decrease in Industrial conc.
Traistaru et.al.,2003	Employment Employment	Krugman index Krugman index	Regional Spec. Geo.Conc.	1990-1999 1990-1999	Nuts3 regions of 5 eu accession countries Nace rev 1 industries.	Increase in Bulgaria,Romania, decrease in Estonia. Slight increase.

Source: Compiled by the author.

CHAPTER 3

CONCEPTUAL FRAMEWORK

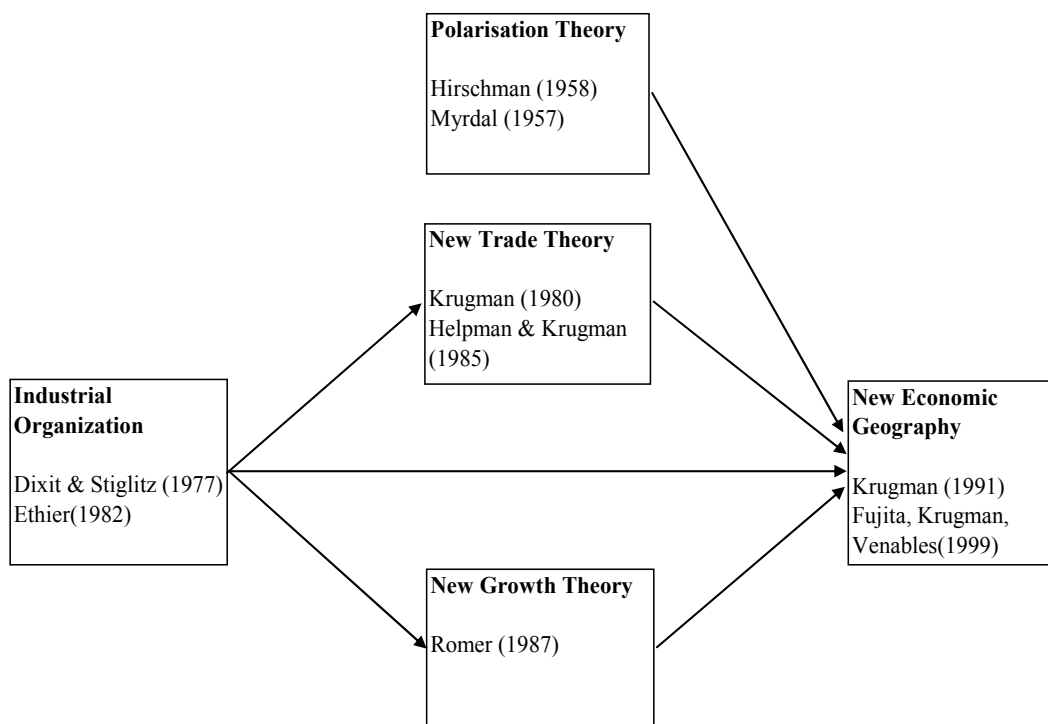
The purpose of this chapter is to construct a conceptual model for Turkey in order to analyze the spatial concentration patterns of Turkish manufacturing industry during the integration period of Turkey based on the assumptions and predictions of New Economic Geography Theory and to see how applicable this theory is to Turkey. First, basic assumptions and propositions of the New Economic Geography Theory are given and the relation of the theory with the research questions is stated. Secondly, hypothesis are developed parallel with the research questions. Then the conceptual model developed for Turkey is presented. In delimiting the framework of the conceptual model the theory that follows the approach put forward in Krugman's (1991a) book and his article in Journal of Political Economy (1991b)¹⁶ is referred to.

3.1 New Economic Geography Theory

New Economic Geography Theory has emerged in the beginning of the 90s in order to model location forces based on the relation between market forces and distances in space. Many of the New Economic Geography ideas have been around for a long time in the works of economic geographers, location, trade and growth theorists but New Economic Geography has the fundamental merit of having framed those ideas within a general equilibrium model encompassing most of these ideas and bringing a more geographically and

¹⁶ A Web of Science search shows that these two works received a combined total of over 1000 journal citations (Head and Mayer, 2004).

historically context sensitive explanation (Ottaviano, Thisse, 2004; Brakman and Garretsen, 2003; Meardon, 2001, Phelps, 2004). Indeed Ottaviano and Thisse (2004, p.2576) use the phrase “ to combine old ingredients through a new recipe” for New Economic Geography. New Economic Geography theory has been built on various theories most of which have been explained in Chapter 2. Figure 3.1. adapted from Lehner and Maier (2001) gives a brief summary of the historical evolution of New Economic Geography theory.



Source : Adapted from Lehner and Maier (2001)

Figure 3.1 : Historical Evolution of New Economic Geography Theory

3.1.1 Main Assumptions of New Economic Geography Theory

Five essential ingredients distinguish New Economic Geography models from other approaches in understanding the geography of economic activity (Head and Mayer, 2004).

1. Increasing returns to scale
2. Imperfect Competition
3. Trade costs
4. Endogenous firm locations
5. Endogenous location of demand
 - a. Mobile workers who consume where they work
 - b. Firms that require the outputs of their sector as intermediate inputs.

The first four ingredients have appeared first in the New Trade literature. With these assumptions agglomeration can arise but only through the magnification of initial region size asymmetries. What differentiates New Economic Geography and what it contributes to the literature is the fifth assumption. With all five assumptions initial symmetry can be broken and agglomerations can form through a process of circular causation. Producers and consumers co-locate to exploit plant level scale economies while minimizing trade costs therefore New Economic Geography focuses on the impact of forward and backward trade linkages on observed spatial concentration of economic activity. The theory predicts that geographic concentration of industries arise because of self-reinforcing backward and forward linkages. The self-reinforcing or circular causation process is at the heart of the subject and it differentiates the New Economic Geography theory from the straight line chain of causes-and-effects usually presented in economics (Baldwin and Wyplosz, 2004). As downstream firms move to a location they enlarge the market for upstream

firms and as upstream firms move they increase the supply and lower the price of intermediate goods. This interaction can create cumulative causation and clustering of linked industrial activities in a location (Venables, 1996).

As stated in the fifth assumption the core New Economic Geography theory models the cumulative causation process in such a way that the model includes location decisions of mobile factors of production (Krugman (1991), Fujita, Krugman and Venables (1999)). In Krugman (1991a) and related work, agglomeration occurs because firms benefit from being near large consumer and industrial markets. If productive forces can move across borders and trade is not costless a combination of scale economies and trade costs generates agglomeration forces that encourage geographic clustering of economic activity. In addition to the predictions of the New Trade Theory, positive externalities are created by synergies across the economic units (consumer, supplier, firm, institutions) so as a result of forward and backward linkages firms tend to cluster in the same geography.

3.1.2 Propositions of the New Economic Geography Theory

A review of the empirics of agglomeration and trade by Head and Mayer (2004) is organized around four propositions that emerge from the New Economic Geography models.

1. Trade induces agglomeration – In an industry featuring increasing returns and partially mobile demand, a reduction in trade costs facilitates spatial concentration of producers and consumers which means that integration is expected to increase agglomeration.

2. Market potential attracts factor inflows – Capital will be drawn to areas with good access to major markets for final goods and major suppliers of intermediate inputs (backward linkages). Workers favor locations with good access to suppliers of final goods (forward linkages).
3. Market potential raises local factor prices – A location whose access to major markets and suppliers is not impeded by large trade costs, will tend to reward its factors with higher wages and land rentals.
4. Home market / Magnification effect- Regions with large demand for increasing returns industries account for an even larger share of their production.

The conceptual model of this research is developed based on the first two propositions which focus mainly on the effects of integration on spatial concentration and reasons of agglomeration. In the next section the relation between the research questions mentioned in section 1.3 and the theoretical framework will be examined.

3.1.3 The Relation Between Research Objectives of the Study and the Theoretical Framework

Parallel with the theory, one of the main objectives of this research as stated in the first research question is to understand whether the integration process with the EU caused spatial concentration patterns of Turkish manufacturing industry to change. Firstly it should be questioned if Turkish regions have become more specialized and Turkish industries have become more concentrated during the integration period. According to the New Geographical Economy Theory, regions will become more concentrated and industries will become more concentrated due to integration. The integration process is expected to increase trade by setting the

forces of economies of scale free and lowering transport costs. Krugman (1991a) shows that the interaction of labor migration across regions with increasing returns and decreasing trade costs creates a tendency for firms and workers to agglomerate together and transact more as regions integrate.

One of the main objectives of this research as stated in the second research question is to understand the determinants of agglomeration in Turkey. New Economic Geography focuses on forward and backward trade linkages as causes of observed spatial concentration of economic activity and the hypothesis of New Economic Geography is that as the existence of horizontal and vertical linkages increase between the firms across the regions, industrial concentration increases.

The pattern of change in concentration patterns of Turkish manufacturing industry is also questioned for Turkey in line with the theory. Concerning the change in regional specialization pattern of different regions theory suggests that integration process results in the emergence of both highly specialized core and periphery regions (Krugman, 1991a). Concerning the change in geographical concentration, theory suggests that as the degree of integration increases integration favors a re-dispersion of some industrial activity towards the periphery. Integration causes the economic geography of the integration area to result in a core periphery system where the core gets specialized in increasing returns to scale industries and the periphery mainly in industries with constant returns, perfect competition, and a low income potential.

Moreover, the pattern of supply and demand side transactions across the industries which cause the related industries to form agglomerations of industries in Turkish manufacturing industry is questioned parallel with the theory. Integration is expected to increase trade and trade can be denoted by the number of transactions in the industry for those regions according to New Economic Geography. Much of the demand for firms' output comes not from final consumers but from other firms that purchase intermediate goods and services. The combination of the

backward and forward linkages creates the possibility of a clustering of vertically related industries (Amiti, 1998) and appropriate key industries for regions / countries could be identified by examining input-output tables (Krugman , 1995). Therefore the theory predicts the pattern of supply and demand side transactions across the industries to cause the related industries to form agglomerations of industries. The theory also predicts that the locational pattern of identified agglomerations of industries change on the geographical scale in the integration period. In the integration period cost and demand linkages become dominant and industries that are characterized by linkages are pulled towards a core (Ottaviano, Puga ,1997).

In order to test the two research questions that have been derived from the theory, questions are translated into two hypothesis for Turkey which will be presented in the next section.

3.2 Hypotheses

Based on the predictions of New Economic Geography Theory it can be expected that as trade liberalization in 1980 and customs union agreement in 1996 reduced barriers to trade, regional specialization and geographical concentration in Turkish manufacturing increases. Based on the predictions of the New Economic Geography Theory linkages are significant factors of geographical concentration of the Turkish manufacturing industry. Following the predictions of New Economic Geography theory we propose the hypotheses below:

Hypothesis 1: Economic integration with the EU caused regions in Turkey to become more specialized and industries in Turkey to become more concentrated.

Hypothesis 2: The pattern of geographical concentration of Turkish manufacturing industry is significantly determined by the existence of supply and demand linkages.

3.3 Conceptual Model of the Research

The model of this research is constructed from explanatory variables that proxy for factors that are responsible for differences in geographical concentration according to the explanations of different theories mostly following the studies of Haaland (1999) and Paluzie, Pols and Tirado (2001).

3.3.1 Dependent Variable

The degree of geographical concentration of industries in Turkey is the dependent variable measured as the Gini index of geographical concentration of Turkish industries.

3.3.2 Independent Variables

Independent variables in the regression equation test the two hypotheses that are predicted by the New Economic Geography Theory. In Hypothesis 1, economic integration process is measured by a dummy variable which takes the value of 1 after 1996 and 0 otherwise. In Hypothesis 2, the degree of linkages are defined by the independent variable “intermediate consumption per production” because New Economic geography literature points out the importance of local markets and horizontal and vertical production relations between firms. If an industry is characterized by extensive input-output linkages a firm will be able to reduce its costs by locating together with other firms within the industry.

3.3.3 Control Variables

As pointed out in Chapter 2, in explaining differences in the degree of geographical concentration across industries, Neo Classical Theory, New Trade Theory offer distinct predictions about what characterizes the concentrated industries. Control variables are derived from these theories which offer different explanations than the New Economic Geography Theory.

Labor Productivity: Differences in technology are reflected by differences in labor productivity which are defined with the control variable “value added per employee”. (Haaland, 1999; Paluzie, Pols and Tirado, 2001). According to Ricardo, regional specialization of industry is directly related with the concentration of production factors and technological accumulation in the region. Therefore, differences in technology between regions may give rise to comparative advantages and hence specialization.

Labor Usage: In order to capture how ”Heschker-Ohlin” effects may explain sectoral variation in the degree of concentration, the control variable “labor usage” is used. Following Paluzie, Pols and Tirado (2001), we define labor usage as labor costs divided by value added at factor cost. According to Heschker-Ohlin theory given that relative factor endowments differ across regions, differing factor intensities across industries may induce regional specialization and geographical concentration of industries. Assuming that factor endowments are distributed , the more intensive an industry is in the use of a certain factor the more concentrated would we presume the industry to be. Regions where capital is abundant specialize on capital based products while regions where labor is abundant specialize on labor based products.

Firm Size: New trade theory predicts that a demand bias in favor of a particular good creates a large home market for this good and scale economies.

The theory predicts that scale economies cause firms to cluster in certain regions and the variable that explains the characteristic for this theory is “average firm size” .

In a brief summary as presented in Figure 3.2, variables that measure characteristics of the industries according to alternative theories are:

- The Ricardian approach : value added per employee. (value added /number of employee)
- Heckscher-Ohlin approach : labor usage (labor cost/value added)
- New External Trade theory: average firm size (employment/number of firms)
- New Economic Geography theory: intermediate consumption per production ((production - value added)/production)

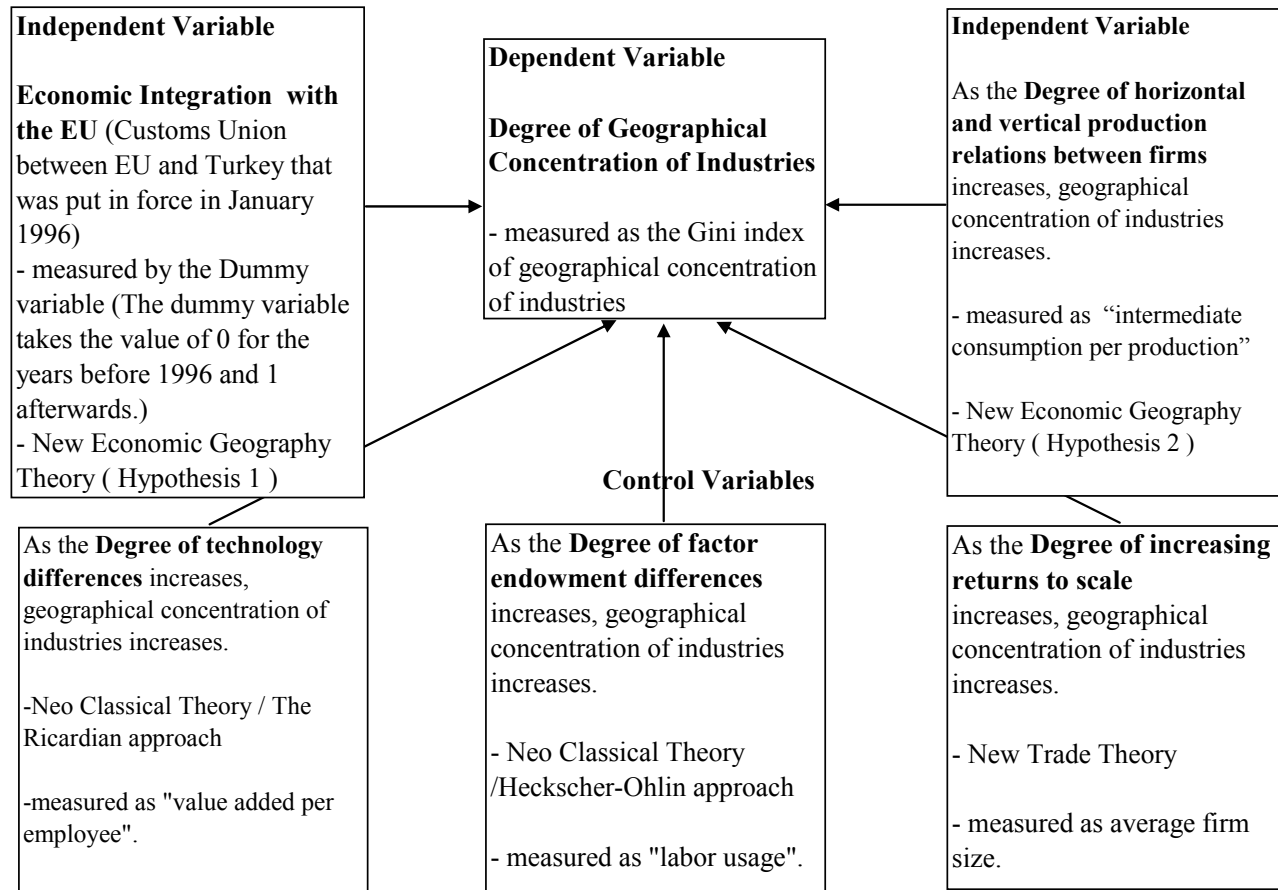


Figure 3.2: Conceptual Model of the Research

CHAPTER 4

METHOD

4.1. Data

4.1.1 Sources of Data

This study makes use of secondary data. The data consists of the 1980-2001 annual manufacturing industry survey data compiled by State Institute of Statistics of Turkey. The data covers ISIC Rev2 classification system at the 4-digit level. In order to be able to conduct a study on data that covers a longer time period, a previous version of the ISIC classification system (ISIC Rev2) has to be used instead of the latest revision (ISIC Rev3).

The annual manufacturing industry surveys cover a wide range of data of manufacturing industry. The patterns of regional specialization and geographical concentration were analyzed on the basis of employment data. The data is subject to statistical secrecy and consequently no data are available for sectors with fewer than ten firms in a region.

In order to identify agglomerations of industries within Turkey, Input-Output tables are obtained from the State Institute of Statistics. The latest available I-O table of the Turkish industry is for the year 1998. 1998 I-O table is the first table at basic prices prepared according to the concepts and definitions of the 1995 European System of Accounts (ESA'95). The data includes value of purchases

and sales of intermediate inputs among 97 industries. Out of the 97 industries 7 are agricultural, 4 are mining, 58 are manufacturing and energy, 1 is construction and 24 are service industries.

4.1.2 Time Period

In this research, the period that covers the integration process of Turkey starts with efforts to integrate with the world markets. The milestones of this period are trade liberalization in 1980 and the Customs Union Agreement in 1996. The data covers the years between 1980 and 2001. Concentration indexes are calculated at 5 year intervals from 1980 to 1995 and then for 2001. 2001 data is the latest period available and starting from 2002 data will be prepared according to the NACE classification system by the State Institute of Statistics of Turkey due to adaptability efforts with the EU statistics system.

4.1.3 Regional Classification System

The level that will construct the basis of this research is the agglomeration of specialized industrial activity at the regional level. The annual manufacturing industry surveys are prepared at the city level therefore data is arranged for NUTS 2 regions which corresponds to 26 regions for Turkey. NUTS (Nomenclature of Territorial Units for Statistics) is the administrative classification of the European Union as defined by the Statistical Office of the European Union. The NUTS classification is hierarchical in that it subdivides each Member State into three levels; running from NUTS0 (Member States) to NUTS3 (sub provincial regions). NUTS2 which is the level set as the base in this research, defines a geographical area having minimum 800.000, maximum 3 million of population for which an administrative authority has power to take administrative or policy decisions in accordance with the legal and institutional framework of the Member State.

The reason behind the choice of this regional classification level is that this level suits best to the examination purposes of this research. In the literature the

geographical scope of New Economic Geography is by and large restricted to sets of NUTS2 and NUTS3 (Brakman et al., 2005). Moreover, the European Commission uses specific regional units as targets for the convergence process and has defined NUTS2 as the geographical level at which the persistence or disappearance of unacceptable inequalities should be measured (Boldrin and Canova, 2001). Furthermore, in setting criteria for regional policies the EU has mostly adopted the 211 NUTS2 regions of the EU as the appropriate territorial unit (Boldrin and Canova, 2001).

4.2 Methodology

4.2.1. Methods to Determine Concentration Indexes

In order to answer the first research question concentration indexes are calculated and compared for the years between 1980 and 2001. In this research concentration is studied from two perspectives; the concentration of industries and the specialization of regions. *Regional specialization* is defined as the distribution of the shares of an industry i in total manufacturing in a specific region j compared to a norm. Istanbul region is said to be specialized in the textile industry if this industry has a high share in the employment of manufacturing of Istanbul region. The production structure of a region is called “highly specialized” if a small number of industries are responsible for a large share of the production. This interpretation can be applied to many variables such as value added, production, exports, trade, employment etc. *Geographical concentration* is defined as the distribution of the shares of the regions in an individual industry i compared to a benchmark distribution. A specific industry i is said to be concentrated if a large part of production is carried out in a small number of regions. The tobacco industry is said to be concentrated if a large part of production/ employment/ trade/ exports is carried out in a few regions.

There are several measures of specialization and concentration proposed in the literature, each having certain advantages as well as shortcomings. Most commonly used measures in the existing literature are the Herfindahl Index,

Krugman Index and the locational Gini Index. Since the Herfindhal index is biased towards the largest regions share (Aiginger, 1999; Traistaru, Aira, 2002) due to the fact that this will cause the Turkish results to be affected by the large size of İstanbul region, in this analysis Gini coefficient of Regional Specialization and Gini Coefficient of Geographical Concentration have been selected as the measure of concentration. The standard form of calculation of Gini index was used as the basis for Krugman's (1991) coefficient. Gini coefficient overcomes a number of shortcomings of the other indexes and is the most widely used index in the analysis of regional patterns which makes it easier to make comparisons with the existing literature.

In this research the main focus is on the distribution of total economic activity which makes it appropriate to use "relative" type of concentration and specialization indexes (Traistaru I., A.Iara, 2002). Relative concentration is about whether regions tend to account for a large share of economic activity of an industry relative to their average share in all other industries. Relative specialization is about whether industries tend to account for a large share in the economic activity of a region relative to their average share in all other regions (Brakman et al., 2005). However, it should be taken into consideration that taking relative measures rather than absolute measures highlights the role of small regions, firstly since it eliminates the bias in size and secondly since small regions often get a very large share in an industry relative to its size.

Gini Coefficient of Regional Specialization is a coefficient which is calculated for each region, the higher the index the more specialized the region. Gini Coefficient of Geographical Concentration of Industries is a coefficient which is calculated for each industry, the higher the index the greater the geographical concentration of the industry. GINI index takes values between zero and one, values close to zero indicate low specialization, and close to one, high specialization. GINI indexes of employment are calculated and compared for the years 1980, 1985, 1990, 1995 and 2001. Industrial concentration and regional specialization are measured by GINI index as demonstrated below:

GINI Index for regional specialization:

$$GINI_j^s = \left(\frac{2}{n^2\bar{R}}\right) \left[\sum_{i=1}^n \lambda_i |R_i - \bar{R}| \right]$$

$$R_i = \frac{s_{ij}^s}{s_i}; \bar{R} = \frac{1}{n} \sum_{i=1}^n R_i; s_{ij}^s = \text{share of industry } i \text{ in region } j \text{ takes place in total}$$

employment of region j, s_i = share of employment in industry i takes place in total employment. n: number of regions.

λ_i indicates the position of the industry i in the ranking of R_i in descending order.

GINI Index for geographical concentration:

$$GINI_i^c = \frac{2}{m^2\bar{C}} \left[\sum_{j=1}^m \lambda_j |C_j - \bar{C}| \right]$$

$$C_j = \frac{s_{ij}^c}{s_j}; \bar{C} = \frac{1}{m} \sum_{j=1}^m C_j; s_{ij}^c = \text{share of industry } i \text{ in region } j \text{ takes place in total}$$

employment of i, s_j = share of employment of j region takes place in total employment. m: number of industries.

4.2.2. Econometric Analysis

In order to test Hypothesis 1 and 2 and explore the determinants of geographical concentration of industries, a panel model is estimated where the dependent variable is GINI concentration index and the independent and control variables are the variables that represent determinants of geographical concentration derived from different theories. A fixed effect panel model is estimated for the years 1980, 1985, 1990, 1995 and 2001. The 83 cross sectional units are represented by the four-digit ISIC Rev2 industries for the overall manufacturing industry.

For the choice between linear and nonlinear specifications likelihood ratio (LR) test is applied and the hypothesis that the linear model is a more effective

predictor than the log linear model is rejected. Since the model employs cross sectional data, heteroskedasticity test is applied and the standard deviation of the forecasted coefficients is corrected using the method developed by White. It has also been tested whether there is intercorrelation among the independent variables and it has been found that there is no multicollinearity.

Hypothesis 1 derived from the first research question tests the effect of economic integration (independent variable) on geographical concentration (dependent variable). In order to explore the effect of economic integration on the pattern of geographical concentration of Turkish manufacturing industry a dummy variable is used in the econometric model. Since economic integration is defined as the Customs Union between EU and Turkey that was put in force in January 1996 the dummy variable takes the value of 0 for the years before 1996 and 1 afterwards (0 for the years 1980, 1985, 1990, 1995; and 1 for 2001). We expect that the coefficient estimate of the dummy variable is positive and significant.

Hypothesis 2 derived from the second research question tests whether linkages (independent variable) are significant determinants of geographical concentration (dependent variable). As explained previously, there are four main explanations that focus on what determines geographical concentration of industries¹⁷; the Ricardian approach, Heckscher-Ohlin approach, New Trade Theory and New Economic Geography Theory. According to the first explanation regional specialization of industry is directly related with the concentration of production factors and technological accumulation in the region (Ricardo's approach). In the model, the variable TF measures the technological differences of industry groups across the regions, letting differences in technology reflected by differences in labor productivity defined as value added per employee (Haaland, 1999; Paluzie, Pons and Tirado, 2001). In the equation, VA_{ij} measures value added of industry i at region j , E_{ij} measures employment of industry i at region j , c denotes number of regions and n denotes number of industries. Hence the more significant the regional differences in relative productivity the higher the value of TF.

¹⁷ The following variables and arguments follow closely those developed in Haaland et.al. (1999) and Paluzie, Pons and Tirado (2001).

$$TF_i = \sqrt{\frac{1}{n} \sum_j \left[\frac{\frac{VA_{ij}}{E_{ij}}}{\frac{1}{c} \sum_j \frac{VA_{ij}}{E_{ij}}} - \frac{\sum_i \frac{VA_{ij}}{E_{ij}}}{\frac{1}{c} \sum_j \sum_i \frac{VA_{ij}}{E_{ij}}} \right]^2}$$

According to Heckscher-Ohlin theory, regions where capital is abundant specialize on capital based products while regions where labor is abundant specialize on labor based products. Following Paluzie, Pons and Tirado (2001), we measure the labor intensity of the HO variable as shown below. HO is defined as labor costs divided by value added at factor cost. A high value of HO coefficient developed by Amiti (1999) means that the labor use in the industry deviates from the average. We expect that those industries which differ substantially from the mean are most geographically concentrated. If LC_{ij} denotes labor cost of industry i at region j , VA_{ij} denotes value added of industry i at region j , the index that measures differences in labor use across industries is defined as follows:

$$HO_i = \left[\frac{\sum_j LC_{ij}}{\sum_j VA_{ij}} - \frac{\sum_j \sum_i LC_{ij}}{\sum_j \sum_i VA_{ij}} \right]^2$$

New Trade Theory predicts that a demand bias in favor of a particular good creates a large home market for this good and scale economies. The theory predicts that scale economies cause firms to cluster in certain regions and the more important scale economies in an industry the higher degree of concentration is seen in that industry. The proxy is measured by the SCALE variable, where E_{ij} denotes employment of industry i at region j and NF_{ij} denotes number of firms in industry i at region j .

Although average firm size does not assess the ability of a firm to exploit market power, it is expected that industries subject to high scale economies to be more geographically concentrated because this kind of industry needs fewer plants to satisfy (Paluzie, Pons, Tirado, 2001). Amiti (1997) uses average firm size as a

proxy for scale economies, Brülhart and Torstensson (1996) use engineering estimates of minimum efficient scale in order to capture the content of the new trade theory. Haaland et al. (1999) choose an expenditure index which measures the distribution of demand across countries.

$$SCALE_i = \frac{\sum_j E_{ij}}{\sum_j NF_{ij}}$$

Finally, New Economic Geography Theory points out the importance of local markets and horizontal and vertical production relations between firms. If vertical integration between firms is higher in an industry, that industry will tend to concentrate in one area. The EG coefficient developed with this purpose is defined as below, where X_{ij} denotes output of industry i at region j and VA_{ij} denotes value added of industry i at region j . High value of EG index means that vertical integration is also high for the mentioned industry. As mentioned in the study of Paluzie, Pons, Tirado (2001) this measure of vertical linkage makes the variable more like a measure of diversity because it includes a wide range of products while economic geography models only refer to manufactured intermediate goods. In Haaland et al. (1999) based on the idea that the extend to which an industry uses its own products as intermediates affects the degree to which it is concentrated, the rate of input from own industry to output of the industry has been used a proxy. The input output table used in the study offers this kind of data (tables are provided by EUROSTAT) whereas I-O table of the Turkish manufacturing industry does not.

$$EG_i = \frac{\sum_j (X_{ij} - VA_{ij})}{\sum_j X_{ij}}$$

If Hypothesis 2 is true we expect that the coefficient estimate associated with the EG variable is positive and significant. The equation employed (the log

transformations of the equation are used) to explain geographical concentration of industries takes the following form:

$$\text{Gini}_i^c = \beta_1 + \beta_2 \text{TF}_i + \beta_3 \text{EG}_i + \beta_4 \text{HO}_i + \beta_5 \text{SCALE}_i + \beta_6 \text{DUMMY}_i + u_i$$

(Equation 1)

4.2.3. Methods to Determine Spatial Concentration Patterns

4.2.3.1. Location Quotients

In order to explore the change on the locational pattern of industries on geographical scale, location quotients are calculated and compared for the years 1980 and 2001. To identify whether a core periphery pattern exists and find if manufacturing activities are concentrated in certain regions across the nation and elaborate on changes in the locations of industries, regional highpoint industries are found for all regions using location quotients. Location quotient is a measure of the industry's concentration in an area relative to the rest of the nation which is formulated as;

$$\text{LQ} = \left[\frac{\text{Industry's local employment}}{\text{Total local employment}} \right] / \left[\frac{\text{Industry's national employment}}{\text{Total national employment}} \right].$$

A location quotient greater than 1 means that the industry employs a greater share of the local workforce than it does nationally. LQ value greater than 1.25 is considered to be an initial evidence of regional specialization.

4.2.3.2. Input Output and Factor Analysis

In order to explore whether the pattern of supply and demand side transactions across the industries cause the related industries to form agglomerations of industries in Turkey, input-output and factor analysis are conducted. The quantitative approach towards identifying agglomerations of industries is generally regarded as a critical component of the analysis. The most commonly

used quantitative techniques in identifying agglomerations are location quotients and input-output analyses. (Rosenfeld, 1997) These types of quantitative analyses provide an initial tool for identifying potential agglomerations of industries and indicate the relative presence of different industries in the local region¹⁸.

There are varieties of tools that are available to identify and analyze industry clusters, from simple measures of specializations to input-output based methodologies. Methods are typically based on identification of key industries in regions through use of simple measures of specialization, particularly based on employment data, depicting percentage distribution of employment across industries and location quotients. Such methods that specifically focus on identifying regional key industries through the use of employment data say little about inter-industry trading patterns which makes it difficult to make generalizations on transactions across industry groups (Akgüngör , 2006).

One of the most common approaches for identification of agglomerations is based on quantitative techniques, such as input-output analyses. (Rosenfeld, 1997) These tools help identify relative concentrations of industries in the region, as well as identify the buyer-seller linkages in different industry sectors. I-O methodology has long been used by regional scientists for sorting industries into groups, using graph theory, triangulation and factor/principle component analysis (Czamanski and Ablas, 1979). Roberts (1992) and Abbott and Andrews (1990) use cluster analysis to combine sectors into groups that share the same

¹⁸ Clustering of vertically related industries is named as “agglomerations of industries” in this research. The distinction between the concept of cluster and the concept of agglomeration needs to be emphasized because to understand what differentiates clusters from agglomerations helps to explain the differing arguments regarding the methodology to identify each. In order to identify clusters, their ability to cooperate needs to be examined. Quantitative analyses used in this research do not address whether the fore mentioned trust-relationships, which are supposed to exist in clusters really exist between firms and they do not account for other factors beyond the product-market relationships, such as industry collaboration and information flow (Doeringer and Terkla, 1995). Therefore it can be said that it is necessary to conduct qualitative analyses in addition to the quantitative analysis in order to truly identify industry clusters.

production technologies (Bergman and Feser, 2002). Feser and Bergman (2000)¹⁹ employ the US input-output (I-O) table and determine the inter-industry purchase relations.

Following the method proposed by Feser and Bergman (2000), this study uses sale and purchase data from the Turkish 1998 I-O table. The Turkish 1998 I-O table gives the value of goods and services sold by the row industry to the column industry. Using the table, intermediate good purchases and sales are calculated as a percentage of total good purchases and sales (Matrix X and Matrix Y). The x and y coefficients that make up matrices X and Y are derived as follows:

$$\chi_{ij} = \frac{a_{ij}}{p_j}, \quad \chi_{ji} = \frac{a_{ji}}{p_i}, \quad Y_{ij} = \frac{a_{ij}}{s_i}, \quad Y_{ij} = \frac{a_{ji}}{s_j}$$

where a_{ij} (a_{ji}), represents value of goods and services sold by row industry i (j), to column industry j (i). p and s stand for total intermediate purchases and sales, respectively. These matrices were derived to obtain information of dependence between industries in terms of relative purchasing and sales links.

For example, a large value in X, χ_{ij} , means that industry j depends on industry i as a source. On the other hand a large value in Y, Y_{ij} , means that industry i depends on industry j as a market. This dependence information provides a ground for a correlation analysis to set out linkages between pair of industries. Each column in X matrix represents the intermediate input purchasing pattern of the column industry and the sum of the columns should add to unity. Similarly, each row in Y matrix shows the intermediate output selling pattern of the row industry and the sum of each row should also add to unity.

¹⁹ For a detailed description of the method, see, Feser and Bergman (2000). The following paragraphs that describe Feser and Bergman's methodology draws extensively from Akgüngör, Kumral and Lenger (2003) and Akgüngör (2006).

Four matrices are calculated using the matrices X and Y. Elements of the first matrix (X correlation matrix) are the correlations between the columns of matrix X. This resulting matrix gives the degree to which pair of industries has a similar input-purchasing pattern. Elements of the second matrix (Y correlation matrix) are the correlations between the columns of matrix Y. Matrix Y represent the degree to which pair of industries have similar output selling patterns. The third matrix shows the degree to which the buying pattern of an industry is similar to the selling pattern of the other industries (X-Y correlation matrix). Elements of the X-Y correlation matrix are the correlations between the columns of matrix X and matrix Y. The elements of the fourth matrix (Y-X correlation matrix) are the correlations between the columns of matrix Y and matrix X. X-Y correlation matrix gives us the degree to which the selling pattern of an industry is similar to the buying pattern of other industries (Feser and Bergman, 2000).

Finally, the largest values of each cell are selected among the four correlation matrices defined above and a symmetric matrix is constructed (matrix Lv). The columns of the Lv symmetric matrix describe the pattern of relative linkage between the column industry and all other industries. To cluster industries with similar selling and purchasing patterns, the Lv matrix is used for principal component factor analysis with orthogonal rotation²⁰.

The relative linkage between a given industry and the derived factor can be measured by the generated set of loadings. Following Feser and Bergman (2000) industries with loading 0.60 or higher, on a given cluster can be viewed as strongly linked to that cluster (primary industries), whereas industries with loading 0.35 and 0.60 are accepted as moderately and weakly linked (secondary industries).

²⁰ Through rotation, the factor matrix is transformed into a simpler and easily understood matrix. A rotation, which requires the factors remain uncorrelated, is an orthogonal rotation while others are oblique rotation. The correlation coefficients of the factors identified in the rotated component matrix are low, implying that the factors are not correlated. We therefore use an orthogonal rotation and do not impose a restriction to the analysis to assume that the resulting clusters are correlated.

CHAPTER 5

EMPIRICAL FINDINGS

5.1. Regional Specialization and Geographical Concentration in Turkey

5.1.1. Change in the Level of Regional Specialization

As supported by Hypothesis 1, results show that the average value (arithmetic mean) of GINI coefficient of regional specialization has increased from 0,737 to 0,748 between 1980 and 2001 (Table 5.1). Although room for further specialization in Turkey is limited, the increase in the average value supports the prediction developed by Krugman (1991a) that regions become more specialized during the regional integration period. The term covers the period after 1980, during which Turkey liberalized its trade and established a Customs Union with the EU but it is not possible to state how much of this increase in specialization is due to Turkey's economic integration. There is, however, a sign of a tendency of increase in specialization of the regions.

Closer inspection on the trends of five year periods reveal that regional specialization index has decreased 0,56 % between 1980-1985 and 2,05 % between 1985-1990 and then increased steadily for the rest of the period examined (Table 5.1).

Results show that the level of change in regional specialization has not been in the same way in every region. There have been considerable increases particularly in some of the regions' regional specialization level in time. Kırıkkale and Malatya have been regions with the highest increase after 1980. Following them, regions

with the highest increase after 1980 are Van, Gaziantep, Samsun and Şanlıurfa. Regions with the highest decreases have been Antalya, Hatay, Tekirdağ and Kocaeli (Table 5.1).

Relatively high specialized regions tend to witness decreases in their specialization levels and relatively low specialized regions tend to witness increases in their specialization levels. This change can be seen in decreases in high specialized regions such as Antalya, Zonguldak, Hatay, Kocaeli and Tekirdağ (Table 5.1) and in increases in less specialized regions such as İstanbul, Gaziantep, Kırıkkale and Malatya (Table 5.1). Some of the regions have experienced decreases of specialization, most remarkably those that had been highly specialized in the past like the mining and steel regions (Zonguldak and Hatay)²¹.

²¹ Similar patterns of change was observed in French and Spanish regions with similar type of industry specializations (Krieger-Boden, 2002).

Table 5.1 : Change In the Level of Regional Specialization (1980-2001)

	1980	% ch.	1985	% ch.	1990	% ch.	1995	% ch.	2001	1980-2001
İstanbul	0,484	-10,46%	0,433	20,97%	0,524	7,54%	0,564	4,84%	0,584	21%
Ankara	0,643	5,69%	0,679	0,17%	0,680	-10,54%	0,609	-8,49%	0,550	-14%
İzmir	0,601	2,92%	0,619	-3,29%	0,599	-4,40%	0,572	5,37%	0,557	-7%
Bursa	0,624	13,15%	0,706	-5,76%	0,665	-9,72%	0,600	-6,81%	0,654	5%
Kocaeli	0,849	-17,47%	0,701	-13,33%	0,607	15,73%	0,703	-7,12%	0,690	-19%
Tekirdağ	0,879	-29,25%	0,622	13,42%	0,706	4,93%	0,741	-19,02%	0,631	-28%
Adana	0,602	-5,41%	0,569	4,17%	0,593	1,19%	0,600	9,23%	0,614	2%
Aydın	0,833	-5,36%	0,789	2,59%	0,809	1,32%	0,820	1,74%	0,809	-3%
Antalya	0,995	-18,27%	0,813	-26,95%	0,594	1,61%	0,604	28,46%	0,671	-33%
Bahkesir	0,812	-29,74%	0,570	21,07%	0,690	6,27%	0,734	-11,30%	0,677	-17%
Zonguldak	1,010*	13,00%	1,141*	31,47%	1,500*	-67,84%	0,482	87,41%	0,847	-16%
Manisa	0,763	-11,96%	0,672	12,79%	0,758	-14,80%	0,646	1,06%	0,635	-17%
Konya	0,760	-0,98%	0,753	7,13%	0,806	4,82%	0,845	-9,31%	0,799	5%
Gaziantep	0,649	34,02%	0,870	-14,19%	0,746	-10,92%	0,665	11,90%	0,798	23%
Hatay	1,077*	-16,45%	0,900	-13,33%	0,780	4,44%	0,815	-13,48%	0,756	-30%
Kayseri	0,834	-13,56%	0,721	-0,42%	0,718	8,67%	0,780	14,31%	0,897	8%
Kırıkkale	0,321	165,71%	0,854	1,23%	0,865	-5,86%	0,814	-2,05%	0,723	125%
Samsun	0,719	-13,81%	0,620	25,17%	0,776	-9,11%	0,705	8,03%	0,878	22%
Trabzon	0,912	-2,76%	0,887	-10,38%	0,795	35,34%	1,076	-0,94%	1,012	11%
Malatya	0,414	46,99%	0,608	-1,66%	0,598	29,18%	0,773	29,51%	0,992	140%
Kastamonu	0,492	16,48%	0,573	-18,28%	0,469	48,63%	0,697	-6,46%	0,526	7%
Erzurum	0,685	31,35%	0,900	-15,11%	0,764	47,45%	1,126	-43,78%	0,643	-6%
Şanlıurfa	0,770	-2,76%	0,749	8,52%	0,813	-8,82%	0,741	36,57%	0,910	18%
Mardin	1,417*	-36,96%	0,893	-11,14%	0,794	-0,33%	0,791	59,06%	1,389*	-2%
Ağrı	0,537	78,60%	0,959	-42,23%	0,554	62,09%	0,898	-7,75%	0,508	-5%
Van	0,491	-5,16%	0,466	1,76%	0,474	79,53%	0,851	-14,93%	0,685	40%
Average	0,737		0,733		0,718		0,740		0,748	
% change		-0,56%		-2,05%		3,07%		3,25%		1,36%

* In these regions the Gini Index of 1 does not mean that the region is concentrated in one sector. It is a consequence of the problem of statistical secrecy. When a region has less than ten firms in a sector data are not available.

The average increase observed in the value of regions with increasing specialization levels between 1980-2001 is 25 % (Table 5.2). Among the regions experiencing increasing specialization, regions that had a level of specialization below the national average at the beginning of the period (7 out of 14 regions) still have a level of specialization below the national average at the end of the period of observation, with the exception of Malatya and partly Kırıkkale. Regions experiencing an increase in specialization were already less specialized than the

national average. The evidence therefore does not seem to be in favor of a convergence in the level of specialization of regions within Turkey.

The average decrease observed in regions with decreasing specialization levels between 1980-2001 is 16 % (Table 5.3). Among the 14 regions experiencing decreasing specialization, out of the 6 regions that had a level of specialization above the national average at the beginning of the period, 3 regions (Hatay, Zonguldak, Mardin) still have levels of specialization above the national average. Antalya, Tekirdağ and partly Aydın and Kocaeli regions that had above average specialization in 1980 have fell below average specialization in 2001. The evidence therefore partly seems to be in favor of a convergence in the level of specialization of regions within Turkey.

Average values of regional specialization (arithmetic mean) reveal that specialization of regions has ranged between 0,718 and 0,748 in the period of 1980-2001 (Table 5.1). Comparing the average specialization values of Turkish regions with those of the other countries, empirical studies covering the same period show that Turkish regions can be considered as highly specialized. For instance US and EU average overall regional specialization values²² are approximately 0,11 and 0,20 respectively (i.e. Aiginger, Rossi-Hansberg,2003) which are much lower than Turkish average values. At the country level, 1990 values of average GINI coefficients are 0,24 in Belgium, 0,08 in France, 0,13 in Germany, 0,17 in Italy, 0,08 in UK, 0,33 in Denmark and 0,44 in Greece (Amiti,1998). Greece gives the closest values when compared with the Turkish average values. Spanish regions as well show a very high degree of specialization in comparison to the average European region, 0,34 for 1992 (Paluzie et al., 2001), which is still low compared with values of specialization of regions in Turkey²³.

²² In a similar comparison of levels of regional specialization between EU and US, it is observed that US regions are more specialized than EU regions mainly due to lower transport costs and to the unrestricted forces of economies of scale(Aiginger, Leitner, 2002).

²³ In the existing empirical literature it can be observed that there are marked differences between specialization levels across European countries and these differences vary systematically with the country size. Large economies like UK, France, and Germany are least specialized whilst the three small countries Greece, Portugal and Norway display the highest average GINI indices since large countries are likely to have more heterogeneous economic and natural endowments and scale

Table 5.2 : Change In Regional Specialization of Regions with Increasing Specialization Levels (1980-2001)

NUTS2 Reg.	1980	1985	1990	1995	2001	1980-2001
Adana	0,60	0,57	0,59	0,60	0,61	2%
Bursa	0,62	0,71	0,67	0,60	0,65	5%
Konya	0,76	0,75	0,81	0,85	0,80	5%
Kastamonu	0,49	0,57	0,47	0,70	0,53	7%
Kayseri	0,83	0,72	0,72	0,78	0,90	8%
Trabzon	0,91	0,89	0,79	1,00	1,00	10%
Şanlıurfa	0,77	0,78	0,81	0,74	0,91	18%
İstanbul	0,48	0,43	0,52	0,56	0,58	21%
Samsun	0,72	0,62	0,78	0,71	0,88	22%
Gaziantep	0,65	0,87	0,75	0,66	0,80	23%
Van	0,49	0,47	0,47	0,85	0,69	40%
Kırıkkale	0,32	0,85	0,86	0,81	0,72	125%
Malatya	0,41	0,61	0,60	0,77	0,99	140%
Average	0,62	0,68	0,68	0,74	0,77	25%

Table 5.3 : Change In Regional Specialization of Regions with Decreasing Specialization Levels (1980-2001)

NUTS2 Reg.	1980	1985	1990	1995	2001	1980-2001
Antalya	1,00	0,81	0,59	0,60	0,67	-33%
Hatay	1,08	0,90	0,78	0,81	0,76	-30%
Tekirdağ	0,88	0,62	0,73	0,74	0,63	-28%
Kocaeli	0,85	0,70	0,61	0,70	0,69	-19%
Manisa	0,76	0,67	0,76	0,65	0,64	-17%
Balıkesir	0,81	0,57	0,69	0,73	0,68	-17%
Zonguldak	1,01	1,14	1,50	0,48	0,85	-16%
Ankara	0,64	0,68	0,72	0,61	0,55	-14%
İzmir	0,64	0,62	0,60	0,57	0,56	-12%
Erzurum	0,69	0,90	0,76	1,13	0,64	-6%
Ağrı	0,54	0,96	0,55	0,90	0,51	-5%
Aydın	0,83	0,79	0,81	0,82	0,81	-3%
Mardin	1,42	1,03	0,79	0,79	1,39	-2%
Average	0,86	0,80	0,76	0,73	0,72	-16%

economies may be exhausted for a larger number of industries (Brühlhart, 2001b, Midelfart-Kvarnik et al., 2002).

In ranking, regions with increasing specializations have increased their rankings among the other regions (Table 5.4).

Table 5.4 : Ranking of Gini Indices of Regional Specialization (NUTS II Regions)

Regions	1980	Rank	1985	Rank	1990	Rank	1995	Rank	2001	Rank
İstanbul	0,484	24	0,433	26	0,524	24	0,564	25	0,584	22
Ankara	0,643	17	0,679	16	0,680	16	0,609	20	0,550	24
İzmir	0,601	20	0,619	20	0,599	19	0,572	24	0,557	23
Bursa	0,624	18	0,706	14	0,665	17	0,600	22	0,654	17
Kocaeli	0,849	7	0,701	15	0,607	18	0,703	16	0,690	13
Tekirdağ	0,879	6	0,622	18	0,706	14	0,741	13	0,631	20
Adana	0,602	19	0,569	24	0,593	22	0,600	23	0,614	21
Aydın	0,833	9	0,789	10	0,809	4	0,820	6	0,809	8
Antalya	0,995	4	0,813	9	0,594	21	0,604	21	0,671	16
Balıkesir	0,812	10	0,570	23	0,690	15	0,734	14	0,677	15
Zonguldak	1,010	3	1,141	1	1,500	1	0,482	26	0,847	7
Manisa	0,763	12	0,672	17	0,758	11	0,646	19	0,635	19
Konya	0,760	13	0,753	11	0,806	5	0,845	5	0,799	9
Gaziantep	0,649	16	0,870	7	0,746	12	0,665	18	0,798	10
Hatay	1,077	2	0,900	3	0,780	8	0,815	7	0,756	11
Kayseri	0,834	8	0,721	13	0,718	13	0,780	10	0,897	5
Kırıkkale	0,321	26	0,854	8	0,865	2	0,814	8	0,723	12
Samsun	0,719	14	0,620	19	0,776	9	0,705	15	0,878	6
Trabzon	0,912	5	0,887	6	0,795	6	1,076	2	1,012	2
Malatya	0,414	25	0,608	21	0,598	20	0,773	11	0,992	3
Kastamonu	0,492	22	0,573	22	0,469	26	0,697	17	0,526	25
Erzurum	0,685	15	0,900	4	0,764	10	1,126	1	0,643	18
Şanlıurfa	0,770	11	0,749	12	0,813	3	0,741	12	0,910	4
Mardin	1,417	1	0,893	5	0,794	7	0,791	9	1,389	1
Ağrı	0,537	21	0,959	2	0,554	23	0,898	3	0,508	26
Van	0,491	23	0,466	25	0,474	25	0,851	4	0,685	14
Average	0,737		0,733		0,718		0,740		0,748	

Regions with specializations above the average (according to 2001 values ranked from the lowest to the highest) are Hatay, Gaziantep, Konya, Aydın, Zonguldak, Samsun, Kayseri, Şanlıurfa, Malatya, Trabzon and Mardin, most of which are located in the eastern side of the country. DPT (2003) confirms that particular cities in Anatolia such as Çorum, Kahramanmaraş, Denizli, Gaziantep, depending on their own capacities and by specializing on certain sectors have developed as new emerging regions. TUSIAD and DPT findings also state that the most specialized regions are Gaziantep, Trabzon, Zonguldak, Aydın, Ağrı and Şanlıurfa (TUSIAD and DPT, 2005).

Regions with specializations below the average (according to 2001 values ranked from the lowest to the highest) are İstanbul, Ağrı, Kastamonu, Ankara, İzmir, Adana, Tekirdağ, Manisa, Erzurum, Bursa, Antalya, Balıkesir, Van, Kocaeli and Kırıkkale, most of which are located in the western side of the country.

One of the reasons for this divide in regional specialization between east and west is the structure of industry in regions. Examining the number of industries in regions it is found that there is a negative correlation (-0, 41) between the number of industries in a region and the degree of regional specialization; as the number of industries in a region increases regional specialization of the region decreases and vice versa. Examining the number of industries reveals that İstanbul has always been the region with the most diversified industry structure, having 68 and 61 industries in 1980 and 2001 respectively (Table 5.5). İzmir and Kocaeli have been closest followers with 50 and 49 industries in 2001. TUSIAD/DPT study states that regions with the most diversified industry structure are found to be Kocaeli , Ankara and İzmir based on 2002 data (TUSIAD and DPT, 2005).

Regions with highest increase in the number of industries between 1980 and 2001 are Kocaeli and Tekirdağ with 104 % and 117 % change respectively (Table 5.5). As would be expected regions that have decreasing regional specializations have increasing number of industries, that is 29 % increase between 1980-2001. Average number of industries in regions that have regional concentrations above the average are 10 and 13 in 1980 and 2001 respectively which are lower than the average number of industries in regions that have regional concentrations below the average, that is 22 and 26 in 1980 and 2001 respectively.

Table 5.5 : Change in Number of Industries in Regions (1980-2001)

NUTS2 Regions	1980	2001	% change
İstanbul (İstanbul)	68	61	-10%
Ankara (Ankara)	36	42	17%
İzmir (İzmir)	49	50	2%
Bursa (Bursa, Eskişehir, Bilecik)	30	43	43%
Kocaeli (Kocaeli, Yalova, Bolu, Sakarya, Düzce)	24	49	104%
Tekirdağ (Tekirdağ, Kırklareli, Edirne)	12	26	117%
Adana (Adana-Mersin)	23	27	17%
Aydın (Aydın-Denizli-Muğla)	16	21	31%
Antalya (Antalya-Isparta - Burdur)	13	11	-15%
Balıkesir (Balıkesir-Çanakkale)	14	15	7%
Zonguldak (Zonguldak-Karabük-Bartın)	3	6	100%
Manisa (Manisa, Uşak, Kütahya, Afyon)	18	29	61%
Konya (Konya- Karaman)	16	22	38%
Gaziantep (Gaziantep-Kilis-Adıyaman)	10	15	50%
Hatay (Hatay-Osmaniye-Kahramanmaraş)	7	8	14%
Kayseri (Kayseri-Sivas-Yozgat)	17	21	24%
Kırıkkale(Kırıkkale-Nevşehir-Kırşehir-Niğde-Aksaray)	18	9	-50%
Samsun (Samsun-Amasya-Çorum -Tokat)	15	17	13%
Trabzon(Trabzon-Rize-Artvin-Giresun-Ordu-Gümüşhane)	12	10	-17%
Malatya (Malatya- Elazığ-Tunceli-Bingöl)	9	8	-11%
Kastamonu (Kastamonu-Sinop-Çankırı)	7	6	-14%
Erzurum (Erzurum-Erzincan- Bayburt)	9	6	-33%
Şanlıurfa (Diyarbakır-Şanlıurfa)	7	8	14%
Mardin (Batman-Mardin-Siirt-Şırnak)	3	4	33%
Ağrı (Kars-Iğdır-Ağrı-Ardahan)	4	2	-50%
Van (Van-Hakkari-Bitlis-Muş)	6	8	33%
Average	17	20	17%
Regions with specializations above the average	10	13	22%
Regions with specializations below the average	22	26	16%
Regions with increasing specializations	18	20	7%
Regions with decreasing specializations	16	21	29%

It can be stated that the overall regional specialization level of the Turkish manufacturing industry has increased between 1980 and 2001 in accordance with the predictions of the New Economic Geography theory but regional specialization levels of periphery regions have increased more than those of core regions. It can be observed that there is a changing trend away from the core towards the periphery. Eastern regions have become more specialized in time (Figure 5.1 and Figure 5.2).

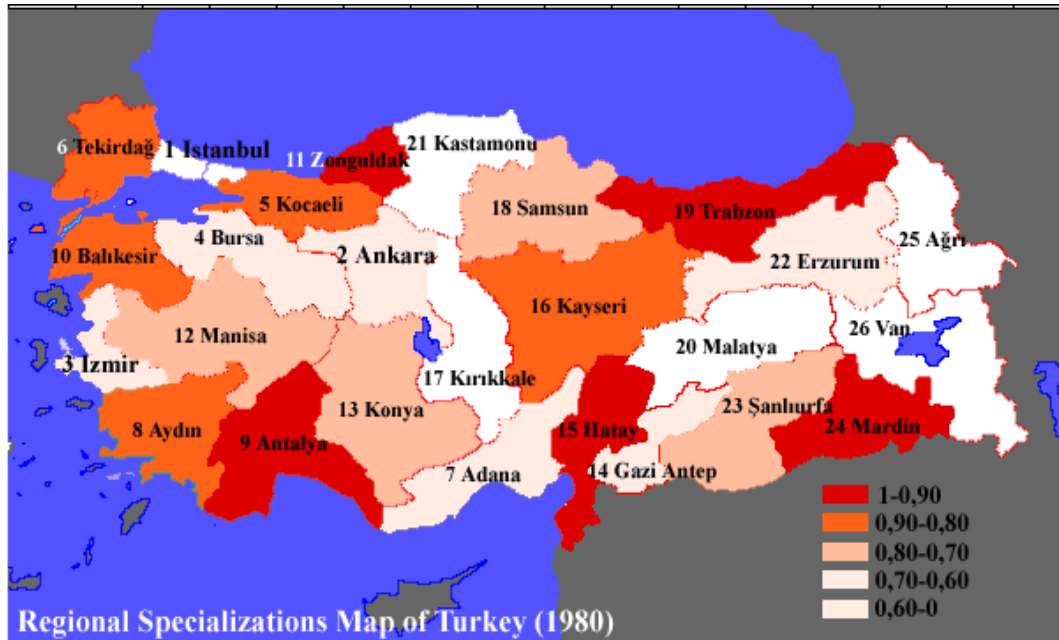


Figure 5.1: Regional Specialization Map of Turkey (1980)



Figure 5.2 : Regional Specialization Map of Turkey (2001)

5.1.2. Change in the Level of Geographical Concentration

As supported by Hypothesis 1 we need to answer whether geographical concentration level of Turkish industries increased between 1980 and 2001. Results show that the average value (arithmetic mean) of GINI concentration index increased by 14 % over time as expected in the New Economic Geography theory. The theory supports the prediction developed by Krugman (1991a) that industries become more geographically concentrated during integration period. Closer inspection on the trends of five year periods reveal that geographical concentration index has followed a steady path over this whole period (Appendix 1). Industries with highest change in GINI concentration indices are 3212 (Manufacture of made-up textile goods except wearing apparel), 3222, (Manufacture of wearing apparel, except fur apparel), 3851 (Manufacture of professional, scientific, measuring, controlling equipment, not classified elsewhere), 3240 (Manufacture of footwear, except vulcanized or molded rubber or plastic footwear), 3522 (Manufacture of drugs and medicines), 3311 (Sawmills, planing and other wood mills) and 3513 (Manufacture of synthetic resins, plastic materials and man-made fibres except glass).

Geographical concentration level has ranged between 0,45 and 0,52 between 1980 and 2001 (Appendix 1). Average geographical concentration values reveal that Turkish industries are highly concentrated. Empirical studies of the same period show that for US and EU geographical concentration averages range between 0,1 and 0,30 (Amiti,1998; Brülhart,1998b; Aiginger, Rossi-Hansberg,2003), which are lower than Turkish average values. The geographical concentration of industries in Spain seems to be higher than the Turkish values which is 0,67 in 1992 (Paluzie, et al., 2001).

Looking at the absolute values of concentrations we observe that the industries with highest GINI concentration indexes are; 3710 (Iron and steel basic industries), 3118(Sugar factories and refineries), 3116 (Grain mill products), 3117 (Manufacture of bakery products) and 3211 (Spinning, weaving and finishing

textiles) (Appendix). These industries are classified as low tech and medium low tech industries . Appendix 1 also reveals that industries such as 3825 (Manufacture of office, computing and accounting machinery), 3832 (Manufacture of radio, television and communication equipment and apparatus) and 3522 (Manufacture of drugs and medicines) have lower than average concentration coefficients. These industries are classified as high tech industries²⁴.

In accordance with these findings we see that low tech industries generally have been the highest concentrated industries and high tech industries generally have been the lowest concentrated industries for all years and that in ranking, high coefficients of low-tech sectors were replaced by middle and high technology sectors over time (Appendix 3)

The change in the level of geographical concentration is not the same for different industries. When geographical concentration indexes of the 4 digit industries are grouped according to the OECD (1987) classification system and group-wise average Gini coefficients are computed it can be seen that average GINI value of high tech industries shows the highest change over time by a change of 29 %²⁵ (Table 5.6). High tech industries that show the highest increase are; 3522 (Manufacture of drugs and medicines) and 3851 (Manufacture of professional, scientific, measuring and controlling equipment, not classified elsewhere). Table 5.10 also demonstrates that sectors defined as medium high level technology sectors, and medium low level technology follow by 15 % and 10 % change respectively. Sectors defined as middle level technology such as 3831 (manufacture of electrical industrial machinery and apparatus) and 3843

²⁴ Classification system of OECD is used, see Appendix 2. For more information on the definition and classification of industries according to technology level, see, OECD, Science, Technology and Industry Scoreboard, 2003. (<http://www1.oecd.org/publications/e-book/92-2003-04-1-7294/>).

²⁵ Using the same classification system of OECD, Traistaru et al. (2003) find similar patterns of change in CEEC countries' high tech industries, they are less concentrated than the national average in all countries although their level of concentration increases. Brülhart (1998b) finds high tech industries namely, chemicals, motor vehicles display above average increases in localisation in the EU, in Brülhart (2001a) the strongest concentration appears in low tech industries. Technology intensive industries are the least geographically concentrated industries and their concentration increased in the post-1986 period.

(manufacture of motor vehicles) have geographical concentrations indices that have increased over time. These industries can be regarded and named as engineering related sectors (Akgüngör, 2005). Akgüngör (2005) also demonstrates that engineering related activities make up the largest cluster template in Turkish manufacturing industry in terms of number of sectors and employment.

Medium high tech sectors with increasing geographical concentrations are; 3529 (Manufacture of chemical products not classified elsewhere), 3823 (Manufacture of metal and woodworking machinery) 3831 (Manufacture of electrical industrial machinery and apparatus), 3839 (Manufacture of electrical apparatus and supplies not classified elsewhere) . Medium Low tech sectors with increasing geographical concentrations are; 3841 (Shipbuilding and repairing), 3513 (Manufacture of synthetic resins, plastic materials and man-made fibers except glass), 3620 (Manufacture of glass and glass products).

Table 5.6 : Change in Gini Coefficient of Geographic Concentrations of Industry Groups (OECD Classification)

Industry Groups	1980	1985	1990	1995	2001	1980-2001
3522	0,222	0,502	0,310	0,381	0,439	98%
3825	0,222	0,222	0,222	0,222	0,222	0%
3832	0,356	0,289	0,369	0,357	0,419	18%
3851	0,222	0,315	0,222	0,312	0,435	96%
3852	0,222	0,314	0,308	0,222	0,222	0%
3853	0,222	0,222	-	-	0,222	0%
3854	0,222	0,222	-	-	0,222	0%
High Tech Industry Average	0,241	0,298	0,286	0,299	0,311	29%
3111	0,863	0,704	0,755	0,732	0,690	-20%
3112	0,918	0,834	0,798	0,660	0,684	-25%
3113	0,482	0,472	0,619	0,638	0,757	57%
3115	0,654	0,672	0,596	0,699	0,627	-4%
3116	0,745	0,763	0,801	0,792	0,829	11%
3117	0,721	0,746	0,728	0,788	0,807	12%
3118	0,743	0,758	0,743	0,803	0,805	8%
3119	0,553	0,611	0,504	0,663	0,641	16%
3121	0,851	0,354	0,388	0,575	0,629	-26%
3122	0,788	0,731	0,800	0,672	0,728	-8%
3131	0,519	0,565	0,612	0,615	0,700	35%
3132	0,780	0,424	0,604	0,477	0,348	-55%

3133	0,369	0,304	0,314	0,222	0,222	-40%
3134	0,468	0,526	0,505	0,512	0,483	3%
3140	0,781	0,793	0,792	0,779	0,621	-21%
3211	0,718	0,744	0,735	0,711	0,767	7%
3212	0,302	0,421	0,497	0,713	0,703	133%
3213	0,376	0,376	0,483	0,596	0,551	46%
3214	0,630	0,401	0,428	0,651	0,633	1%
3215	0,222	0,222	0,222	-	0,222	0%
3219	0,222	0,222	0,222	0,222	0,305	38%
3221	0,306	0,310	0,305	0,378	0,305	0%
3222	0,300	0,421	0,441	0,662	0,720	140%
3231	0,308	0,389	0,311	0,507	0,478	55%
3233	0,222	0,222	0,222	0,303	0,308	39%
3240	0,405	0,549	0,595	0,557	0,704	74%
3311	0,445	0,698	0,588	0,579	0,729	64%
3312	0,222	0,222	-	0,222	0,304	37%
3320	0,530	0,222	0,418	0,620	0,697	31%
3411	0,530	0,606	0,654	0,640	0,634	20%
3412	0,427	0,750	0,385	0,383	0,565	32%
3419	0,297	0,463	0,312	0,308	0,403	36%
3421	0,425	0,376	0,374	0,425	0,626	47%
3909	0,222	0,222	0,222	0,222	0,436	97%
Low Tech industry Average	0,510	0,503	0,490	0,519	0,563	10%
3842	0,650	0,424	0,432	0,365	0,359	-45%
3843	0,641	0,654	0,530	0,636	0,689	8%
3844	0,222	0,309	0,222	0,222	0,222	0%
3849	0,222	0,222	-	0,222	0,222	0%
3521	0,386	0,296	0,363	0,358	0,482	25%
3523	0,432	0,382	0,431	0,378	0,444	3%
3529	0,364	0,449	0,475	0,523	0,514	41%
3530	0,397	0,371	0,456	0,525	0,296	-25%
3541	0,222	0,405	-	-	-	-100%
3542	0,287	0,287	0,292	0,222	-	-100%
3543	0,222	0,222	0,222	-	0,222	0%
3544	0,222	0,222	0,222	0,222	0,222	0%
3821	0,290	0,294	0,373	0,286	-	-100%
3822	0,587	0,705	0,720	0,655	0,548	-7%
3823	0,423	0,418	0,594	0,504	0,589	39%
3824	0,554	0,637	0,657	0,658	0,682	23%
3829	0,507	0,534	0,614	0,665	0,616	21%
3831	0,387	0,436	0,434	0,525	0,541	40%
3833	0,388	0,377	0,392	0,407	0,414	7%
3839	0,479	0,435	0,615	0,492	0,648	35%
Medium High Tech. Industry Average	0,394	0,404	0,447	0,437	0,453	15%
3841	0,222	0,299	0,256	0,222	0,302	36%
3511	0,471	0,545	0,289	0,351	0,432	-8%
3512	0,443	0,474	0,504	0,558	0,416	-6%
3513	0,222	0,498	0,306	0,375	0,367	65%
3551	0,276	0,309	0,222	0,222	0,222	-20%
3559	0,639	0,590	0,397	0,564	0,615	-4%

3560	0,698	0,602	0,705	0,707	0,744	7%
3610	0,430	0,548	0,481	0,519	0,524	22%
3620	0,414	0,468	0,490	0,473	0,624	51%
3691	0,734	0,727	0,627	0,769	0,735	0%
3692	0,814	0,785	0,757	0,826	0,563	-31%
3699	0,511	0,564	0,604	0,653	0,737	44%
3710	0,733	0,714	0,648	0,783	0,872	19%
3720	0,671	0,715	0,666	0,617	0,732	9%
3811	0,537	0,596	0,474	0,499	0,459	-14%
3812	0,476	0,432	0,447	0,556	0,608	28%
3813	0,490	0,575	0,595	0,552	0,641	31%
3819	0,623	0,668	0,669	0,729	0,761	22%
Medium Low Tech. Industry Average	0,523	0,562	0,508	0,554	0,575	10%
Grand Average	0,457	0,470	0,471	0,494	0,520	14%

In summary, it is observed in Table 5.6 and Figure 5.3 that although the concentration levels of high technology and medium high technology industries are lower than the average for all years, their concentration levels have increased above the average over time. On the other hand, concentration levels of low technology and medium low technology industries are higher than the average for all years whereas their concentration levels have increased below the average over time. It is therefore possible to state that industrial concentration of Turkey's manufacturing sector has changed in favor of engineering related sectors against labor based and resource based sectors.

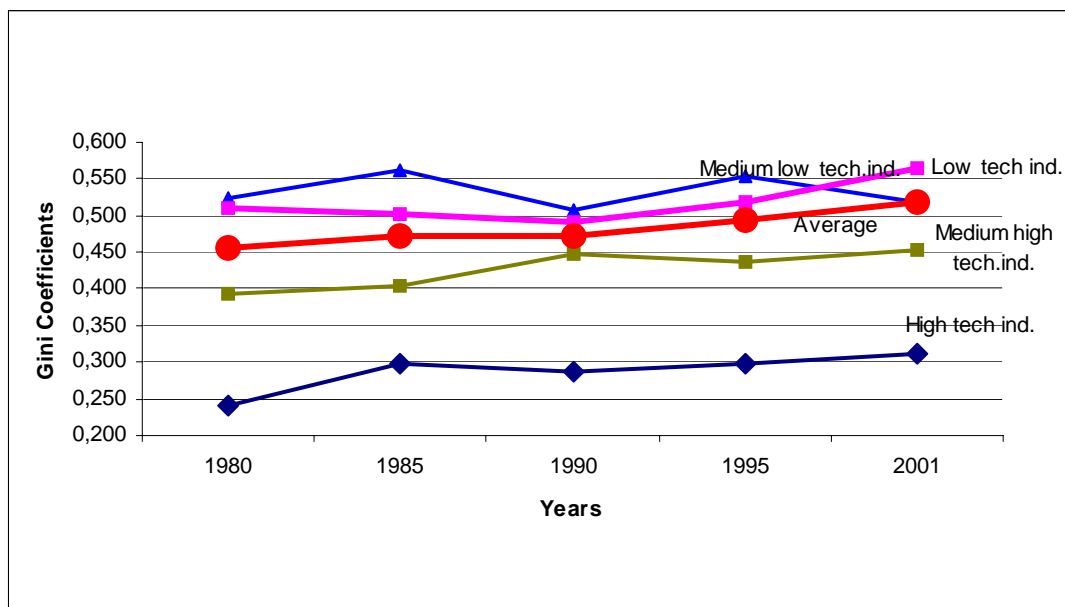


Figure 5.3 : Change in Geographical Concentration Patterns in Industry Groups
(Categorization Based on OECD, 1987)

The finding that low-tech industries are highly concentrated in Turkey can be explained by the dominance of State Owned Enterprises in manufacturing starting from the beginning years of the republic. For example, industries with highest GINI concentration indexes 3710 (Iron and steel basic industries) and 3118 (Sugar factories and refineries) reflect the dominance of resource based and state owned manufacturing structure of the Turkish manufacturing industry. In Turkey, only big scale investments had been encouraged for long years (Kepenek, Yentürk, 2000). Over time, particularly after 1980, the industry structure changed in favor of private enterprise which gave way to the development and clustering of engineering related industries as well as medium and high tech industries (Akgüngör, 2006). A similar condition is observed in US industries concentration patterns in the study of Aiginger and Leitner (2002), the high concentration level of US industries is found to be consistent with the fact that it was possible to build up industries from scratch at the beginning of the industrialization period²⁶.

5.1.3. The Relation between Regional Specialization and Geographical Concentration

Regional specialization average values reveal that specialization of regions has been high between 1980 and 2001, ranging between 0,737 and 0,748. Compared with that, geographical concentration levels have ranged between 0,45 and 0,52, at a lower level than regional specialization values (Figure 5.4). If we compare the average concentration and specialization values empirical studies of the same period show that for the US average regional specialization is around 0,11 while geographical concentration averages are approximately 0,30, which shows a contrasting picture with that of Turkish patterns. EU averages, showing a similar

²⁶ Comparing the change in the type of industries in which countries specialize in the EU, Midelfart and Kvarnik et al.(2003) find that French, UK and Germany tend to specialize in high tech, high skill industries. Greece and Portugal are tending to specialize in low-tech , low skill industries, Spain in medium tech, medium skill while Ireland has focused on high-tech, high-skill industry. Austria and Belgium focus in medium tech, medium skill industries , while Netherlands specializes in higher skill but lower technology industries. Amongst the Scandinavians, Finland and Sweden specialize in high tech, high skilled industries while Denmark specializes in medium tech, medium skill industries.

pattern with that of the US, are 0,20 and 0,30 respectively (Aiginger, Rossi-Hansberg,2003).

Closer inspection on the trends of five year periods reveal that geographical concentration index has followed a steady path over this whole period whereas regional specialization index has decreased 0,56 % between 1980-1985 and 2,05 % between 1985-1990, but then increased steadily for the rest of the period examined.

The average values of geographical concentration and regional concentration both have increased between 1980-2001, but the increase in geographical concentration has been more significant than the increase in regional concentration values, the increase in geographical concentration has been at the rate of 14 % compared with 1 % increase of regional specialization. However, it should also be considered that already highly specialized regions of Turkey would tend to witness less increase in their specialization levels than relatively lower concentrated industries.

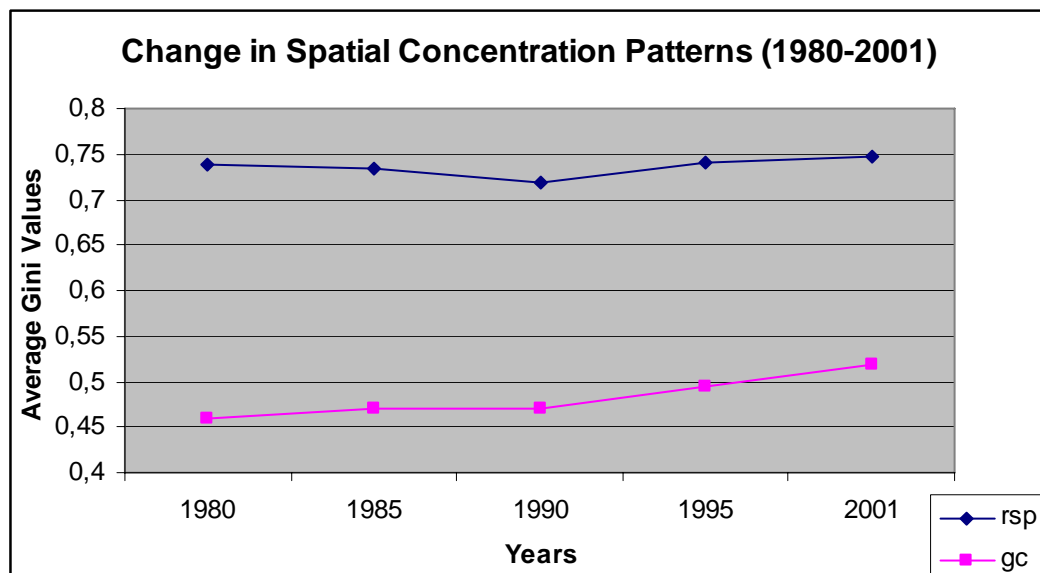


Figure 5.4: Change in Spatial Concentration Patterns (1980-2001)

In order for the two indexes to develop exactly in parallel all countries, regions, industries in the world should be of the same size. Then increased specialization would mean that industries will also become more concentrated (Aiginger and Davies, 2004). Therefore, the interpretation of these changes lies with differential growth rates of regions and industries. The increase in both indexes shows that smaller industries have tended to grow more rapidly than larger industries, while smaller regions have tended to grow more rapidly than the larger regions. However, the increase in concentration of the industries has been more than the increase in specialization of the regions. This is confirmed in Table 5.7 where the smaller industry groups (industry groups that employ less than 10 % of the manufacturing employment) increased their share of employment from 22 % to 27 % and the combined share of employment in small regions (regions that employ less than 10 % of the manufacturing employment) increased from 53 % to 54 % between 1980-2001. This is also confirmed with the output figures where the smaller industry groups (industry groups that produce less than 10 % of the manufacturing output) increased their share of manufacturing output from 15 % to 30 % and the combined share of small regions (regions that produce less than % 10 of the manufacturing output) increased from 38 % to 41 % between 1980-2001.

Table 5.7 : Shares of Large and Small Regions and Industries

	Shares of Total Manufacturing			Changes in Shares	
	1980	1990	2001	1980-1990	1990-2001
Small Industries* Total	22%	20%	27%	-11%	34%
Small Regions** Total	53%	47%	54%	-11%	15%
Small Regions Share in					
Large Industries	56%	50%	56%	-11%	13%
Small Industries	48%	43%	58%	-11%	35%
Large Regions Share in					
Large Industries	44%	50%	44%	15%	-11%
Small Industries	52%	57%	42%	10%	-27%

* Industry groups that produce less than 10 % of the manufacturing output.

** Regions that produce less than 10 % of the manufacturing output.

Plotting two variables against each other, it can be seen that although the general trend was a move in the north-easterly direction there has been an opposite movement between 1980 and 1990 (Figure 5.5). On the specialization side before 1990 we see that smaller regions and smaller industries lost ground between 1980-1990 both at the rate of 11 % (Table 5.7). Small regions lost their shares in large industries but after 1990 smaller regions have increased their shares across the country in both large and small industries (Table 5.7).

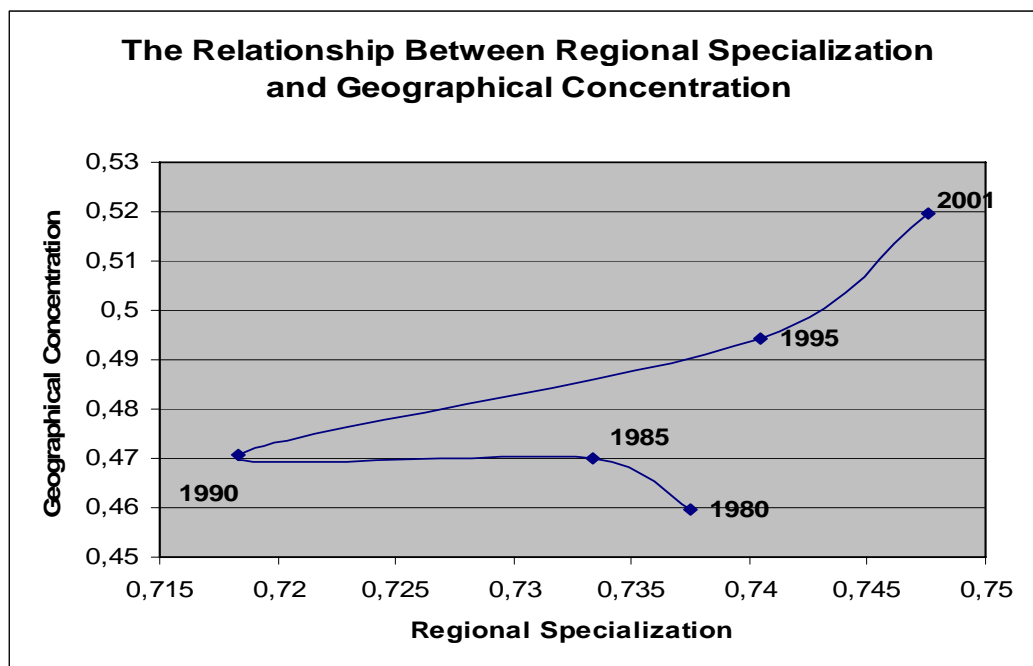


Figure 5.5 : The Relation between Regional Specialization and Geographical Concentration

As a conclusion, in line with the existing literature and the New Economic Geography theory regional specialization and geographical concentration have been generally increasing in employment terms. Thinking of the change trend in the geographical concentration patterns in line with the changing regional specialization patterns it could be stated that, the acceleration of high tech and medium high tech industries against low tech and medium low tech industries since 1980s reveals that increased and relocated regional specialization is the result of low tech industries disappearing faster in the western regions than in the eastern regions.

5.2. Econometric Findings

Hypothesis 1 and 2 were developed to investigate the determinants of geographical concentration of industries in Turkey. Following mostly the discussion presented in Paluzie, Pons and Tirado (2001), the systematic relation between industry characteristics and geographical concentration is tested in this section. To determine the determinants of the manufacturing industry a panel model is estimated where the dependent variable is GINI concentration index, the independent and control variables are the variables that represent sectoral characteristics.

As explained in the previous chapters, there are four main explanations that focus on what determines industrial concentration; the Ricardian approach, Heckscher-Ohlin approach, New Trade Theory and Geographical Economics Theory. According to the Ricardian explanation, as the concentration of production factors and technological accumulation in the region increases geographical concentration of industry increases. In the model, the variable TF measures the technological differences of industry groups across the regions. According to Heckscher-Ohlin theory, regions where capital is abundant specialize on capital based products while regions where labor is abundant specialize on labor based products, in the model HO variable measures the labor intensity. New Trade Theory predicts that scale economies cause firms to cluster in certain regions and the more important scale economies in an industry the higher degree of concentration is seen in that industry. The proxy is measured by the SCALE variable in the model. New Economic Geography literature points out the importance of local markets and horizontal and vertical production relations between firms. If vertical integration between firms is higher in an industry, that industry will tend to concentrate in one area. The proxy is measured by the EG variable in the model (Haaland, 1999; Paluzie, Pons and Tirado, 2001).

In order to test Hypothesis 1 and to take into account the effect of the Customs Union between EU and Turkey that was put in force in January 1996, a dummy variable is used in the econometric model. The dummy variable takes the value of 0 for the years before 1996 and 1 afterwards (0 for the years 1980, 1985, 1990, 1995; and 1 for 2001) (See Chapter 4 for the equation employed).

It can be argued that looking at aggregate trends and determinants is misleading hence aggregate results might obscure different patterns within certain types of sectors. In the next sections determinants of geographical concentration are analysed based on different industry groups to see whether different patterns exist within the Turkish manufacturing industry. The 83 cross sectional units are represented by the four-digit ISIC Rev2 industries for the overall manufacturing industry in Panel Model (1). To differentiate between industry groups two more panel models are estimated, Panel Model (2) is estimated for 57 cross sectional units (ISIC Rev 2 industries which constitute the low and medium low technology industries) and Panel Model (3) is estimated for 26 cross sectional units (ISIC Rev 2 industries which constitute the high and medium high technology industries). Fixed effect panel models are estimated for the years 1980, 1985, 1990, 1995 and 2001.

For the choice between linear and nonlinear specifications likelihood ratio (LR) test is applied and the hypothesis that the linear model is a more effective predictor than the log linear model is rejected. The log transformations of the equation are used because a close relationship exists between changes in a variable's logarithms and percentage changes in the variable itself (Murray, 2006). Since the model employs cross sectional data, heteroskedasticity test is applied and the standard deviation of the forecasted coefficients is corrected using the method developed by White. The results of the econometric model are presented in Table 5.8 and they are interpreted in the next sections.

Table 5.8: Panel Estimates of the Determinants of Geographical Concentration of Industries (Dependent variable= log(GINI); Fixed Effect)

	All Industries	Low and Medium Low Technology Industries	High and Medium High Technology Industries
Variables	Panel Model (1)(n=83)	Panel Model (2)(n=56)	Panel Model (3)(n=27)
Constant	-0.614 (-18.05334)*	-0.616 (-11.00303)*	-0.536 (-4.713692)*
Log(TF)	-0.167 (-9.329834)*	-0.151 (-8.651345)*	-0.215 (-9.068285)*
Log(HO)	-0.004 (-1.553776)	-0.005 (-1.49191)	-0.0032 (-1.499967)
Log(SCALE)	0.0812 (7.243903)*	0.0904 (5.54087)*	0.052 (3.765663)*
Log(EG)	0.0783 (-1.290286)	0.125 (-1.599334)	-0.0597 (-2.38364)***
DUMMY (1=2001 and 0 otherwise)	0.0293 (2,739387)**	0.0376 (2.398493)***	0.00887 (-1.054674)
Adj R ²	0.91	0.92	0.94
F-Statistics	46.22691*	39.01543*	45.59445*

* Significant at the $\alpha \leq 0.0005$ level

**Significant at the $\alpha \leq 0.005$ level

***Significant at the $\alpha \leq 0.01$ level

(Numbers in parentheses are t-statistics.)

5.2.1. Economic Integration and Geographical Concentration

Supporting Hypothesis 1 and predictions of the New Economic Geography Theory integration is found to be a significant factor on the increase in geographical concentration of industries. The DUMMY variable measuring the effect of the customs union with the EU after 1996 is found to be statistically significant²⁷. This result indicates that Turkey's economic integration with the EU is a significant factor in explaining the change in industry concentration (Table 5.8) thus supporting the first hypothesis that economic integration caused geographical concentration of industries to increase in Turkey.

²⁷ In February 2001 an economic crisis took place in Turkey which could raise some concerns on the validity of the result obtained since the result of Hypothesis 1 is based only on 2001 data. In order to overcome the concerns on this issue it would be useful to acknowledge that a similar analysis has been conducted by Falcıoğlu and Akgüngör (2007) using 2000 data and the same result has been achieved.

When the estimation is predicted for different categories of industries it can be observed that integration has different effects on different categories of industries. Integration has a significant effect on low and medium low level industries whereas no significant effect can be observed on high and medium high industries. Lower technology industries are those which are affected significantly by the integration process (Table 5.8).

This finding is compatible with the findings of Forslid et al. (2002) in the sense that locational effects of integration are highly region and sector specific with some sectors being driven primarily by comparative advantage and others by agglomeration forces associated with scale economies and input-output linkages. In the study of Lemoine and Kesenci (2003) it is found that for Turkey, trade in high-tech products shows a specific feature; it is not much affected by transport costs. Trade with geographically close countries is not the most intensive in high technology ; proximity favors more the ordinary imports than high technology imports. For Turkey imports from the US show the most important high-tech content: the share of high tech product in its imports from US is twice higher than that in its whole imports.

5.2.2. Supply and Demand Linkages and Geographical Concentration

In testing Hypothesis 2 , results suggest that only TF (Ricardian Theory) and SCALE (New Trade Theory) variables (control variables) are significant in explaining industry concentration. The HO (Hescher- Ohlin Theory) and EG (New Economic Geography Theory) variables are not statistically significant in explaining industry concentration (Table 5.8).

Contrary to the expectations, there is a strong inverse relationship between regional productivity differences across the industries and industrial agglomeration. A possible reason for such an unpredicted result may be that the TF variable measures regional technological differences using average value added per labor as a proxy. This must be interpreted with caution for the Turkish

case because low-value added (and low tech industries) industries are dominant in the Turkish manufacturing industry and do not have significant regional productivity differences.

The significance of SCALE variable predicts that industrial concentration and scale economies have parallels and industries subject to high scale economies become more geographically concentrated. This result is in accordance with the New Trade Theory (Krugman, 1980; Krugman and Venables, 1995) and our previous findings on the Turkish manufacturing industry. During the integration period it is expected that industries subject to scale economies such as chemicals, machinery, transport equipment (high tech. industries) agglomerate the most (Forslid et al., 2002) verifying the finding that high technology industries are those that concentrate above the Turkish average. Therefore, Hypothesis 2 predicting that the pattern of geographical concentration is significantly determined by the existence of supply and demand linkages is not supported for the Turkish manufacturing industry.

When the estimation is predicted for different categories of industries it can be observed that supply and demand side linkages have different effects on different categories of industries. The second model predicts that only TF (Ricardian Theory) and SCALE (New Trade Theory) variables are significant in explaining industry concentration of low and medium low technology industries, in parallel with the overall crosssectional estimation findings. The HO (Hescher- Ohlin Theory) and EG (New Economic Geography Theory) variables are not statistically significant in explaining industry concentration of low and medium low technology industries.

The third model, this time predicts that the HO (Hescher- Ohlin Theory) variable is not statistically significant but TF (Ricardian Theory) and SCALE (New Trade Theory) variables are significant in explaining industry concentration of high and medium high technology industries and surprisingly EG (New Economic Geography) variable has a significant negative effect on concentration thus representing evidence against New Economic Geography theories.

In some of the theoretical models this result is explained in such a way that linkages might be weakened by the opening of a closed economy to free trade (Krugman and Livas, 1996; Fujita, Krugman and Venables, 1999). Opening economies lets firms to receive most of their intermediate inputs from (and sell a large share of their production to) abroad. Firms become less dependent on the local market since their focus has shifted to the bigger external market and this process weakens linkage advantages particularly in developing countries (Krugman and Livas, 1996). Another supporting result is found in the study of Lemoine and Kesenci (2003) which states that in the case of Turkey, trade in high-tech products is not much affected by transport costs. A similar result is observed in the case of Spain particularly for the sectors characterized by a high use of intermediates such as the production and first transformation of metals or chemicals and oil products (Paluzie, Pons and Tirado,2001). These findings support that linkages particularly in the high technology industries may have weakened as the Turkish economy is opened to external trade.

5.3. Spatial Concentration Patterns in Turkey

5.3.1. Change in the Regional Specialization Patterns of Regions

Previous findings on regional specialization reveal that regional specialization level has increased, related with these findings this study also finds that spatial pattern of industries has changed on the geographical scale among regions between 1980-2001. Inspection of the changing pattern of industries located in regions with increasing regional specializations reveal that there has not been much change in the pattern of industries within these regions. For instance in

Kırıkkale which has the highest changing specialization rate and located at the periphery of a core region, in 1980 highpoint industries were 3692 (Manufacture of cement, lime and plaster) , 3112 (Manufacture of dairy products) , 3214 (Manufacture of carpets and rugs) (Appendix 4) all of which are low and medium low technology industries. In 2001 high point industries have become 3530 (Petroleum Refineries), 3132 (Wine Industries) and 3529 (Manufacture of chemical products not classified elsewhere) most of which are medium high technology industries (Appendix 5).

In Malatya which is located in the eastern periphery, in 1980 highpoint industries were 3512 (Manufacture of fertilizers and pesticides), 3720 (Non-ferrous metal basic industries) which are medium low tech industries, have become 3132 (Wine industries) 3140 (Tobacco Manufactures) , in 2001 which are low technology industries. In Van which is located in the eastern periphery, in 1980 highpoint industries were 3112 (Manufacture of dairy products), 3111 (Slaughtering, preparing and preserving meat), 3122 (Manufacture of prepared animal feeds) all of which are low technology industries have become 3118 (Sugar Factories and Refineries), 3214 (Manufacture of carpets and rugs), 3240 (Manufacture of footwear, except vulcanised or moulded rubber or plastic footwear) which are also low technology industries in 2001. In Şanlıurfa which is again located in the eastern periphery, in 1980 highpoint industries were 3131 (Distilling, rectifying and blending spirits), 3111 (Slaughtering, preparing and preserving meat), 3112 (Manufacture of dairy products) all of which are low technology industries have become 3131 (Distilling, rectifying and blending spirits), 3691 (Manufacture of structural clay products) and 3831 (Manufacture of electrical industrial machinery and apparatus) most of which are medium high and medium low tech industries in 2001 (Appendix 4 and 5).

Based on this discussion it is hard to claim that there exists a common pattern of change within industries located in the regions with increasing regional specializations most of which are periphery regions. Periphery regions were mainly specialized in low and medium low industries in 1980 and this structure

has not changed until 2001. Relating these findings with the findings in the previous section, results reveal that regions with low technology industry (periphery regions located mainly in eastern side of the country) seem to be increasing their specialization.

Considering the industry structure of regions that have the highest decreasing rate of specialization reveals that certain changes have taken place. In Antalya which is located at the periphery of a core region, in 1980 highpoint industries were 3312 (Manufacture of wooden and cane containers and small cane ware), 3511 (Manufacture of basic industrial chemicals except fertilizers), 3311 (Sawmills, planing and other wood mills), 3111 (Slaughtering, preparing and preserving meat) , 3118 (Sugar Factories and Refineries) all of which are low technology industries. In 2001, the highest highpoint industry turned out to be 3529 (Manufacture of chemical products not classified elsewhere) which is a medium high technology industry (Appendix 4 and 5).

In Hatay which is located at the periphery of a core region, in 1980 highpoint industries were 3710 (Iron and steel basic industries) ,3112 (Manufacture of dairy products), 3692 (Manufacture of cement, lime and plaster), 3116 (Grain Mill Products), 3211 (Spinning, weaving and finishing textiles) all of which are low and medium low industries have become 3710 (Iron and steel basic industries), 3115 (Manufacture of vegetable and animal oils and fats), 3512 (Manufacture of fertilizers and pesticides), 3118(Sugar Factories and Refineries) which are still low and medium low technology industries in 2001 except 3843 (Manufacture of motor vehicles) which is classified under medium high technology industries (Appendix 4 and 5).

In Kocaeli which is located at the periphery of a core region, in 1980 highpoint industries were basically 3544, 3824 (Manufacture of special industrial machinery and equipment exc.metal,woodworking machinery) which are medium high industries. In 2001, highpoint industries were still medium high tech industries , not much has changed in this period (Appendix 4 and 5).

What can be derived from this discussion is that regions that are at the periphery of core regions, such as Kırıkkale at the periphery of Ankara, Hatay and Antalya at the periphery of Adana, Kocaeli at the periphery of İstanbul, have changed the industrial composition of their region in a such a way that at least one high medium technology industry is involved in their industry mix in 2001.

Changing patterns of the region of İstanbul which is the biggest core region in Turkey confirms these findings. In 1980 the highpoint industries were 3215 (Cordage, rope and twine industries) (low tech ind.), 3219 (Manufacture of textiles not elsewhere classified) (low tech ind.), 3543 (medium high tech ind.), 3849 (Manufacture of transport equipment not classified elsewhere) (medium high tech. ind.), 3851 (Manufacture of professional, scientific, measuring, controlling equipment, not classified elsewhere) (high tech ind.). In 2001, we observe that only 3215 (Cordage, rope and twine industries) remains as an industry from low tech industry, 3825 (Manufacture of office, computing and accounting machinery), 3852 (Manufacture of photographic and optical goods), 3853 (Manufacture of watches and clocks), 3854 all of which are high tech industries have concentrated in this core region (Appendix 4 and 5).

Therefore, İstanbul as the biggest core region increased its concentration on production of high level industries while decreasing its concentration on the production of low, medium low and medium high level industries, leading these industries this time to be concentrated in its periphery regions such as Kocaeli. In the literature, Akgüngör (2006) also points out the importance of newly developing centers near the periphery of another core region in Turkey, Ankara such as Çorum, Kayseri, Konya, Samsun and Eskişehir and state that for instance manufacturing activities related to furniture (a low technology industry) seem to be moving outside Ankara and its periphery to the new industry centers (Akgüngör, 2006). DPT (2003) study confirms that industry spreads to nearby cities from traditional cities of İstanbul, Ankara, İzmir and Adana but without mentioning the structure of industrial change.

A finding that is parallel to the findings also confirms the prediction that highpoint industries in regions where regional specialization is intensive should have high concentration coefficients as well. Among the most concentrated five industries in 2001; 3710 (Iron and steel based industries) is an industry that is highly concentrated with high (greater than 1.25) location quotients 19,97 and 9,97 in Zonguldak and Malatya respectively, 3118 (Sugar factories and refineries) is an industry that is highly concentrated with a location quotient 10,21 in Malatya, 3116 (Grain mill products) is an industry that is highly concentrated with location quotient 5,63 in Malatya , 3691 (Manufacture of structural clay products) is an industry that is highly concentrated with a location quotient 10,19 in Şanlıurfa, 3117 (Manufacture of bakery products) is an industry that is highly concentrated with a location quotient 4, 99 in Mardin (Appendix 4 and 5).

As a conclusion, discussions made so far suggest that between 1980 and 2001 the spatial pattern of change between industries among regions has resulted in a core periphery pattern. These discussions confirm the predictions of the Krugman hypothesis which expects the integration process to result in a core periphery pattern where the core gets specialized in increasing returns to scale industries and the periphery in industries with constant returns, perfect competition, and low income potential (Krugman, 1991a).

5.3.2. Change in the Pattern of Supply and Demand Linkages

Previous findings on the determinants of geographical concentration that do not support the predictions of New Economic Geography do not necessarily prove that linkages do not have much function in the formation of industries. Krugman (1995) defines the function of linkages in such a way that they become tools in identifying appropriate key industries in regions. One of the factors that affect the strength of backward and forward linkages is the input output structure of the industries (Forslid et al., 2002). In order to present the change in pattern of supply and demand linkages, firstly agglomerations of industries derived from input-output relations will be presented.

Results reveal that the pattern of supply and demand side transactions across the industries cause the related industries to form agglomerations of industries in Turkey. In this study ten agglomerations²⁸ have been identified in the Turkish manufacturing sector with respect to inter-industry selling and purchasing relationships. The identified agglomerations are, “packaged food products”, “natural resources based industry”, “engineering”, “textile”, “leather”, “chemicals”, “energy”, “stone based industry”, “paper and publishing” and “production and processing of field crops”²⁹.

The latest available I-O table of the Turkish industry is for the year 1998. The data includes value of purchases and sales of intermediate inputs among 97 service and manufacturing industries³⁰. The results of the factor analysis are presented in Appendix 7 (Results given in this table do not include the 27 service industry variables, see Appendix 8 for service industries). Following Feser and Bergman (2000) industries with loading 0.60 or higher, on a given cluster are viewed as strongly linked to that agglomeration, whereas industries with loading 0.35 or lower are accepted moderately and weakly linked. Factor loadings of more than 0,60 are highlighted and denoted as the primary sectors of the agglomerations. Factor loadings between 0,35 and 0,60 are denoted as secondary sectors. Most factors yielded agglomerations consisting of primary and secondary industries. (See Appendices 9-18 for sector details of each agglomeration.). When the identified agglomerations are evaluated on the basis of OECD categorization system, it can be generalized that agglomerations of Engineering, Chemicals, Stone Based, Natural Resources Based and Petroleum Based Industries comprise mostly of medium high and high technology industries. Agglomerations of Textile, Leather, Paper and publishing, Production and processing of field crops, Packaged Food Products comprise mostly of low and medium low technology industries.

²⁸ The focus of this research is upon the theory of agglomeration and not on clusters as defined by Porter (1990) and pursued by others.

²⁹ Titles given to the agglomerations identified in this study follow the titles used in the study of Akgüngör (2006).

³⁰ The classification system of the Input Output Table (1998) is given in accordance with ISIC Rev3 classification in DIE (2004), see Appendix 6 for correspondance between the classification system of the Input Output Table (1998), Rev2 and Rev3 codes.

Table 5.9: Factor Analysis of Variables: Total Variance Explained

Rotation Sums of Squared Loadings			
Factor No.	Eigenvalue	Total Variance Explained (%)	Cumulative (%)
1-Paper & Publishing	18,67	19,66	19,66
2- Engineering	12,08	12,72	32,38
3- Stone Based	11,75	12,36	44,74
4- Packaged Food	9,16	9,64	54,38
5- Prod.Field Crops	8,89	9,36	63,74
6- Textile	5,87	6,18	69,92
7- Natural Res.	4,20	4,42	74,34
8- Petroleum Based	3,21	3,38	77,72
9- Chemicals	2,82	2,97	80,69
10-Leather	2,51	2,65	83,34

Ten agglomerations have emerged which cumulatively accounted for 83,34 % of the variance (Table 5.9).

Factors:

- 1- **Paper and Publishing:** Factor analysis reveals that paper and publishing agglomeration consists of 4 subsectors of agricultural and mining industries, 4 subsectors of manufacturing industry and 14 subsectors of service industry as primary industries (Appendix 9). 6 subsectors of service industry are classified as secondary industries. An important finding related with this agglomeration is that it demonstrates the highest degree of input output relation with service industries compared with the other agglomerations. Service industries in relation with paper and publishing mainly consist of trade, education and social activities subsectors (see Appendix 8 and 9 for service sector details). The manufacturing industry subsectors can be classified under the category of low technology industries (Appendix 9).

“Paper and publishing” has been identified as a separate agglomeration for the first time in this study though its subsectors show signs of resemblance with the unidentified agglomerations in the studies of Akgüngör (2006 and 2002).

2- Engineering: Factor analysis reveals that engineering agglomeration consists of 1 subsector of mining industry, 10 subsectors of manufacturing industry (highest number of manufacturing industry subsectors compared with the other agglomerations) and 1 subsector of service industry as primary industries (Appendix 10). 6 subsectors of manufacturing and 3 subsectors of service industry are classified as secondary industries. Service industries in relation with the engineering agglomeration are transport via railways, construction and water transport. Engineering agglomeration consists of the manufacturing subsectors that are mostly classified under the category of medium high and high technology industries (Appendix 10). Agglomeration with similar subsectors are classified under the title “Vehicle manufacturing” in Akgüngör (2002) and “Engineering” in Akgüngör (2006).

3- Stone Based Industry: Factor analysis reveals that stone based agglomeration consists of 1 subsector of mining industry, 10 subsectors of manufacturing industry (highest number of manufacturing industry subsectors compared with the other agglomerations) and 2 subsectors of service industry as primary industries(Appendix 11). 3 subsectors of manufacturing and 4 subsectors of service industry are classified as secondary industries. Service industries in relation with the stone based agglomeration are land transport, transport and distribution of water. Stone based industry agglomeration consists of the manufacturing subsectors that are mostly classified under the category of medium high and medium low technology industries (Appendix 11). Agglomeration with similar subsectors are classified under the same title in Akgüngör (2006) but was not identified as an agglomeration in Akgüngör (2002).

4- Packaged Food Products Industry: Factor analysis reveals that Packaged Food Products agglomeration consists of 2 subsectors of agricultural industry, 6 subsectors of manufacturing industry and 2 subsectors of service industry as primary industries (Appendix 12). 2

subsectors of manufacturing and 1 subsector of service industry are classified as secondary industries. Service industries in relation with the Packaged Food Products agglomeration are construction and purification and distribution of water. Packaged Food Products agglomeration consists of the manufacturing subsectors that are mostly classified under the category of low technology industries (Appendix 12). Agglomeration with similar subsectors are classified under the same title in Akgüngör (2006) , and under the title of “food and agriculture” in Akgüngör (2002).

5- Production and Processing of Field Crops: Factor analysis reveals that Production and Processing of of Field Crops agglomeration consists of 3 subsectors of agricultural industry, 7 subsectors of manufacturing industry (Appendix 13). Neither a subsector of service industry nor a secondary industry is identified. Production and Processing of of Field Crops agglomeration consists of the manufacturing subsectors that are mostly classified under the category of low and medium low technology industries (Appendix 13). Agglomeration with similar subsectors are classified under the same title in Akgüngör (2006) , and under the title of “food and agriculture” in Akgüngör (2002).

6- Textile : Factor analysis reveals that Textile agglomeration consists of 4 subsectors of manufacturing industry and 1 subsector of service industry as primary industries (Appendix 14). 1 subsector of agricultural, 3 subsectors of manufacturing and 1 subsector of service industry are classified as secondary industries. Service industries in relation with the Textile agglomeration are distribution of gas and electricity. Textile industry agglomeration consists of the manufacturing subsectors that are mostly classified under the category of low technology industries (Appendix 14). Agglomeration with similar subsectors are classified under the same title in Akgüngör (2006) , and under the title of “textile and home accessories” in Akgüngör (2002).

- 7- Natural Resources Based Industry:** Factor analysis reveals that Natural Resources Based agglomeration consists of 1 subsector of forestry industry 2 subsectors of manufacturing industry as primary industries (Appendix 15). 1 subsector of mining, 3 subsectors of manufacturing and 1 subsector of service industry are classified as secondary industries. Service industry in relation with the Natural Resources Based agglomeration is extraction of crude petroleum and natural gas. Natural Resources Based industry agglomeration consists of the manufacturing subsectors that are mostly classified under the category of low and medium high technology industries (Appendix 15). Agglomeration with similar subsectors is classified under the title “Furniture” in Akgüngör (2006) , but was not identified as an agglomeration in Akgüngör (2002).
- 8- Energy :** Factor analysis reveals that Energy agglomeration consists of 1 subsector of mining, 1 subsector of manufacturing industry and 1 subsector of service industry as primary industries (Appendix 16). 5 subsectors of service industry are classified as secondary industries. Service industries in relation with the Energy agglomeration are air transport, transport via railways, water and land transport. Energy industry agglomeration consists of only one manufacturing subsector that is classified under the category of high technology industries (Appendix 16). Agglomeration with similar subsectors is classified under the title “Mining” in Akgüngör (2002) , but was not identified as an agglomeration in Akgüngör (2006).
- 9- Chemicals:** Factor analysis reveals that Chemicals agglomeration consists of 2 subsectors of manufacturing industry as primary industries (Appendix 17). 3 subsectors of manufacturing are classified as secondary industries. There are no service industries in relation with the Chemicals agglomeration. Based on the findings of the input-output tables of Turkish manufacturing industry, chemicals agglomerations consist of the subsectors that are mostly classified under the category of high tech and

medium high tech industries (Appendix 17). Agglomeration with similar subsectors is classified under the same title in Akgüngör (2002) , but was not identified as an agglomeration in Akgüngör (2006).

10- Leather: Factor analysis reveals that Leather agglomeration consists of 2 subsectors of manufacturing industry as primary industries (Appendix 18). 3 subsectors of manufacturing are classified as secondary industries. In the study of DPT (2000a) secondary industries related with leather industry are textile, chemicals, machinery and accessories. Other related industries are packaging, cosmetics, rendering and glue industry. Based on the findings of the input-output tables of Turkish manufacturing industry, Leather agglomerations consist of the subsectors that are mostly classified under the category of low tech industries (Appendix 18). Agglomeration with similar subsectors is classified under the same title in Akgüngör (2002) , but was not identified as an agglomeration in Akgüngör (2006).

After the identification of industries we can explore the change in locational pattern of identified agglomerations of industries on the geographical scale between 1980 and 2001. Agglomerations of low technology industries - Textile, Leather, Paper and Publishing, Production and Processing of Field Crops and Packaged Food Products- show the most dramatically changing patterns in terms of changing locations (Table 5.10 and Appendix 19-20). In a similar study by Forslid et al. (2002) textiles, leather and food products industries which get increasingly concentrated as integration proceeds are exactly the same industries that exhibit significant changes in location patterns. It can be expected that low wage industries presumably are mainly labor intensive and they look for cheap locations and prefer to concentrate there because as Davis and Weinstein (1999) suggests in industries where linkages are not important determinants, weakly linked industries are the first to relocate in response to cost differentials since they benefit less from being close to other industries. Brülhart (1998) finds that the strongest localization trends appear in labor intensive industries, which

concentrate in peripheral regions. In the integration process it is expected to see a core periphery pattern in low technology agglomerations of industries.

In the literature, concerning the characteristics of high technology industries, such as metals, chemicals, transport equipment and machinery, it is supported that substantial increasing returns to scale and the presence of intra industry linkages make proximity to markets and self-reinforcing forces important determinants of the location of production in these industries (Forslid et al., 2002). Similarly, a positive correlation between relative wage costs and location is expected in the study of Hildebrandt and Wörz (2004) for the following reason: high wage industries will respond in their location decision more strongly due to factors such as, endowment with human capital, consequently they will concentrate in those countries/regions that offer appropriate conditions and thus justify paying high wages. This confirms our previous findings on Turkish manufacturing industry that existence of scale economies is a significant determinant of localization particularly in high technology industries of Turkish manufacturing industry.

New Economic Geography Theory mainly suggests that stronger linkages tie firms tightly to existing agglomerations whereas weakly linked industries are the first to relocate in response to cost differentials since they benefit less from being close to other industries (Davis and Weinstein, 1999). Findings on the inverse relation between linkages and agglomeration particularly in the high technology industries in Turkey may seem to be contradictory but if linkages are not important determinants of high technology industries it is less likely that they show any differentiating locational change. As integration proceeds these sectors increase their concentration in the core regions, close to the larger markets. Hence they were initially all rather concentrated in the core regions in the 80s and integration does not have any significant effect on high technology industries. In the study of Brülhart (1998) it is also suggested for the EU integration period that high technology industries are strongly localized but they show no core-periphery gradient. Therefore, it can be expected that high technology industries exhibit

relatively stable patterns of localization. As expected, agglomerations of high technology industries – Chemicals, Engineering, Stone and Natural Resources Based Industries - show relatively stable patterns in terms of changing locations compared with agglomerations of low technology industries (Table 5.10 and Appendix 19-20).

Table 5.10: Average Absolute Change in Location Quotients of Agglomerations (1980-2001)

Regions (NUTS2)	High Technology Agglomerations				Low Technology Agglomerations				
	Chemicals	Engineering	Stone Based	Natural Res. Based	Leather	Paper and publishing	Pack.Food Products	Pr.Field Crops	Textile
İstanbul	0,32	0,04	0,53	0,08	0,71	0,13	0,23	0,01	0,02
Ankara	0,51	0,02	0,2	0,36	0,56	1,32	1,75	0,26	0,32
İzmir	0,28	0,49	0,22	0,13	0,75	0,37	0,12	0,3	0,19
Bursa	0,64	0,33	0,57	0,58	0,2	0,37	0,13	0,53	0,45
Kocaeli	0,87	0,08	0,42	1,13		0,45	0,39	0,5	0,3
Tekirdağ		0,42	0,48	0,14		0,29	0,58	2,57	0,85
Adana		0,35	0,84	0,76	0,12	0,55	0,41	0,4	1,9
Aydın	0,61	0,11	0,3	0,06		5,55	0,14	0,08	0,02
Antalya	8,87	0,39	0,78	0,71			0,42	3,3	0,13
Balıkesir	0,81	0,06	0,3	0,05	1,94	1,48	5,4	1,29	0,46
Zonguldak		0,85	0,3	0,28		0,62	0,48		
Manisa	0,57	0,29	0,79	0,16	2,49	0,84	1,86	0,66	0,43
Konya		0,29	0,48	0,1		0,98	0,61	0,41	0,14
Gaziantep		0,02	0,38	0,07	0,43		0,32	0,7	0,75
Hatay		1,29	0,07	0,03			0,03	2,17	0,41
Kayseri		0,28	0,42	3,09			0,19	0,09	1,42
Kırıkkale	1,66	1,63	2,89	2,61			0,99	3,04	0,77
Samsun		0,51	0,03	0,13	1,14		0,24	6,4	
Trabzon	0,28	0,09	0,14	5,4		0,06	0,17	0,42	
Malatya		1,26	0,75	0,07			0,64	5,04	
Kastamonu			0,83			5,25	0,41	0,71	0,05
Erzurum		0,3	0,5	0,34	9,22		1,27	9,61	1,07
Şanlıurfa		0,49	1,41	0			2,22	1,51	0,13
Mardin			1,26	11,96			1,39	1,13	0,01
Ağrı			2,09		14,97		10,13	15,31	
Van			1,21		9,28		2,74	8,54	0,32
Average Change	1,402	0,436	0,700	1,228	3,484	1,304	1,279	2,599	0,483
Average Change	0,94				1,83				

Considering the changing location patterns of lower technology industries - Leather, Paper and Publishing, Packaged Food Products, Production and Processing of Field Crops, Textile- we observe that most of these industries exhibit changing patterns of localization. Considering the agglomerations of leather industries in terms of changing locations it can be observed that agglomerations of leather industries have expanded from the core towards eastern peripheral regions since 1980. In 1980, agglomerations of leather industries had been distributed among İstanbul, İzmir, Ankara and Adana regions which at the same time have been the four biggest regions in the country (Appendix 21). DPT (2000a) report shows that leather industry was located nearby water streams, close to big settlements mainly in the form of workshops. In time, due to deformed urbanization, establishments remained in the middle of settlement areas with no infrastructure to build waste treatment facilities and to adapt new technologies. Industry related with tanning and dressing of leather had to move to organized industry areas in the 90s due to increasing demand and the need of bigger production facilities. Many firms have moved away from Kazlıçeşme/İstanbul to periphery areas of İstanbul such as Çorlu, Bursa and Gerede in the 90s (DPT, 2000a). Central production area of İstanbul, Kazlıçeşme has been moved to Tuzla Organized Industry Zone, Yeşildere and central production area of İzmir, Yeşildere has been moved to Menderes Organized Industry Zone. İstanbul is still a central place of production of leather products, for instance manufacture of luggage, handbags, saddlery and harness is located mainly in Mercan/İstanbul. Manufacture of footwear is located in İstanbul as well, some of the publicly owned firms are located in Kars, Van and Erzincan (DPT, 2000a). Analyzing the picture in 2001, it can be observed that the production location has spread to peripheries of the four core regions namely to Balıkesir, Manisa, Bursa, Samsun and Gaziantep (Appendix 22).

In Appendix 22 it can also be seen that production of leather has emerged in three regions located on the east border of Turkey; Erzurum, Ağrı and Van. The reasons why leather agglomeration expands so substantially in peripheral regions can be explained by the comparative advantage of peripheral regions in the production of

unskilled labor-intensive goods and the increasing demand from the Russian market. After 1994 increasing demand from Russia and the other Eastern Block countries has caused the production capacity of the Turkish leather sector to increase above 80 % between 1995 and 1998 until the economic crisis in Russia in 1998 which has caused the leather industry to decrease its capacity usage rate to the level of 30-40 % (DPT, 2000a).

Starting from 70s it has been observed that the location of leather production in the world has changed in the same way as it changed in Turkey. During the integration period, developed countries started to leave production to underdeveloped and developing countries due to environmental concerns, heavy use of water in the sector, increasing operation and labor costs. Especially after the second half of 80s, the collapse of USSR and Eastern Block, central production location preferences of leather industries in Europe have changed towards eastern countries, it has been reported that every year 100 million pairs of shoes production shifts from Europe to Far East countries. This changing trend is observed in manufacture of footwear in a faster manner because of low investment need of the sector. Empirical studies on EU demonstrate that leather industry in Europe as well exhibits a locational pattern towards periphery due to integration. Agglomeration takes place only in Europe South because the leather production of Europe South is more than twice as large as in any other European region and south region has comparative advantage in labor intensive production (Forslid et.al., 1999).

Considering the change in agricultural industries (production and processing of field crops and packaged food products) leads us to the same pattern of change; expansion from the cores towards eastern peripheral regions since 1980. In 1980 agricultural industries are mainly located in Ankara and its periphery regions (production of cereals), in Samsun (production of tobacco), in İzmir and its periphery regions (production of fruit and vegetables), in Şanlıurfa (food products) and in Balıkesir (food products) (Appendix 23 and 25). In 2001, specializations of eastern peripheral regions in these industries increase

(Appendix 24 and 26). Especially in Erzurum, Ağrı and Van, all of which have the same industry structures and specialize in food products, mainly in production of field crops and sugar (DPT, 2006). Krugman (1991) states that regions with an initial scale advantage in particular sectors would see their advantage reinforced in those sectors in the integration period, the place where agglomeration happens could be the result of a historical accident, one small change in the share of manufacturing in a region may then set off a chain reaction (Traistaru et al, 2003).

Considering the change in textiles it can again be seen that textiles move out of central regions into peripheral regions. In 1980, textile production was concentrated in Adana, Aydın, Kayseri and Gaziantep (Appendix 27). In 2001, we see that textile industry has expanded to peripheral regions from the core regions leaving only Gaziantep and Aydın regions as relatively the most concentrated regions in the textile industry (Appendix 28). DPT (2001c) report suggests that core regions of İstanbul and İzmir should concentrate on more value added textile related industries such as design and marketing of textile and production of textile products should be switched to Anatolia. Eraydın (2000) states that some of the textile firms prefer to expand their production facilities outside of İstanbul due to high wages and look for new production places in Anatolia and Trachea. In the agglomeration of paper and publishing industry, a similar pattern of change in location can be observed. This time again the agglomeration moves towards the east but does not expand over to the eastern peripheral regions (Appendix 29 and 30). In the study of Hildebrandt and Wörz (2004) in CEECs the production of pulp and paper is concentrated mainly in large countries as well.

Considering the changing location patterns of higher technology industries - Engineering, Chemicals, Stone Based, Natural Resources Based- we observe that most of these industries exhibit relatively stable patterns of localization. Mainly they are all rather concentrated around the two largest core regions, İstanbul, Ankara and their peripheral regions. As integration proceeds these sectors increase their concentration in the core regions, close to the larger markets. Hence they were initially all rather concentrated in the core regions in the 80s.

Although engineering has concentrated in core areas of İstanbul, Ankara, Konya and Adana regions both in 1980 and 2001, it has also been rather dispersed to all regions of the country (Appendix 31 and 32). Previous studies demonstrate that the employment share of engineering increased in traditional industry regions such as İstanbul, İzmir and Ankara as well as newly developing industry districts such as Yozgat, Çankırı, Çorum, Niğde, Nevşehir, Kırşehir, Samsun and Eskişehir. In Akgüngör (2006) the reason for such concentration in space is that firms located particularly in Konya provide parts and supplies to the automotive industry in Bursa and its vicinity (İstanbul region). Konya and Eskişehir regions with rich mining resources as well as their suitable geographic locations to major industry centers provide unique opportunities for the development of machinery industry. Existence of textile related machinery is another explanation of the presence of engineering related industries in dispersed locations due to the dispersed structure of textile industry.

There has not been much change in the distribution of agglomerations of chemical industry during the integration period between 1980-2001; chemicals industry is mainly located in the western side of Turkey and has expanded only to the regions of Kırıkkale, Manisa and Aydın which are located at the periphery of core regions (Appendix 32 and 33). Particularly Kırıkkale has been a region that has experienced significant changes since 1980 with the development of high technology industries in the region, especially with the opening of Kırıkkale refinery in 1986. Kırıkkale has also been specialized in the production of guns and weapons, tractor and machinery for forestry (DPT, 2006). One of the high technology industries of the chemicals industry is manufacturing of drugs, one of the sectors that increases its concentration in core regions. Drugs industry has been located mainly (90 % of total production) in İstanbul, Kocaeli and Tekirdağ due to existence of health institutions, packaging facilities and availability of technical personnel. Drugs are produced mainly in developed countries in the world and EU countries produce 40 % of the world production (DPT,2001b).

CHAPTER 6

CONCLUSION

6.1 Discussion of Results

The main objective of this research is to study the change in spatial concentration patterns of Turkish manufacturing industry during the integration period based on the predictions of the New Economic Geography Theory. The term covers the period between 1980 and 2001 during which Turkey liberalized its trade and established a Customs Union with the EU.

Spatial concentration patterns are analyzed using two measures of concentration; specialization of regions and geographical concentration of industries. The findings reveal that average value of both measures have increased during the integration period thus supporting the prediction developed by Krugman (1991a) and supporting Hypothesis 1 that has been developed for Turkey that regions become more specialized and industries become more concentrated with integration.

Findings on regional specialization reveal that most of the regions with specializations above the average are located in the eastern side of the country and most of the regions with specializations below the average are located in the western side of the country. Comparing the change in regional specialization levels of regions between 1980 and 2001, it can be observed that there is a

changing trend away from the core towards the periphery. Eastern regions have become even more specialized in time.

When the increase in geographical concentration is analyzed based on the industries' group-wise average Gini coefficients computations (groups are categorized according to the OECD (1987) classification system) it is seen that average value of high tech industries show the highest change over time although the concentration of high tech and medium high tech industries is lower than the average for all years. On the other hand, concentration of low tech and medium low tech industries is higher than the average for all years whereas their concentrations have increased below the average over time. It is therefore possible to state that industrial concentration of Turkey's manufacturing sector have changed in favor of engineering related sectors against labor based and resource based sectors. This finding is compatible with the changing industry structure in Turkey, particularly after 1980, when the industry structure changed in favor of private enterprise which gave way to the development of engineering related industries as well as high tech industries.

The general approach to measure the change in spatial concentration over time employed so far in testing the assumptions and predictions of New Economic Theory is a crude strategy because the interpretation of the results as evidence of New Economic Geography relies upon the assumption that trade costs are the only variable changing over time. This way the reasons behind agglomeration are explained without considering the possible effects of other factors that are subject of other theories. Therefore to estimate the contribution of various factors the measure of geographical concentration is regressed over a set of determinants to identify the determinants of the Turkish manufacturing industry and to identify if integration has a direct effect in this period. An econometric study is conducted where the dependent variable is the geographical concentration index and the independent and control variables are the variables that represent different characteristics identified in the competing theories.

It can be argued that looking at aggregate trends and determinants is misleading hence aggregate results might obscure different patterns within certain types of sectors. In order to see whether different patterns exist within the Turkish manufacturing industry, determinants of geographical concentration are analyzed based on different industry groups; high and medium high technology industries and low and medium low technology industries. As a result of the dominance of low technology industries in the manufacturing industry of Turkey it was expected to see that results similar with the general trend would be achieved in the category of low technology industries. However, high and medium high technology industries showed different patterns of geographical concentration.

In testing Hypothesis 1, findings of the econometric analysis show that the effect of the customs union with the EU after 1996 is statistically significant. This result indicates that Turkey's economic integration with the EU is a significant factor in explaining the change in industry concentration thus supporting Hypothesis 1 that economic integration caused geographical concentration of industries to increase in Turkey. This result is in accordance with the prediction of the New Economic Geography theory.

Considering the effect of integration on the concentration patterns of different industry groups it has been found that integration has a significant effect on low and medium low level industries whereas no significant effect can be observed on high and medium high industries. Lower technology industries are those which are affected significantly by the integration process.

In testing Hypothesis 2, findings of the econometric analysis show that geographical concentration and scale economies have parallels and industries subject to high scale economies have become more geographically concentrated in the Turkish manufacturing industry. This result is in accordance with the New Trade Theory (Krugman, 1980; Krugman and Venables, 1995) which can be expected as a partial support for New Economic Geography Theory because in New Economic Geography Theory linkages only become economically

meaningful in the presence of sufficiently strong scale economies. Nevertheless, findings do not support Hypothesis 2 developed in this research based on New Economic Geography Theory.

Considering the determinants of the geographical concentration of different industry groups it has been found that although the variable supporting the New Trade Theory is again found to be significant in explaining concentration of high and medium high technology industries, this time New Economic Geography variable has a significant negative effect on concentration thus representing evidence against New Economic Geography theory. New Economic Geography theory brings the explanation itself by stating that firms become less dependent on the local market since their focus shifts to the bigger external market and this process weakens linkage advantages particularly in developing countries (Krugman and Livas, 1996). Therefore, in the case of Turkey the findings support that linkages particularly in the high technology industries may have weakened as the economy is opened to external trade.

Looking at the change in pattern of geographical concentration of industries between 1980 and 2001 it has been found that the spatial pattern of change between industries among regions has resulted in a core periphery pattern. These discussions confirm the predictions of the Krugman hypothesis which expects the integration process to result in a core periphery pattern where the core gets specialized in increasing returns to scale industries and the periphery in industries with constant returns, perfect competition, and low income potential (Krugman, 1991a).

Exploring the pattern of supply and demand linkages in Turkey, results reveal that the pattern of supply and demand side transactions across the industries cause the related industries to form agglomerations of industries in Turkey. Ten agglomerations have been identified in the Turkish manufacturing industry with respect to inter-industry selling and purchasing relationships. When the

agglomerations are classified on their technology level (OECD Categorization) agglomerations of low technology industries which are characterized with weak intraindustry linkages - Textile, Leather, Paper and Publishing, Production and Processing of Field Crops and Packaged Food Products- show the most dramatically changing patterns in terms of changing locations. Agglomerations of high technology industries – Chemicals, Engineering, Stone and Natural Resources Based Industries which are characterized with strong intraindustry linkages - show relatively stable patterns in terms of changing locations compared with agglomerations of low technology industries. New Economic Geography Theory mainly suggests that stronger linkages tie firms tightly to existing agglomerations whereas weakly linked industries are the first to relocate in response to cost differentials since they benefit less from being close to other industries.

These different findings on industry groups show that determinants of concentration and the effects of integration are highly region and sector specific (Table 6.1). Although the findings of the overall manufacturing industry in Turkey partly support the predictions of New Economic Geography, the findings based on different industry groups either partly support the predictions of New Economic Geography Theory or support evidence against New Economic Geography Theory.

Table 6.1: Summary of Empirical Findings

	Empirical Results	
	Low technology Industries	High technology Industries
Determinants of Concentration	scale economies (positive correlation)	scale economies (positive correlation) linkages (negative correlation)
Integration Effects	significant effect	no effect
Change in Location	from core to periphery	Stable
Concentration Level	Above country average	Below country average
Change in Concentration Level	Increase below the country average	Increase above the country average

Source: Compiled by the author.

Theoretical work on New Economic Geography has a longer history starting from 90s compared with the empirical works which have tested New Economic Geography in a serious way starting from 1995. As it was evidenced in the empirical literature review, there is not much consensus on the data, the methodology or the results in the empirical studies that ask similar questions for different countries or unions of countries. There are numbers of explanations that are consistent with the findings and not much yet that strongly points out to the explanation offered by New Economic Geography. As the pioneer of the New Economic Geography Theory, Krugman (1998, p.173) acknowledges; “Serious empirical work remains to be carried out and the New Economic Geography Theory has been more successful at raising questions than at answering them, better at creating a language with which to discuss issues than at creating the tools to resolve those discussions”.

6.2 Policy Implications

Spatial change caused by integration has policy significance for various reasons but the mostly argued reason stems from the long-standing concern that economic integration may be associated with increased inequality between regions. There are two important issues to be asked in the context of integration; the first one is if there are existing initial inequalities between countries will these be amplified or diminished by the integration process? The second is, whatever the initial differences are, might integration cause economic activity to agglomerate in particular locations, thereby creating inequality? Based on the answers given to these questions what will be the appropriate policy implications to be imposed in integrated regions?

Theoretical models bring out explanations to the subject in two broad mainstreams. According to the neo-classical theory income disparities between regions are explained on the basis of differences between regions in their endowments of natural resources, factors of production, infrastructure or technology. In this context the removal of obstacles from the movement of goods

and factors would by itself cause convergence because economic integration would lead regions to specialize according to their comparative advantage. The policy implications of this approach support that any direct state intervention should be refused as it would only postpone the adjustment process. A direct state intervention in favor of the lagging regions would be economically inefficient. Subsidies to firms or transfers to households are to be avoided as they are ineffective (Feragina, Pastore, 2003).

Recent empirical analyses show that production of firms close to large markets increases and large markets attract more firms which create a cumulative causation process and as a result regional differences increase. New Economic Geography brings both these convergence and divergence forces together in a common analytical framework and explains the evolution of regional inequalities during a process of economic integration and the role of regional policy in this environment.

The policy implications of New Economic Geography would be those interventions aimed at increasing local demand via transfers to incomes of workers and firms in peripheral regions or at increasing the potential of local supply via increasing the factor or technological endowment of a region. Although interventions that increase local demand could have a positive impact on peripheral regions such advantages can be short-lived and if transportation costs are low could benefit the core regions rather than the peripheral regions. Moreover, supply constraints could prevent the ability of peripheral regions to take advantage of the increased local demand. Vice versa increasing the supply potential of local economies could have an important impact on peripheral regions increasing their ability to develop new types of production. Nonetheless such advantages could be mitigated by lower market size and high labor mobility of skilled workers (Feragina, Pastore, 2003).

Besides the explanations of the theories, it is also possible to assess the results of policy implications in real world conditions because at the end of 2006 many of

the older Member States have been the beneficiaries of EU regional policy for more than 30 years. Despite the efforts in this time period, profound regional income disparities exist, especially peripheral regions continue to lag behind in employment, productivity and wages (Puga, 2002; Brakman et.al.,2005). Well known attempts of regional policy implications to bridge the gap between regions in EU are of Italy between the Mezzogiorno and the North, of Germany between the Neue Lander and the West, and of the European Commission to reduce regional disparities in general.

At the heart of the process of implementing EU regional policy is the reform of Structural Funds formed in 1988. The first ‘objective’ of this main instrument is ‘promoting the development and structural adjustment of regions whose development is lagging behind’. The Structural Funds account for over 30 % of total EU budget for the 2000-2006 period and 69.7 % of the Fund is allocated to Objective 1. Despite these large regional policy expenditures regional inequalities in Europe have not narrowed substantially over the last two decades and by some measures have even widened (Puga, 2002). Over the past fifteen years while inequalities between regions within each member state have risen, conversely income differences across Member states have reduced. In countries experiencing higher growth compared to the EU average, the gap between the income level in the richest and the poorest regions within the country has increased but the gap between the income level of the poorest regions to the EU average has reduced (Feragina, Pastore, 2003; Puga, 2002; Boldrin, Canova, 2001).

Another implementation that regional policy is biased towards is investment in infrastructure because it is accepted that adequate infrastructure adds to competitiveness and competitiveness adds to regional growth. Hence improving infrastructure helps lagging regions to catch up (Brakman et al., 2005). One of the main instruments to reduce regional inequalities in EU is the improvement of transport infrastructure. The Trans European Transport Network will give much of the EU better access to the main activity centers. However it is not obvious that lower transport costs facilitate convergence. A better connection between two

regions with different development levels not only gives firms in a less developed region better access to the inputs and markets of more developed regions. It also makes it easier for firms in richer regions to supply poorer regions at a distance and can thus harm the industrialization prospects of less developed areas. The gap in relative accessibility between core and peripheral areas is likely to increase as a result of the new infrastructure, which reinforces the position of core regions as transport hubs as well. Brakman et.al (2005) also stresses that large infrastructure projects are hazardous instruments, if they push the freeness of trade beyond a point they trigger dominance of agglomeration forces which harm the periphery. Infrastructure may thus accelerate a drift to the core. Therefore policy impact may be adverse as core regions may benefit disproportionately in the long run (Brakman et al., 2005; Puga,2002).

This picture is in consistency with the New Economic Geography theory explanations given before. It can be stated that New Economic Geography models not only point out potential ambiguity in the impact of lower transport costs on less developed regions, but they also show that the overall effect depends on certain aspects of the economic environment (Puga,2002).

Although there may be many explanations on the effects of policy other than economic issues³¹, theory, descriptive statistics and econometric analysis also support the conclusion that European economic geography is characterized by a network of local and stable core periphery systems. This implies that disparities between core regions and their peripheries are hard to change and regional policies targeted on peripheries tend to be insufficient to counter centripetal market forces (Brakman et al., 2005). Boldrin and Canova (2001) find no econometric evidence that Structural Funds have had a positive impact upon growth rates of either labor or total factor productivity in the poorer regions.

³¹ One of them being the implementation failures of the Structural Funds which is a highly complex process imposed onto the constitutional and institutional frameworks of individual Member States. The main conflict issues are; implementation differences between countries, variation in administrative arrangement within countries, dominant role of government authorities, differences between national and EU regional policies and management deficits at every level (Bachtler, 2003).

Besides evaluation of the impact of economic integration versus regional policy on geographical changes is difficult because the integration process has started in the presence of increased EU transfers to peripheral regions under the umbrella of regional policy (Ferragina and Pastore, 2003).

The enlargement process of the EU is another challenge for EU regional policies because enlargement to low income countries will increase differentials between rich and poor members even more. Based on the predictions of New Economic Geography, capital areas in the East that are closer to the EU core will implement a fast growth process which peripheral areas will not. Considering different dimensions, that in all CEECs there are already big gaps at both national and regional level, the way European regional policy is implemented and budget constraints of the policy, it can be seen that in the literature a consensus has been reached that the enlargement calls for a complete rethinking of the EU regional policy. Ferragina and Pastore (2003) state that the necessary process of catching-up, modernizing, stabilizing and adjusting industrial structures raises the issue whether regional policy ought to support primarily backward regions in the CEECs or the national growth poles. Brakman et al. (2005) similarly state that a focus of regional policy on local agglomerations, which have a realistic chance to hold on to economic activity, is desirable. Porter (2003) suggests that regions should focus on upgrading the productivity of all clusters in which they have a meaningful position rather than attempting to migrate to more desirable clusters.

If the policy implications in Turkey are analyzed it can be seen that after 1980 the spatial reflections of the new policies on export base development and decentralization policy of industrial activities from metropolitan cities caused industrial expansion in the adjacent provinces of metropolitan regions. However, there exist significant differences between Turkish regions, which are pronounced as the East West divide. Since 1980s there have been high rates of growth in Turkish economy as a whole but the analyses indicate that regional disparities have been increasing (Gezici, Hewings, 2004). The difference between development divide measure compared with Marmara region has been 5 years for

Aegean region, 14 years for Mediterranean region, 18 years for Central Anatolian Region, 20 years for Black Sea Region , 72 years for South East Anatolia Region and 128 years for East Anatolia Region (DPT, 2000b).

The main objectives of regional policies in Turkey have been the “minimization of regional disparities, avoidance of disorder in the process of urbanization and the development of metropolitan areas” (Ministry of Foreign Affairs, 2001). The responsible institution in implementing and developing policies is the DPT (State Planning Organization).

Turkish governments have implemented regional policies to reduce regional disparities, especially during the planned period under the Five Year Development Plans starting from 1960s. Main regional political implication in favor of lagging regions has been the introduction of KÖY (Priority Provinces for Development) in 1968 meaning provinces endowed with a set of incentives. The incentives mainly aim to control and lead the allocation of public and private sources in such a way to attract firms and investments to lagging regions. The main instrument of the policy is that these regions receive higher shares of total public investments and private investment that choose to locate in these regions gain privileges through differentiated instruments such as, discounts in investment charges, exemption from customs, housing taxes, value added tax, stamp duties and credit allocation from the investment encouragement fund.

The amount of investments benefiting from incentives given has reached 12,5 % of GNP between 1978-1982, 16,5 % between 1983-1987, 10 % between 1988-1992, 13,5 % between 1993-1997 (Turkey signed CU agreement in this period) and 7,3 % between 1998-2000, in 2001 it has only been 5,6 % of GNP (Şenses, Taymaz, 2003). Concerning the share of private investment incentives, in the 1990-1997 period KÖY regions take 13,69 % while İstanbul takes 18,94 %. Gezici (2000) interprets the results of this comparison as the failure of the policy of directing investments and stimulating private sector investments to the KÖYs.

In the 1980-1988 period the share of incentives given to manufacturing industry decreased from 75 % to 6 %, tourism and other service industries gained precedence. Among the manufacturing industries 50 % of incentives were given to textile and food products industries between 1968-1997. Another characteristic of the period after 1980 was to give precedence in incentives to sectors and firms that made exportation (Şenses, Taymaz,2003).

Another policy implication is the public investment in infrastructure of lagging regions. In 1989 public investment of Southeastern Anatolia Project (GAP) has been launched which aimed not only improvements in the region of South Eastern Anatolia but in the rest of the country as well. The project which started as an integrated multi sector regional development program has become a human-focused sustainable development project in time. The project constitutes 10 % of the surface area and population of the country and by the beginning of 2002 the total spending was 15 billion dollars with a cash realization ratio of 48 %. In the period 1995-2000 the number of industrial enterprises almost doubled in the region and the share of the region in total value added has reached from 2 % to 4 % (Prime Ministry GAP Regional Development Administration, 2001). Industrial enterprises in the region concentrate mostly in foodstuff and textiles (Prime Ministry GAP Regional Development Administration, 2001). Between 1997 and 2001 due to South Anatolian project agriculture in Şanlıurfa has grown above the Turkish average (DPT, 2006). DPT has initiated other similar regional development projects in regions such as, Eastern Anatolia and Black Sea.

Although state tried to lead resource allocation either directly or indirectly to decrease regional disparities, factors of development have continued to concentrate in the west side. State Planning Organization studies state that the regional policies adopted have not been successful enough to decrease the regional disparities (DPT, 2003). During the period of policy implications although some of the regions have gained benefits, such as Gaziantep, Bilecik, Kahramanmaraş, Denizli, Çorum and Malatya it can not be stated that the reason behind their success is incentives given but rather the market size, raw material

endowment, local infrastructure and transportation availabilities of regions. For instance in 1998, only 39 out of 119 firm has benefited from incentives in Malatya, 14 out of 126 in Karaman, 63 out of 183 in Çorum (DPT, 2000b).

The impact of public capital on private sector investment in the manufacturing sector is studied by Karadağ et al. (2004) for the period 1980-2000 in seven Turkish regions³². The empirical results are based on VAR estimates using private output, labor and capital and public capital. As a result it is found that the effect of public capital formation on the output of manufacturing is positive for the regions Marmara, Aegean, Central Anatolia, southeastern Anatolia, Eastern Anatolia but not for Mediterranean and Black Sea Regions. Only in Marmara region elasticity values are positive for both input and output values which mean that public investments promote growth through regional agglomeration economies. Public capital formation in Turkey had a considerable positive contribution to aggregate private sector output performance but had a negative effect on the balanced regional development dramatically. In the study of Gezici and Hewings (2004) it is emphasized that in the 1980s externally oriented policies and the focus on application for membership in the EU have generated privileges to the metropolitan cities and stimulated the concentration of fastest growing activities in large cities which caused policy conflicts. As a result, these policy conflicts have neutralized the attempts to reduce regional disparities and sustained core-periphery disparities.

Starting from the Eighth Development Plan in 2001 the need for new regional policies and political instruments has been pronounced and State Planning Organization has started to conduct studies on new regional development policies that aim to establish an incentive system which focuses on regional and industrial differences in Turkey (DPT, 2006a, 2006b). Ninth Development Plan determines new instruments of regional development for the years 2007-2013 which are integrated analysis of local production structures, so that different policies can be developed for different regions, cooperation between firms and local governments

³² The traditional classification of Turkey into 7 regions is based on topologic and climatic differences.

particularly in innovation, local knowledge accumulation and knowledge sharing between regions (DPT, 2006b).

As it has been stated in the research objectives, one of the aims of this research is to contribute to recent discussions on new regional development policies in Turkey. Findings of this research support that different patterns of concentration exist for different types of industries and different types of regions. Therefore the main strategy put forward in the studies of DPT (DPT, 2006a, 2006b) which propose an incentive system that focuses on regional and industrial differences in Turkey is supported. Instead of policies that support only a region or an industry, dynamics of geographical concentration of industries in particular regions should be determined and the industry in that particular region should be supported through appropriate policies.

6.3 Further Research Areas

The empirical findings of this research have pointed out two areas that lack empirical research for Turkey; the effect of integration on particular industries' geographical concentration/particular regions' specialization patterns and the effect of external trade on geographical concentration patterns of industries.

Concerning the first suggested research area, if regions can be classified according to their specializations it may be possible to investigate the effect of integration on particular regions because it creates a difference for the effects of integration on a region whether this region is a traditional coal and iron location or a high tech industry location. The analysis of identification of agglomerations based on their input-output structure is a significant step in a more comprehensive analysis of regions' specialization patterns. If agglomerations of industries can be identified it may be possible to investigate the effect of integration on particular agglomerations of industries as well because findings of this research on the determinants of geographical concentration also suggest that there are differences

across agglomerations of industries with respect to the factors that determine industrial location patterns.

Another finding of this research which supports evidence against New Economic Geography Theory shows that the effect of external trade on concentration of industries needs to be studied empirically. Related with this issue, the effect of foreign direct investment on concentration, the effect of multinational organizations' location strategies on concentration could be the most appealing research topics.

A related research area could be the analysis of the effect of diversification versus concentration, whether diversification or concentration contributes more to the economic development of a region. The effect of concentration or diversification on regions' economic performances could lead to studies that compare the effects of diversity of agglomerations in a region with diversity of industries. A suggested further study could be examining the relation between regional economic performances and agglomerations of industries rather than industries because the industry may not be the appropriate unit of analysis. Based on the cluster perspective by Porter (2000) the relevant knowledge spillovers that affect performance should be stronger within agglomerations and among related industries. Hence it could be expected that specialization in agglomerations, not in industries, should lead to higher performance. Therefore agglomerations' role in economic performance of Turkish regions or agglomerations as factors in regional economic performance should be studied.

REFERENCES

- Aiginger, K., Davies, S.W. (2004). "Industrial Specialization and Geographic Concentration: two sides of the same coin? Not for the European Union", *Journal of Applied Economics* 7(2), 231-248.
- Aiginger, K., Leitner W. (2002). "Regional Concentration in the USA and Europe; Who Follows Whom? ". *Welwirtschaftliches Archiv* 138, 1-28.
- Aiginger, K., Pfaffermayr, M. (2004). "The Single Market and Geographic Concentration in Europe", *Review of International Economics* 12(1), 1-11.
- Aiginger, K., Rossi-Hansberg, E. (2003). "Specialization versus concentration: A Note on Theory and Evidence", Mimeo, University of Linz.
- Akgüngör, S. (2006). "Geographic Concentrations in Turkey's Manufacturing Industry: The Turkish Case", *European Planning Studies* 14(2), 169-197.
- Akgüngör, S. (2002). "Innovativeness Within Industrial Relationships: A Case Study of Industry Clusters In Turkey", (Academy of Marketing Science, Multicultural Marketing Conference Proceedings, Valencia, Spain, June 26-29 2002, ed. by. Salah S. Hassan, Enrique Bigne, J.S. (Vic) Johar, 730-746)
- Akgüngör, S., Falcioğlu, P. (2005). "European Integration and Regional Specialization Patterns in Turkish Manufacturing Industry", (in: Coskun Can Aktan-Ed., Selected Proceedings of the First International Conference,) İzmir, Turkey: Yaşar University, 291-307.
- Akgüngör S., Barbaros R.F., Kumral N. (2002). "Competitiveness of the Turkish Fruit and Vegetable Processing Industry in the European Union Market", *Russian & East European Finance & Trade* 38(3), 34-53.
- Akgüngör, S., Kumral N., Lenger, A. (2003). "National Industry Clusters and Regional Specializations in Turkey", *European Planning Studies* 11(6), 647-670.
- Alonso,W. (1960). "A Theory of the Urban Land Market", *Papers and Proceedings of the Regional Science Association* 6, 149-58.

Alonso, W. (1973). "National Interregional Demographic Accounts: A Prototype.", Rep. No:17, Institute of Urban and Regional Development, University of California, Berkley.

Amiti, M. (1999). "Specialization Patterns in Europe", *Weltwirtschaftliches Archiv* 135(4), 573-93.

Amiti, M. (1998). "New Trade Theories and Industrial Location in the EU: A Survey of Evidence", *Oxford Review of Economic Policy* 14(2), 45-53.

Audretsch, D., Feldman, M. (1996). "R&D Spillovers and the Geography of Innovation", *American Economic Review* 86(3), 630-640.

Bachtler, J. (2003). "The Implementation of EU Regional Policy: Experience from EU-15 Member States", Conference Almanac Readiness of the Candidate Countries for the EU Regional Policy. www.sfpa.sk.

Baldwin, R., Wyplosz, C. (2004). *Economics of European Integration*, Mc Graw Hill.

Bergman, E.B., Feser, E.J. (1999). *Industrial and Regional Clusters: Concepts and Comparative Applications*, The Web Book of Regional Science. Regional Research Institute: West Virginia University.

Boldrin, M., Canova, F. (2001). "Inequality and convergence in Europe's regions: reconsidering European regional policies". *Economic Policy* 16(32), 205-254.

Brakman, S., Garretsen, H. (2003). "Rethinking the 'New' Geographical Economics", *Regional Studies* 37(6&7), 637-648.

Brakman, S., Garretsen, H., Gorter, J., Van Der Horst, A., Schramm, M. (2005). "New Economic Geography, Empirics and Regional Policy", accessed from feweb.vu.nl/Ersa_2005/final-papers/236.pdf. on 1st of February, 2007.

Braunerhjelm, P., Faini, R., Norman, V., Ruane, F., and Seabright, P. (2000). *Integration and the regions of Europe: How the right policies can prevent polarization*. CEPR.

Brühlhart, M. (1995). "Industrial Specialization In the EU: A Test of the New Trade Theory", Trinity Economic Paper Series, 95/5.

Brühlhart, M. (2006). "The Fading Attraction of Central Regions: An Empirical Note on Core-Periphery Gradients in Western Europe", *Spatial Economic Analysis* 1(2), 227-236.

Brühlhart, M. (2001a). "Evolving Geographical Concentration of European Manufacturing Industries", *Weltwirtschaftliches Archiv* 137(2), 215-243.

Brühlhart, M. (2001b). "Growing alike or growing apart? Industrial Specialization of EU Countries", (in: Wyplosz C.-Ed., *The Impact of EMU on Europe and Developing Countries*.) Oxford: Oxford University Press.

Brühlhart, M. (1998a). "Economic Geography, Industry Location and Trade: The Evidence", *World Economy* 21(6), 775-802.

Brühlhart, M. (1998b). "Trading Places: Industrial Specialization in the European Union", *Journal of Common Market Studies* 3(36), 319-346.

Brühlhart, M., Torstensson, J. (1996). "Regional Integration, Scale Economies and Industry Location in the European Union", CEPR Discussion Paper No. 1435.

Brühlhart, M., Traeger, R. (2005). "An account of Geographic Concentration Patterns in Europe", *Regional Science and Urban Economics* 35(6), 597-624.

Burgess, T.F., Gules, H.K., Gupta, J.N.D., Tekin, M. (1998). "Competitive Priorities, Process Innovations and Time Based Competition in the Manufacturing Sectors of Industrializing Economies: The case of Turkey", *Benchmarking for Quality Management and Technology* 5(4), 304-316.

Carlton, D.W. (1983). "The Location and Employment Choices Of New Firms: An Econometric Model With Discrete And Continuous Endogenous Variables", *Review of Economics and Statistics* 65, 440-449.

Christaller, W. (1933), *Die zentralen Orte in Süddeutschland*. Jena: Fischer.

Clark, G.L., Feldman, M.P., Gertler, M.S. (2000). "Economic Geography: Transition and Growth", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 3-17.

Combes, P., Overman, H. (2004), "The Spatial Distribution of economic Activities in the European Union". In: Henderson, J.V., Thisse, J.F.(Eds.), *Handbook of Regional and Urban Economics* 4, Elsevier, Amsterdam, 2609-2669.

Dalum, B., Laursen, K., Villumsen, G. (1996). "The Long Term Development of OECD Export Specialisation Patterns: De-specialisation and 'Stickiness'". DRUID Working Paper No. 96-14, 35 p.

Davis, D.R., Weinstein, D.E. (1999). "Economic Geography and Regional Production Structure: An Empirical Investigation", *European Economic Review* 43, 379-407.

Dixit, A.G., Norman, V. (1980). *Theory of International Trade*, Cambridge; Cambridge University Press.

Dixit, A.G., Stiglitz, J. (1977). "Monopolistic competition and optimum product diversity", *American Economic Review* 67, 297-308.

DPT (2006a). İllerde Öne Çıkan Sanayi Sektörleri, DPT Yayınları, accessed from <http://www.dpt.gov.tr/bgyu/illersedsanayi.html> on 1st of March, 2007.

DPT (2006b). Dokuzuncu Kalkınma Planı (2007-2013), Bölgesel Gelişmede Temel Araçlar ve Koordinasyon Özel İhtisas Komisyonu Raporu, accessed from http://plan9.dpt.gov.tr/oik15_1_bolgeseltemel/151bolgel1.pdf on 1st of August, 2007.

DPT (2003). İllerin ve Bölgelerin Sosyo-Ekonomik Gelişmişlik Sıralaması Araştırması, (The Research on the Rank of Socio-Economic Development Level of the Provinces), DPT Yayınları No. 2671.

DPT (2001a). Kimya Sanayii Özel İhtisas Komisyonu Raporu, Ankara: DPT Yayınları No: 2564- ÖİK: 580.

DPT (2001b). İlaç Sanayii Özel İhtisas Komisyonu Raporu, Ankara: DPT Yayınları No: 2540- ÖİK: 556.

DPT (2001c). Tekstil ve Giyim Sanayii Özel İhtisas Komisyonu Raporu, Ankara: DPT Yayınları No: 2549- ÖİK: 565.

DPT (2000a). Deri ve Deri Mamulleri Sanayii Özel İhtisas Komisyonu Raporu, Ankara: DPT Yayınları No: 2519- ÖİK: 537.

DPT (2000b). Bölgesel Gelişme Özel İhtisas Komisyonu Raporu, Ankara: DPT Yayınları No: 2502- ÖİK: 523.

DPT (1998). International Seminar on the New Local Centers (Denizli-Gaziantep) of Industrial Development, 23-25 Eylül, 1998, Ankara.

Duranton, G., Puga, D. (2004). "Micro Foundations Urban Agglomeration Economies". In: Henderson, J.V., Thisse, J.F.(Eds.), *Handbook of Regional and Urban Economics*, Vol.4. Elsevier,Amsterdam, 2609-2669.

Ellison G., Glaeser E. (1997). "Geographic Concentration in U.S. Manufacturing Industries: A Dartboard Approach", *Journal of Political Economy* 105, 889-927.

Eraydın, A. (2002). Yeni Sanayi Odakları: Yerel Kalkınmanın Yeniden Kavramlaştırılması, Ankara: ODTÜ Mimarlık Fakültesi Basım İşliđi.

Eraydın, A. (2000). "Dış Pazarlara eklemlenmeye çalışan konfeksiyon sanayiinde üretimin örgütlenmesi ve emek süreçleri", *METU Studies in Development* 27(1-2), 91-117.

Ethier, W.J. (1982). "National and International Returns to Scale in the Modern Theory of International Trade", *American Economic Review* 72.

Falcıođlu, P. & Akgüngör, S. (2008). "Regional Specialization and Industrial Concentration Patterns in Turkish Manufacturing Industry: An Assessment For The 1980-2000 Period", forthcoming in *European Planning Studies*.

Feldman, M.P. (2000). "Location and Innovation: The New Economic Geography of Innovation, Spillovers, and Agglomeration", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds. , *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 373-394.

Feldman, M.P. (1999). "Empirical Studies of Innovation and Location", *Economics of Innovation and New Technology* 8, 5-25.

Ferragina, A.M., Pastore, F. (2003). "Regional Policyin an Integrated Europe.Insights from the Literature", Conference Almanac Readiness of the Candidate Countries for the EU Regional Policy.www.sfpa.sk.

Forslid, R., Haaland, J.I., Midelfart Kvarnik, K.H. (2002). "A U-Shaped Europe? A simulation Study of Industrial Location", *Journal of International Economics* 57, 273-297.

Fujita, M. (1988). "A Monopolistic Competition Model of Spatial Agglomeration: Differentiated Product Approach", *Regional Science and Urban Economics* 18, 87-124.

Fujita, M., Krugman, P.R., Venables, A.J. (1999). *The Spatial Economy: Cities, Regions and International Trade*, MIT Pres, Cambridge, MA.

Fujita, M., Krugman, P. (2004). "The New Economic Geography: Past, Present and the Future", *Papers in Regional Science* 83, 139-164.

Gezici, F., Hewings, G.J.D (2004). "Regional Convergence and the Economic Performance of Peripheral Areas in Turkey", *Review of Urban & Regional Development Studies* 16 (2), 113-132.

Gezici, F. (2000). Structure and Performance of the Clusters as Sample Provinces in Turkey with respect to Regional Development, Regional Science Association 40th European Congress Barcelona, Spain 30 August- 2 September 2000.

Giannetti, M. (2002). "The effects of integration on regional disparities: Convergence, divergence or both?", *European Economic Review* 46(3), 539-567.

Glaeser, E. (2000). "The New Economics of Urban and Regional Growth", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 83-98.

Glaeser, E.L & Mare, D.C, (2001). "Cities and Skills", *Journal of Labor Economics*, University of Chicago Press 19 (2), 316-42.

Glaeser, E., Kallal, H., Scheinkman, J., Shleifer, A. (1992). "Growth in Cities", *Journal of Political Economy* 100(6), 1126-52.

Gorter, J. (2001). "The Economic Geography of Europe", CBP Report, no.2001/4, 22-28.

Haaland, J.I., Kind, H.J., Midelfart Kvarnik, K.H. & Torntesson, J. (1999). "What determines the Economic Geography of Europe?", CEPR Discussion Paper no.2072.

Hall, P., Breheny, M., McQuaid, R., Hart D. (1987). *Western Sunrise: The Genesis and Growth of Britain's Major High Tech Corridor*, London: Allen and Unwin.

Hallet, M. (2000). Regional Specialization and Concentration in the EU, Economic Papers no. 141, European Commission.

Hanson, G.H. (2000). "Firms, Workers and the Geographic Concentration of Economic Activity", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press,477-494.

Hanson, G.H. (1998). "Market Potential, increasing returns and geographic concentration", *NBER Working Paper No.6429*.

Hanson, G.H. (1997). "Increasing returns, trade and the regional structure of wages", *Economic Journal* 107, 113-133.

Hanson, G.H. (1996). "Economic Integration, Intraindustry Trade and Frontier Regions", *European Economic Review* 40, 941-949.

Head, K., Mayer, T. (2004). "The Empirics of Agglomeration and Trade ", In: Henderson, J.V., Thisse, J.F.(Eds.), *Handbook of Regional and Urban Economics*, Vol.4. Elsevier,Amsterdam, 2609-2669.

Head, K., Ries, J., Swenson, D. (1995). "Agglomeration Benefits and Location Choice: Evidence from Japanese Manufacturing Investments", *Journal of International Economics* 38, 223-248.

Helpman, E., Krugman, P. (1985). *Market Structure and Foreign Trade. Increasing Returns, Imperfect competition and the International Economy*, Cambridge: MIT press.

Henderson, J.V. (1986). " Efficiency of Resource Usage and City Size", *Journal of Urban Economics* 19, 47-70.

Henderson, J.V. (1974). "The Sizes and Types of Cities", *American Economic Review* 64, 640-656.

Henderson, J.V., A.Kuncoro, M.Turner (1995). "Industrial Development in Cities", *Journal of Political Economy* 103(5), 1067-90.

Hildebrandt, A., Wörz, J. (2004). Determinants of Industrial Location Patterns in CEECs, wiiw Working Papers 32.

Hirschman, A. (1958). *The Strategy of Economic Development*. New Haven: Yale University Press.

Hotelling, H. (1929). "Stability and Competition", *Economic Journal* 39(1), 41- 57.

Isard, W. (1956). *Location and Space-Economy*, New York: Wiley.

Jacobs, J. (1969). *The Economy of Cities*, New York, Random House.

Jovanovic, M.N. (2001). *Geography of Production and Economic Integration*, Routledge.

Karadağ, M., Deliktaş, E., Önder A.Ö. (2004). "The Effects of Public Capital on Private Sector Performance in Turkish Regional Manufacturing Industries", *European Planning Studies* 12(8), 1145-1156.

Kaytaç, M., Altın, S., Güneş, M. (1993). *Türkiye İmalat Sanayinde Yoğunlaşma*, TMMOB, MMO, 1993 Sanayi Kongresi Bildiriler Kitabı , Cilt 1., Ankara.

Keçenek, Y., Yentürk, N. (2000). *Türkiye Ekonomisi*, İstanbul, Remzi Yay.

Kılıçaslan, Y., Taymaz, E. (2006). "The Structure of Structural Change and Growth", Paper presented at the Druid Conference on 16-20 June 2006 in Copenhagen.

Kim, S. (1999). "Economic Integration and Convergence: US Regions, 1840-1987", *The Journal of Economic History* 58(3), 659-683.

Kim, S. (1995). "Expansion of markets and the Geographic Distribution of Economic Activities: The Trends in U.S. Regional Manufacturing Structure, 1860-1987.", *Quarterly Journal of Economics* 110(4), 881-908.

Krieger-Boden, C. (2002). "European Integration and Division of Labor Between European Regions", Paper to be presented at the Fourth Annual Conference of the European Trade Study Group (ETSG), 13-15 September 2002, Kiel, Germany.

Krieger-Boden, C. (2000). "Globalization, Integration and Regional Specialization", Kiel Working Paper 1009, Kiel, Germany.

Kronthaler, F. (2003). "A Study of the Competitiveness of Regions based on a Cluster Analysis: The Example of East Germany", Paper prepared for the 43rd European Congress of the Regional Science Association "Peripheries, centers and locational development in the new Europe", University of Jyväskylä, Finland.

Krugman, P. (2000). "Where in the world is the "new economic geography"?", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 49-60.

Krugman, P. (1991a). *Geography and Trade*, MIT Press, Cambridge, Ma.

Krugman, P. (1991b). "Increasing Returns and Economic Geography", *Journal of Political Economy* 99, 137-150.

Krugman, P. (1985). *Development, Geography and Economic Theory*.

Krugman, P. (1980). "Scale Economies, Product Differentiation and the Pattern of Trade." *American Economic Review* 70, 950-959.

Krugman, P. (1998). "Space: The Final Frontier", *Journal of Economic Perspectives* 12 (2), 161-174.

Lehner, P. & Maier, G. (2001). "Does space finally matter? The Position of New Economic Geography in Economic Journals", ERSA conference papers ersa01p67, European Regional Science Association.

Lemoine and Ünal Kesenci, D. (2003). "Trade and Technology Transfer: The cases of Turkey, India and China Compared", Working Papers, 2001-13 CEPII Research Center.

Lösch, A., (1940). *Die raumliche Ordnung der Wirtschaft*. Jena: Fischer.

Lubenets, N., Fainstein, G. (2003). *Models of Regional Specialisation and Income Dynamics in Transition to EU: Evidence from Estonia*.

Malecki, E. (1980). "Corporate organization of R&D and the location of technological activities", *Regional Studies* 14, 219-34.

Marshall, A. (1949). *Principle of Economics: An Introductory Volume* (Eighth Edition), London: MacMillan.

Marshall, A. (1920). *Principles of Economics*, London: Macmillan.

Markusen, A., Hall, P., Glasmeier, A. (1986). *High Tech America: The What, How, Where and Why of the Sunrise Industries*, Boston: Allan and Unwin.

Martin, P., Ottaviano, G. (2001). "Growth and Agglomeration," *International Economic Review*, Department of Economics, University of Pennsylvania and Osaka University Institute of Social and Economic Research Association 42(4), 947-68.

Meardon, S.J. (2001). "Modeling Agglomeration and Dispersion in City and Country: Gunnar Myrdal, François Perroux, and the New Economic Geography", *American Journal of Economics and Sociology* 60(1), 25–57.

Meyer, D. (1983). "The Emergence of the American Manufacturing Belt: An Interpretation." *Journal of Historical Geography* 9(2), 145-174.

Midelfart-Kvarnik, K.H., Overman, H.G., Redding, S.J. , Venables, A.J. (2002). "Integration and industrial specialization in the EU". *Revue Economique* 53, 469-481.

Midelfart-Kvarnik, K.H., Overman, H.G., Redding, S.J. , Venables, A.J. (2003). "The location of European Industry" In: *European Integration and the functioning of Product Markets, European Economy, Special report no.2*. European Commission Office for Official Publications, Luxembourg.

Mora, T., Vayá, E. and Suriñach J. (2005). "Specialisation and growth: the detection of European regional convergence clubs", *Economics Letters* 86(2), 181-185.

Mora, T., Vayá, E. and Suriñach J. (2002). "Changes in the Spatial Distribution Patterns of European Regional Activity: The Enlargements of the mid-1980's and 2004", (in: Artis, M, -Ed., *Central and Eastern European Countries and the European Union*) Cambridge University Press, 75-105.

Myrdal, G. (1970). *The Challenge of World Poverty: A World Anti-Poverty Program in Outline*. New York: Vintage Books.

Nakamura (1985). "Agglomeration Economies in Urban Manufacturing Industries ; A case of Japanese Cities", *Journal of Urban Economics* 17(1), 108-124.

OECD (2003). *Science, Technology and Industry Scoreboard*, Paris: OECD.

OECD (1997). *The Measurement of Scientific and Technological Activities: Proposed Guidelines for Collecting and Interpreting Technological Innovation Data (Oslo Manual)*. Paris: OECD.

Ottaviano G.I.P., Thisse, J.F. (2004). "Agglomeration and Economic Geography", In: Henderson, J.V., Thisse, J.F.(Eds.), *Handbook of Regional and Urban Economics*, Vol.4. Elsevier, Amsterdam, 2563-2608.

Ottaviano G.I.P., Puga, D. (1997). "Agglomeration in the global economy:A Survey of the 'new economic geography'", *Discussion Paper No.356*, Center for Economic Performance: London School of Economics.

Öz, Ö. (2004). "Türkiye’de Ekonomik Faaliyetlerin Mekansal Dağılımı ve Rekabetçi Yapısı", *METU Studies in Development* 31(2), 211-241.

Öz, Ö. (2003a). "Türkiye’nin Rekabetçi Avantajı: Stratejik Yönetim Perspektifinden bir Değerlendirme", *METU Studies in Development* 30(2), 205-222.

Öz, Ö. (2003b). "Changing Patterns of Competitive Advantage: The Towel/Bathrobe Cluster in Denizli(Turkey)", Paper Presented at the Conference in Modena, Italy, September 12-13 2003.

Öz, Ö. (2002). *Geographic Clusters and International Competitiveness: Evidence from Turkey*, METU: Ankara.

Öz, Ö. (1999). *The Competitive Advantage of Nations: The case of Turkey, Assessing Porter’s Framework for National Advantage*, Aldershot: Ashgate.

Paluzie, E., Pons, J., Tirado, D.A. (2001). "Regional Integration and Specialization Patterns in Spain", *Regional Studies* 35(4), 285-296.

Phelps, N.A. (2004). "Clusters, Dispersion and the Spaces in Between: For a Geography of the Banal", *Urban Studies* 41, 971-989.

Perroux, F. (1970). "Note on the Concept of Growth Poles." (English translation by Linda Gates and Anne Marie McDermott of Perroux's "Note sur la Notion de 'Pole de Croissance'," *Economie Appliquee* 7: 307--20.) In David L. McKee, Robert D. Dean and William H. Leahy, eds., *Regional Economics: Theory and Practice*. New York: The Free Press, 93-104.

Petersson, L. (2002). "The Theory of New Economic Geography and Industrial Location in SADC", *The South African Journal of Economics Quarterly Journal* 70(8), 1222-1246.

Piore, M., Sabel, C.F. (1984). *The Second Industrial Divide*, New York: Basic Books.

Porter, M.E. (2003). "The Economic Performance of Regions", *Regional Studies* 37(6&7), 549-578.

Porter, M.E. (2000). "Locations, Clusters and Company Strategy", (in: Clark, G.L., M.P.Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 253-274.

Porter, M.E. (1999). "Clusters and the New Economics of Competition", *Harvard Business Review* Nov. Dec., 77-90.

Porter, M.E. (1990). *The Competitive Advantage of Nations*, London: Macmillan.

Prime Ministry Southeastern Anatolia Project Regional Development Administration (2001). Status Report, accessed from www.gap.gov.tr/English/Frames/fr22.html on the 1st of February, 2007.

Puga, D. (2002). "European Regional Policies in Light of Recent Location Theories", *Journal of Economic Geography* 2, 373-406.

Puga, D., Venables, A.J. (1996). "The Spread of Industry: Spatial Agglomeration in Economic Development", *Discussion Paper No.279*, Center for Economic Performance: London School of Economics.

Romer, Paul M. (1987). "Growth Based on Increasing Returns Due to Specialization," *American Economic Review* 77(2), 56-62.

Rosenthal, S.S., Strange, W.C. (2004). "Evidence on the Nature and Sources of Agglomeration Economies", In: Henderson, J.V., Thisse, J.F.(Eds.), *Handbook of Regional and Urban Economics*, Vol.4. Elsevier, Amsterdam, 2119-2171.

Rosenthal, S.S., Strange, W.C. (2003). "Geography, industrial organization, and agglomeration", *Journal of Urban Economics* 50, 191-229.

Scott, A.J. (2000). "Economic Geography: The Great Half-Century", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 18-44.

Sheppard, E. (2000). "Geography or Economics? Conceptions of Space, Time Interdependence, Agency", (in: Clark, G.L., M.P. Feldman, M.S. Gertler -Eds., *The Oxford Handbook of Economic Geography*.) Oxford: Oxford University Press, 99-119.

Suedekum, J. (2006). "Concentration and Specialization Trends in Germany since Reunification". *Regional Studies* 48(8), 861-873.

Şenses, F., Taymaz, E. (2003). "Unutulan bir Toplumsal Amaç: Sanayileşme ne Oluyor ? Ne Olmalı? ", ERC Working Papers in Economics, 03/01.

Traistaru, I., Iara, A. (2002). "European Integration, Regional Specialization and Location of Industrial Activity in Accession Countries: Data and Measurement", Phare ACE Project P98-1117-R.

Traistaru, I., Nijkamp, P., Longhi, S. (2003). "Determinants of Manufacturing Location in EU Accession Countries", *ERSA Conference Papers*, Jyväskylä, Finland: European Regional Science Association.

Türkkan, E. (2001). "Türkiye'de Sanayileşme (1980-2000)", (in: Ahmet Şahinöz ed., *Türkiye Ekonomisi Sektörel Analiz*.) Ankara: TEK, 105-145.

TUSIAD/DPT (2005). *Türkiye'de Bölgesel Gelişme Politikaları: Sektör, Bölge Yığılılaşmaları, Tüsiad Büyüme Stratejileri Dizisi No: 4*, İstanbul:Tüsiad.

Venables, A.J. (1996). "Equilibrium Locations of Vertically Linked Industries", *International Economic Review* 37, 341-360.

Von Thünen, J.H., (1826). *Der isolerte Staat in Beziehung auf Landwirtschaft und Nationalökonomie*. Hamburg: F.Perthes.

Weber, A.(1909). *Über den Standort der Industrien*.Tubingen:J.C.B.Mohr.

Wheaton, W.C., Lewis, M.J. (2002). "Urban Wages and Labor Market Agglomeration", *Journal of Urban Economics* 51(3), 542-562.

Yilmaz, B. (2002).” Turkey’s Competitiveness in the European Union: A comparison with Greece, Portugal, Spain and the EU/12/15”, *Russian and East European Finance and Trade* 38(3), 54-72.

Yilmaz, B. (2003).” Turkey’s Competitiveness in the European Union: A comparison with Five Candidate Countries- Bulgaria, The Check Republic,Hungary, Poland , Romania- and the EU/15”, *Ezoneplus Working Paper*, Berlin, Jean Monnet Center of Excellence.

Appendix 1: Change in Gini Indices of Geographic Concentrations (1980-2001)

ISIC REV II Classification of Industries		1980	2001	1980-2001
3111	Slaughtering, preparing and preserving meat	0,863	0,690	-20%
3112	Manufacture of dairy products	0,918	0,684	-25%
3113	Canning and preserving of fruits and vegetables	0,482	0,757	57%
3115	Manufacture of vegetable and animal oils and fats	0,654	0,627	-4%
3116	Grain mill products	0,745	0,829	11%
3117	Manufacture of bakery products	0,721	0,807	12%
3118	Sugar factories and refineries	0,743	0,805	8%
3119	Manufacture of cocoa, chocolate and sugar confectionery	0,553	0,641	16%
3121	Manufacture of food products not elsewhere classified	0,851	0,629	-26%
3122	Manufacture of prepared animal feeds	0,788	0,728	-8%
3131	Distilling, rectifying and blending spirits	0,519	0,700	35%
3132	Wine industries	0,780	0,348	-55%
3133	Malt liquors and malt	0,369	0,222	-40%
3134	Soft drinks and carbonated waters industries	0,468	0,483	3%
3140	Tobacco manufactures	0,781	0,621	-21%
3211	Spinning, weaving and finishing textiles	0,718	0,767	7%
3212	Manufacture of made-up textile goods except wearing apparel	0,302	0,703	133%
3213	Knitting mills	0,376	0,551	46%
3214	Manufacture of carpets and rugs	0,630	0,633	1%
3215	Cordage, rope and twine industries	0,222	0,222	0%
3219	Manufacture of textiles not elsewhere classified	0,222	0,305	38%
3221	Manufacture of wearing apparel, except fur apparel	0,306	0,305	0%
3222	Manufacture of wearing apparel, except fur apparel	0,300	0,720	140%
3231	Tanneries and leather finishing	0,308	0,478	55%
3233	Manufacture of products of leather and leather substitutes, except footwear, wearing apparel	0,222	0,308	39%
3240	Manufacture of footwear, except vulcanised or moulded rubber or plastic footwear	0,405	0,704	74%
3311	Sawmills, planing and other wood mills	0,445	0,729	64%
3312	Manufacture of wooden and cane containers and small cane ware	0,222	0,304	37%
3320	Manufacture of furniture and fixtures, except primarily of metal	0,530	0,697	31%
3411	Manufacture of pulp, paper and paperboard	0,530	0,634	20%
3412	Manufacture of containers and boxes of paper and paperboard	0,427	0,565	32%
3419	Manufacture of pulp, paper and paperboard articles not classified elsewhere	0,297	0,403	36%
3421	Printing, publishing and allied industries	0,425	0,626	47%
3511	Manufacture of basic industrial chemicals except fertilizers	0,471	0,432	-8%
3512	Manufacture of fertilizers and pesticides	0,443	0,416	-6%
3513	Manufacture of synthetic resins, plastic materials and man-made fibres except glass	0,222	0,367	65%
3521	Manufacture of paints, varnishes and lacquers	0,386	0,482	25%
3522	Manufacture of drugs and medicines	0,222	0,439	98%

3523	Manufacture of soap and cleaning preparations, perfumes, cosmetics, other toilet preparations	0,432	0,444	3%
3529	Manufacture of chemical products not classified elsewhere	0,364	0,514	41%
3530	Petroleum refineries	0,397	0,296	-25%
3551	Tyre and tube industries	0,276	0,222	-20%
3559	Manufacture of rubber products not classified elsewhere	0,639	0,615	-4%
3560	Manufacture of plastic products not classified elsewhere	0,698	0,744	7%
3610	Manufacture of pottery, china and earthenware	0,430	0,524	22%
3620	Manufacture of glass and glass products	0,414	0,624	51%
3691	Manufacture of structural clay products	0,734	0,735	0%
3692	Manufacture of cement, lime and plaster	0,814	0,563	-31%
3699	Manufacture of non-metallic mineral products not classified elsewhere	0,511	0,737	44%
3710	Iron and steel basic industries	0,733	0,872	19%
3720	Non-ferrous metal basic industries	0,671	0,732	9%
3811	Manufacture of cutlery, hand tools and general hardware	0,537	0,459	-14%
3812	Manufacture of furniture and fixtures primarily of metal	0,476	0,608	28%
3813	Manufacture of structural metal products	0,490	0,641	31%
3819	Manufacture of fabricated metal products except machinery, equipment not classified elsewhere	0,623	0,761	22%
3821	Manufacture of engines and turbines	0,290		-100%
3822	Manufacture of agricultural machinery and equipment	0,587	0,548	-7%
3823	Manufacture of metal and woodworking machinery	0,423	0,589	39%
3824	Manufacture of special industrial machinery and equipment except metal, woodworking machinery	0,554	0,682	23%
3825	Manufacture of office, computing and accounting machinery	0,222	0,222	0%
3829	Machinery and equipment except electrical not classified elsewhere	0,507	0,616	21%
3831	Manufacture of electrical industrial machinery and apparatus	0,387	0,541	40%
3832	Manufacture of radio, television and communication equipment and apparatus	0,356	0,419	18%
3833	Manufacture of electrical appliances and household goods	0,388	0,414	7%
3839	Manufacture of electrical apparatus and supplies not classified elsewhere	0,479	0,648	35%
3841	Shipbuilding and repairing	0,222	0,302	36%
3842	Manufacture of railroad equipment	0,650	0,359	-45%
3843	Manufacture of motor vehicles	0,641	0,689	8%
3844	Manufacture of motorcycles and bicycles	0,222	0,222	0%
3849	Manufacture of transport equipment not classified elsewhere	0,222	0,222	0%
3851	Manufacture of professional, scientific, measuring, controlling equipment, not classified elsewhere	0,222	0,435	96%
3852	Manufacture of photographic and optical goods	0,222	0,222	0%
3853	Manufacture of watches and clocks	0,222	0,222	0%
3909	Manufacturing industries not classified elsewhere	0,222	0,436	97%
Average		0,454	0,520	14%

Appendix 2: Classification of Industries Based on Technology (OECD)

High-technology industries	ISIC Rev 3 Code
Aircraft and spacecraft	353
Pharmaceuticals	2423
Office, accounting and computing machinery	30
Radio, TV and communications equipment	32
Medical, precision and optical instruments	33
Medium-high-technology industries	
Electrical machinery and apparatus, n.e.c.	31
Motor vehicles, trailers and semi-trailers	34
Chemicals excluding pharmaceuticals	24 excl. 2423
Railroad equipment and transport equipment, n.e.c.	352 + 359
Machinery and equipment, n.e.c.	29
Medium-low-technology industries	
Building and repairing of ships and boats	351
Rubber and plastics products	25
Coke, refined petroleum products and nuclear fuel	23
Other non-metallic mineral products	26
Basic metals and fabricated metal products	27-28
Low-technology industries	
Manufacturing, n.e.c.; Recycling	36-37
Wood, pulp, paper, paper products, printing and publishing	20-22
Food products, beverages and tobacco	15-16
Textiles, textile products, leather and footwear	17-19
Total manufacturing	15-37

Source: OECD (2003), Science, Technology and Industry Scoreboard, Paris: OECD.

Appendix 3: Ranking of Gini Indices of Geographical Concentration (ISIC Rev.2)

4 digit codes	1980	Rank	1985	Rank	1990	Rank	1995	Rank	2001	Rank
3111	0,863	2	0,704	14	0,755	6	0,732	8	0,690	19
3112	0,918	1	0,834	1	0,798	3	0,660	18	0,684	21
3113	0,482	32	0,472	36	0,619	18	0,638	24	0,757	7
3115	0,654	16	0,672	16	0,222	65	0,222	64	0,627	29
3116	0,745	8	0,763	4	0,596	24	0,699	13	0,829	2
3117	0,721	12	0,746	7	0,801	1	0,792	3	0,807	3
3118	0,743	9	0,758	5	0,728	9	0,788	4	0,805	4
3119	0,553	24	0,611	20	0,743	7	0,803	2	0,641	24
3121	0,851	3	0,354	56	0,504	31	0,663	16	0,629	28
3122	0,788	5	0,731	9	0,388	49	0,575	31	0,728	13
3131	0,519	28	0,565	26	0,800	2	0,672	14	0,700	17
3132	0,780	7	0,424	43	0,612	21	0,615	28	0,348	59
3133	0,369	51	0,304	62	0,604	22	0,477	46	0,222	72
3134	0,468	36	0,526	32	0,314	55	0,222	69	0,483	44
3140	0,781	6	0,793	2	0,505	30	0,512	41	0,621	32
3211	0,718	13	0,744	8	0,792	4	0,779	6	0,767	5
3212	0,302	56	0,421	45	0,735	8	0,711	11	0,703	16
3213	0,376	50	0,376	53	0,497	33	0,713	10	0,551	39
3214	0,630	20	0,401	49	0,483	35	0,596	29	0,633	27
3215	0,222	62	0,222	68	0,428	45	0,651	22	0,222	65
3219	0,222	63	0,222	69	0,222	66	0,222	70	0,305	61
3221	0,306	55	0,310	59	0,222	67	0,378	52	0,305	62
3222	0,300	57	0,421	46	0,305	61	0,662	17	0,720	14
3231	0,308	54	0,389	50	0,441	41	0,507	42	0,478	46
3233	0,222	64	0,222	70	0,311	57	0,222	71	0,308	60
3240	0,405	45	0,549	28	0,222	68	0,303	61	0,704	15
3311	0,445	37	0,698	15	0,222	69	0,557	34	0,729	12
3320	0,530	26	0,606	21	0,595	26	0,579	30	0,697	18
3411	0,530	27	0,750	6	0,588	28	0,222	65	0,634	26
3412	0,427	41	0,463	38	0,418	46	0,222	66	0,565	37
3419	0,297	58	0,376	54	0,654	15	0,620	26	0,403	56
3421	0,425	42	0,545	30	0,385	50	0,640	23	0,626	30
3511	0,471	35	0,474	35	0,312	56	0,383	50	0,432	52
3512	0,443	38	0,498	34	0,374	51	0,308	60	0,416	54
3513	0,222	65	0,296	64	0,289	63	0,425	48	0,367	57
3521	0,386	49	0,502	33	0,504	32	0,351	58	0,482	45
3522	0,222	66	0,382	51	0,306	60	0,558	33	0,439	49
3523	0,432	39	0,449	39	0,363	54	0,375	54	0,444	48
3529	0,364	52	0,371	55	0,310	58	0,358	56	0,514	43
3530	0,397	46	0,405	48	0,431	44	0,381	51	0,296	64
3541	0,222	67	0,287	67	0,475	37	0,378	53	0,000	74
3542	0,287	60	0,222	71	0,456	39	0,523	39	0,000	75

3543	0,222	68	0,309	60	0,292	62	0,525	38	0,000	76
3551	0,276	61	0,590	24	0,222	70	0,222	67	0,222	71
3559	0,639	19	0,602	22	0,222	77	0,222	63	0,615	34
3560	0,698	14	0,548	29	0,222	76	0,222	68	0,744	8
3610	0,430	40	0,468	37	0,397	47	0,564	32	0,524	42
3620	0,414	44	0,727	10	0,705	11	0,707	12	0,624	31
3691	0,734	10	0,785	3	0,481	36	0,519	40	0,735	10
3692	0,814	4	0,564	27	0,490	34	0,473	47	0,563	38
3699	0,511	29	0,714	12	0,627	17	0,769	7	0,737	9
3710	0,733	11	0,715	11	0,757	5	0,826	1	0,872	1
3720	0,671	15	0,596	23	0,604	23	0,653	21	0,732	11
3811	0,537	25	0,432	42	0,648	16	0,783	5	0,459	47
3812	0,476	34	0,575	25	0,666	13	0,617	27	0,608	35
3813	0,490	31	0,668	17	0,474	38	0,499	44	0,641	25
3819	0,623	21	0,294	65	0,447	40	0,556	35	0,761	6
3821	0,290	59	0,705	13	0,595	25	0,552	36	0,000	77
3822	0,587	22	0,418	47	0,669	12	0,729	9	0,548	40
3823	0,423	43	0,637	19	0,373	52	0,286	62	0,589	36
3824	0,554	23	0,222	72	0,720	10	0,655	20	0,682	22
3825	0,222	69	0,534	31	0,594	27	0,504	43	0,222	66
3829	0,507	30	0,436	40	0,657	14	0,658	19	0,616	33
3831	0,387	48	0,289	66	0,222	71	0,222	72	0,541	41
3832	0,356	53	0,377	52	0,614	20	0,665	15	0,419	53
3833	0,388	47	0,435	41	0,434	42	0,525	37	0,414	55
3839	0,479	33	0,299	63	0,369	53	0,357	57	0,648	23
3841	0,222	70	0,424	44	0,392	48	0,407	49	0,302	63
3842	0,650	17	0,654	18	0,615	19	0,492	45	0,359	58
3843	0,641	18	0,309	61	0,256	64	0,222	73	0,689	20
3844	0,222	71	0,222	73	0,432	43	0,365	55	0,222	67
3849	0,222	72	0,315	57	0,530	29	0,636	25	0,222	73
3851	0,222	73	0,314	58	0,222	72	0,222	74	0,435	51
3852	0,222	74	0,222	74	0,222	73	0,222	75	0,222	68
3853	0,222	75	0,222	75	0,308	59	0,312	59	0,222	69
3854	0,222	76	0,222	76	0,222	74	0,222	76	0,222	70
3909	0,222	77	0,222	77	0,222	75	0,222	77	0,436	50
Average	0,47		0,48		0,47		0,50		0,52	

Appendix 4: Highest Five Location Quotients of Regions (1980)

İstanbul		Ankara		İzmir		Bursa		Kocaeli		Tekirdağ		Adana		Aydın		Antalya		Balıkesir		Zonguldak		Manisa		Konya	
3215	2,77	3133	10,66	3551	7,89	3842	4,80	3544	24,29	3132	51,34	3211	3,93	3411	29,16	3312	####	3113	15,96	3710	12,39	3512	17,86	3720	17,63
3219	2,77	3542	7,76	3113	5,61	3843	4,23	3824	9,39	3115	16,45	3115	2,92	3211	2,74	3511	38,04	3115	13,44	3411	4,648	3691	11,08	3122	8,29
3543	2,77	3823	6,86	3134	4,80	3823	3,30	3511	9,34	3116	8,48	3521	1,60	3122	2,72	3311	12,91	3118	5,21	3121	0,005	3411	6,24	3116	6,87
3849	2,77	3529	6,48	3140	3,80	3134	3,20	3610	6,74	3118	5,03	3560	1,59	3824	1,99	3111	6,09	3523	4,97			3118	5,36	3822	3,94
3851	2,77	3829	6,07	3221	3,62	3822	2,78	3620	5,63	3692	4,19	3140	1,42	3691	1,88	3118	5,33	3692	4,28			3610	3,22	3118	3,32
Gaziantep		Hatay		Kayseri		Kırkkale		Samsun		Trabzon		Malatya		Kastamonu		Erzurum		Şanlıurfa		Mardin		Ağrı		Van	
3131	15,39	3710	11,29	3214	16,8	3692	44	3140	8,31	3121	18,7	3512	9,362	3118	13,2	3542	97,1	3131	35,8	3530	93,1	3112	55,6	3112	21,8
3214	11,35	3112	0,97	3133	14,1	3112	33,6	3512	6,6	3411	3,25	3720	7,853	3691	10,1	3821	18	3111	29,5	3122	6,905	3111	42	3111	19,2
3212	6,79	3692	0,72	3842	11,9	3214	21,3	3118	4,94	3311	2,41	3118	7,128	3122	9,53	3118	12,4	3112	12	3211	0,008	3692	20,5	3122	18,1
3692	4,39	3116	0,57	3833	3,92			3691	3,73	3720	1,25	3111	5,461	3112	7,04	3111	12,4	3122	10,4			3122	17,3	3692	11,9
3116	3,80	3211	0,50	3811	2,73			3559	2,07	3112	0,74	3140	4,885	3311	6,69	3112	6,78	3822	4,78					3140	6,28

Appendix 5: Highest Five Location Quotients of Regions (2001)

İstanbul		Ankara		İzmir		Bursa		Kocaeli		Tekirdağ		Adana		Aydın		Antalya		Balıkesir		Zonguldak		Manisa		Konya	
3215	2,92	3813	5,56	3901	10,86	3845	8,75	3543	11,89	3115	6,88	3312	14,11	3212	11,74	3529	17,51	3111	28,99	3419	26,89	3691	15,53	3822	39,82
3825	2,92	3832	5,28	3140	5,97	3842	4,05	3544	11,89	3132	6,23	3115	4,83	3511	9,22	3118	14,53	3610	14,99	3710	19,97	3610	10,16	3720	18,06
3852	2,92	3829	4,55	3221	4,00	3559	3,63	3551	11,89	3112	3,72	3692	4,61	3134	4,13	3691	11,29	3411	9,97	3841	7,46	3113	7,06	3116	13,47
3853	2,92	3421	3,55	3134	3,48	3134	3,57	3312	6,15	3620	3,15	3620	4,19	3412	2,80	3214	8,19	3231	8,60	3311	6,59	3118	5,00	3122	8,63
3854	2,92	3319	3,41	3692	3,34	3319	3,08	3513	5,93	3116	3,04	3411	4,07	3822	2,34	3117	8,03	3113	8,25	3117	1,72	3134	3,49	3112	5,28
Gaziantep		Hatay		Kayseri		Kırıkkale		Samsun		Trabzon		Malatya		Kastamonu		Erzurum		Şanlıurfa		Mardin		Ağrı		Van	
3214	15,70	3710	17,74	3133	35,69	3530	86,81	3512	27,81	3121	46,94	3132	117,63	3411	35,34	3122	35,49	3131	82,08	3530	352,04	3118	47,31	3118	29,08
3131	4,21	3115	6,00	3842	15,67	3132	18,86	3140	20,24	3311	7,38	3140	14,62	3691	23,07	3118	34,23	3691	10,19	3116	10,78	3240	23,37	3214	16,60
3211	4,04	3512	5,40	3214	14,29	3131	14,44	3118	11,35	3411	4,05	3118	10,21	3118	15,76	3131	19,67	3831	8,86	3560	6,47			3240	14,49
3117	2,22	3118	4,22	3320	12,82	3529	12,72	3692	5,68	3529	2,17	3710	9,97	3311	14,90	3240	14,39	3699	8,59	3117	4,99			3122	13,06
3116	2,13	3843	3,93	3833	8,40	3819	10,42	3311	5,65	3140	2,10	3116	5,63	3819	7,22	3111	5,90	3116	6,80					3111	9,07

Appendix 6: Approximate Correspondence between ISIC codes, Revision 2 and Revision 3 at the 4-digit level

REVISION 3		REVISION 2	
Code	Industry	Code	Industry
1511	Processing/preserving of meat	3111	Slaughtering, preparing and preserving meat
1512	Processing/preserving of fish	3112	Manufacture of dairy products
1513	Processing/preserving of fruit & vegetables	3113	Canning and preserving of fruits and vegetables
1514	Vegetable and animal oils and fats		Canning, preserving and processing of fish, crustaceans and similar foods
1520	Dairy products	3115	Manufacture of vegetable and animal oils and fats
1531	Grain mill products	3116	Grain mill products
1532	Starches and starch products	3117	Manufacture of bakery products
1533	Prepared animal feeds	3118	Sugar factories and refineries
1541	Bakery products	3119	Manufacture of cocoa, chocolate and sugar confectionery
1542	Sugar	3121	Manufacture of food products not elsewhere classified
1543	Cocoa, chocolate and sugar confectionery	3122	Manufacture of prepared animal feeds
1544	Macaroni, noodles & similar products	3131	Distilling, rectifying and blending spirits
1549	Other food products i.e.	3132	Wine industries
1551	Distilling, rectifying & blending of spirits	3133	Malt liquors and malt
1552	Wines	3134	Soft drinks and carbonated waters industries
1553	Malt liquors and malt	3140	Tobacco manufactures
1554	Soft drinks; mineral waters		
1600	Tobacco products		
1711	Textile fiber preparation; textile weaving	3211	Spinning, weaving and finishing textiles
1712	Finishing of textiles		Manufacture of made-up textile goods except wearing apparel
1721	Made-up textile articles, except apparel	3212	apparel
1722	Carpets and rugs	3213	Knitting mills
1723	Cordage, rope, twine and netting	3214	Manufacture of carpets and rugs
1729	Other textiles i.e.	3215	Cordage, rope and twine industries
1730	Knitted and crocheted fabrics and articles	3219	Manufacture of textiles not elsewhere classified
1810	Wearing apparel, except fur apparel	3220	Manufacture of wearing apparel, except footwear
1820	Dressing & dyeing of fur; processing of fur	3231	Tanneries and leather finishing
1911	Tanning and dressing of leather	3232	Fur dressing and dyeing industries
1912	Luggage, handbags, etc.; saddler & harness		Manufacture of products of leather and leather substitutes, exc. footwear and wearing apparel
1920	Footwear		Manufacture of footwear, except vulcanized or molded rubber or plastic footwear
2010	Sawmilling and planing of wood	3311	Sawmills, planing and other wood mills
2021	Veneer sheets, plywood, particle board, etc.		Manufacture of wooden and cane containers and small cane ware
2022	Builders' carpentry and joinery	3312	Manufacture of wood and cork products not classified elsewhere
2023	Wooden containers	3319	Manufacture of furniture and fixtures, except primarily of metal
2029	Other wood products; articles of cork/straw	3320	metal
3610	Furniture		
2101	Pulp, paper and paperboard	3411	Manufacture of pulp, paper and paperboard
2102	Corrugated paper and paperboard	3412	Manufacture of containers and boxes of paper and

<p>2109Other articles of paper and paperboard 2211Publishing of books and other publications 2212Publishing of newspapers, journals, etc. 2213Publishing of recorded media 2219Other publishing 2221Printing 2222Service activities related to printing 2230Reproduction of recorded media</p>	<p>paperboard Manufacture of pulp, paper and paperboard articles not 3419classified elsewhere 3420Printing, publishing and allied industries</p>
<p>2310Coke oven products 2320Refined petroleum products 2330Processing of nuclear fuel 2411Basic chemicals, except fertilizers 2412Fertilizers and nitrogen compounds 2413Plastics in primary forms; synthetic rubber 2421Pesticides and other agro-chemical products 2422Paints, varnishes, printing ink and mastics 2423Pharmaceuticals, medicinal chemicals, etc. 2424Soap, cleaning & cosmetic preparations 2429Other chemical products n.e.c. 2430Man-made fibers 2511Rubber tires and tubes 2519Other rubber products 2520Plastic products</p>	<p>Manufacture of basic industrial chemicals except 3511fertilizers 3512Manufacture of fertilizers and pesticides Manufacture of synthetic resins, plastic materials and 3513man-made fibers except glass 3521Manufacture of paints, varnishes and lacquers Manufacture of soap and cleaning preparations, perfumes, 3523cosmetics and other toilet preparations 3522Manufacture of drugs and medicines Manufacture of chemical products not classified 3529elsewhere 3530Petroleum refineries Manufacture of miscellaneous products of petroleum and 3540coal 3551Tire and tube industries 3559Manufacture of rubber products not classified elsewhere 3560Manufacture of plastic products not classified elsewhere</p>
<p>2610Glass and glass products 2691Pottery, china and earthenware 2692Refractory ceramic products 2693Struct.non-refractory clay; ceramic products 2694Cement, lime and plaster 2695Articles of concrete, cement and plaster 2696Cutting, shaping & finishing of stone 2699Other non-metallic mineral products n.e.c.</p>	<p>3610Manufacture of pottery, china and earthenware 3620Manufacture of glass and glass products 3691Manufacture of structural clay products 3692Manufacture of cement, lime and plaster Manufacture of non-metallic mineral products not 3699classified elsewhere</p>
<p>2710Basic iron and steel 2720Basic precious and non-ferrous metals 2731Casting of iron and steel 2732Casting of non-ferrous metals</p>	<p>3710Iron and steel basic industries 3720Non-ferrous metal basic industries</p>
<p>2811Structural metal products 2812Tanks, reservoirs and containers of metal 2813Steam generators 2891Metal forging/pressing/stamping/roll-forming 2892Treatment & coating of metals 2893Cutlery, hand tools and general hardware 2899Other fabricated metal products n.e.c.</p>	<p>3811Manufacture of cutlery, hand tools and general hardware 3812Manufacture of furniture and fixtures primarily of metal 3813Manufacture of structural metal products Manufacture of fabricated metal products except 3819machinery and equipment not classified elsewhere</p>
<p>2911Engines & turbines (not for transport equip.) 2912Pumps, compressors, taps and valves 2913Bearings, gears, gearing & driving elements 2914Ovens, furnaces and furnace burners</p>	<p>3821Manufacture of engines and turbines 3822Manufacture of agricultural machinery and equipment 3823Manufacture of metal and woodworking machinery 3824Manufacture of special industrial machinery and</p>

<p>2915Lifting and handling equipment 2919Other general-purpose machinery 2921Agricultural and forestry machinery 2922Machine tools 2923Machinery for metallurgy 2924Machinery for mining & construction 2925Food/beverage/tobacco processing machinery 2926Machinery for textile, apparel and leather 2927Weapons and ammunition 2929Other special purpose machinery 2930Domestic appliances n.e.c.</p>	<p>equipment except metal and woodworking machinery</p>
<p>3000Office, accounting and computing machinery 3110Electric motors, generators and transformers 3120Electricity distribution & control apparatus 3130Insulated wire and cable 3140Accumulators, primary cells and batteries 3150Lighting equipment and electric lamps 3190Other electrical equipment n.e.c.</p>	<p>3825Manufacture of office, computing and accounting machinery 3829Machinery and equipment except electrical not classified elsewhere 3831Manufacture of electrical industrial machinery and apparatus 3833Manufacture of electrical appliances and household goods 3839Manufacture of electrical apparatus and supplies not classified elsewhere</p>
<p>3210Electronic valves, tubes, etc. 3220TV/radio transmitters; line comm. apparatus 3230TV and radio receivers and associated goods</p>	<p>3832Manufacture of radio, television and communication equipment and apparatus</p>
<p>3311Medical, surgical and orthopedic equipment 3312Measuring/testing/navigating appliances, etc. 3313Industrial process control equipment 3320Optical instruments & photographic equipment 3330Watches and clocks</p>	<p>3851Manufacture of professional and scientific, measuring and controlling equipment, not classified elsewhere 3852Manufacture of photographic and optical goods 3853Manufacture of watches and clocks</p>
<p>3410Motor vehicles 3420Automobile bodies, trailers & semi-trailers 3430Parts/accessories for automobiles</p>	<p>3843Manufacture of motor vehicles</p>
<p>3511Building and repairing of ships 3512Building/repairing of pleasure/sport. boats 3530Aircraft and spacecraft 3520Railway/tramway locomotives & rolling stock 3591Motorcycles 3592Bicycles and invalid carriages 3599Other transport equipment n.e.c.</p>	<p>3841Shipbuilding and repairing 3845Manufacture of aircraft 3842Manufacture of railroad equipment 3844Manufacture of motorcycles and bicycles 3849Manufacture of transport equipment not classified elsewhere</p>
<p>3691Jeweler and related articles 3692Musical instruments 3693Sports goods 3694Games and toys 3699Other manufacturing n.e.c.</p>	<p>3901Manufacture of jeweler and related articles 3902Manufacture of musical instruments 3903Manufacture of sporting and athletic goods 3909Manufacturing industries not classified elsewhere</p>

Source: United Nations Statistic Division, Correspondence Tables, accessed from <http://unstats.un.org/unsd/cr/registry> on the 1st of April 2006.

Appendix 7 : Factor Analysis of Variables: Rotated Component Matrix(Manufacturing Industry Variables)

Variable *	Component									
	1-Paper P.	2-Engine.	3-Stone B.	4-Packaged F.	5-Field Crop	6-Textile	7-Natural R.	8-Petrol. B.	9-Chemicals	10-Leather
S1	0,245	-0,158	-0,062	0,196	0,806	-0,064	-0,003	0,178	-0,107	-0,089
S2	0,658	-0,102	-0,064	0,660	0,059	-0,037	0,003	-0,009	-0,110	-0,052
S3	0,668	-0,171	-0,089	0,236	0,089	-0,071	0,169	-0,102	-0,159	0,057
S4	-0,194	-0,223	-0,165	0,045	0,881	-0,071	0,016	-0,049	-0,117	0,096
S5	-0,230	-0,181	-0,151	-0,151	0,802	0,365	0,015	-0,109	-0,002	-0,098
S6	0,134	0,000	0,166	-0,059	-0,001	-0,074	0,879	0,154	-0,116	-0,144
S7	0,076	0,006	0,116	0,851	-0,039	-0,033	0,092	0,387	-0,011	-0,036
S8	0,828	0,289	0,197	-0,024	-0,072	-0,002	-0,025	0,273	0,004	-0,042
S9	0,328	0,123	0,286	0,058	-0,028	-0,041	0,379	0,713	0,063	0,055
S10	0,337	0,781	0,211	-0,083	-0,151	-0,068	0,010	0,256	-0,045	-0,009
S11	0,081	0,187	0,866	-0,040	-0,084	-0,036	0,030	0,340	0,019	-0,019
S12	0,765	0,116	0,192	-0,023	0,009	0,051	0,145	0,413	0,089	0,025
S13	-0,088	-0,191	-0,136	0,859	0,206	-0,056	-0,125	0,000	-0,101	0,031
S14	0,048	-0,143	-0,093	0,735	-0,073	-0,166	0,169	-0,037	-0,003	0,248
S15	-0,050	-0,232	-0,144	0,523	0,154	-0,010	0,278	-0,157	-0,155	0,172
S16	-0,183	-0,183	-0,150	0,041	0,807	-0,089	0,045	-0,012	0,035	-0,027
S17	-0,098	-0,112	-0,133	0,780	0,303	-0,059	-0,071	0,049	-0,059	-0,067
S18	-0,143	-0,149	-0,093	-0,078	0,936	-0,062	0,046	-0,081	-0,048	-0,048
S19	-0,171	-0,194	-0,152	0,171	0,870	-0,088	0,017	-0,055	-0,074	-0,052
S20	0,013	-0,124	-0,030	0,958	-0,047	-0,062	-0,044	-0,016	-0,016	-0,065
S21	-0,172	-0,211	-0,143	0,034	0,883	-0,109	0,127	-0,106	-0,095	0,003
S22	0,122	-0,089	-0,058	0,159	0,255	-0,094	0,789	0,018	-0,104	0,151
S23	0,116	-0,156	-0,099	0,934	0,053	-0,119	0,086	-0,048	0,001	0,015
S24	0,031	-0,130	-0,086	0,952	-0,091	-0,076	-0,002	-0,061	-0,012	-0,035
S25	-0,162	-0,154	-0,117	-0,043	0,914	-0,081	0,076	-0,104	0,003	-0,034
S26	0,142	-0,160	-0,090	-0,183	-0,062	0,922	-0,077	-0,029	0,049	0,050
S27	-0,027	-0,176	-0,082	-0,164	0,054	0,897	-0,004	-0,042	0,257	-0,016
S28	-0,047	-0,148	-0,117	-0,168	-0,080	0,938	-0,030	-0,048	-0,005	0,094
S29	-0,039	-0,124	-0,129	-0,153	-0,089	0,931	-0,054	-0,044	-0,031	0,096
S30	-0,131	-0,246	-0,170	-0,121	-0,185	0,577	-0,085	-0,022	-0,144	0,597
S31	-0,128	-0,266	-0,162	-0,132	-0,131	0,596	-0,050	-0,039	-0,036	0,654
S32	-0,100	-0,094	-0,066	-0,106	-0,251	0,150	-0,039	-0,157	0,110	0,654
S33	-0,151	0,016	0,748	-0,195	-0,230	-0,071	0,286	-0,110	-0,171	-0,303
S34	-0,071	-0,037	0,552	-0,223	-0,277	-0,071	0,418	-0,102	-0,136	-0,352
S35	0,807	-0,076	0,047	0,003	-0,129	-0,074	0,212	-0,146	0,216	0,114
S36	0,799	-0,099	-0,043	0,018	-0,110	-0,104	0,193	-0,191	0,159	0,108
S37	0,746	0,151	0,008	-0,045	-0,183	-0,108	0,107	-0,234	0,366	0,098
S38	0,203	0,122	0,057	0,059	0,178	0,106	0,791	0,098	0,039	0,035
S39	-0,179	-0,052	0,275	-0,090	-0,014	0,245	-0,053	0,038	0,810	0,086
S40	-0,220	-0,165	-0,007	-0,104	0,884	-0,030	0,041	-0,072	0,224	-0,001
S41	-0,115	0,037	0,881	-0,149	0,038	0,011	-0,075	-0,037	0,346	0,038
S42	0,115	-0,177	-0,108	-0,069	-0,048	-0,106	-0,096	-0,014	0,368	-0,133
S43	-0,034	-0,135	0,197	-0,146	-0,035	0,483	-0,046	-0,025	0,760	0,070
S44	0,195	0,052	-0,019	-0,125	0,688	0,022	0,559	0,055	0,118	0,038
S45	-0,050	0,078	0,727	-0,118	-0,061	0,065	-0,120	-0,132	0,543	0,061
S46	0,178	0,002	0,671	0,566	-0,168	-0,051	-0,009	-0,062	0,263	0,036
S47	0,081	0,180	0,938	-0,080	-0,093	-0,048	0,108	0,046	0,086	0,031
S48	0,107	0,236	0,929	-0,045	-0,101	-0,041	0,019	0,093	-0,005	-0,014
S49	0,021	0,197	0,945	-0,076	-0,101	-0,066	0,070	-0,015	0,005	0,005
S50	-0,073	0,701	0,616	-0,104	-0,134	-0,054	-0,058	-0,018	-0,007	-0,072
S51	-0,150	0,463	0,211	-0,213	-0,150	-0,087	-0,225	-0,019	-0,237	0,183
S52	-0,081	0,945	0,113	-0,102	-0,133	-0,051	-0,063	-0,013	-0,070	-0,021
S53	-0,066	0,626	0,697	-0,121	-0,157	-0,044	-0,074	-0,038	-0,064	-0,029
S54	-0,007	0,933	0,114	-0,134	-0,168	-0,104	-0,026	-0,078	-0,035	-0,040
S55	-0,080	0,665	0,658	-0,125	-0,006	-0,109	-0,052	-0,082	-0,021	-0,052
S56	-0,025	0,560	0,701	-0,124	-0,146	-0,082	-0,045	-0,076	-0,019	-0,043
S57	-0,119	0,908	0,039	0,163	-0,150	-0,089	-0,061	-0,052	0,048	-0,041
S58	0,972	-0,052	0,033	-0,024	-0,058	0,017	-0,045	-0,024	-0,065	-0,043
S59	-0,069	0,738	0,436	-0,170	-0,219	-0,137	-0,107	-0,088	-0,070	0,107
S60	0,174	-0,100	-0,100	-0,127	-0,188	-0,200	-0,163	-0,019	-0,049	-0,161
S61	0,113	0,565	0,322	-0,101	-0,244	-0,153	-0,090	-0,121	0,040	-0,164
S62	0,212	0,719	-0,050	-0,130	0,106	-0,178	0,343	-0,080	0,003	-0,031
S63	-0,062	0,925	0,074	-0,098	-0,141	-0,002	0,058	0,043	0,025	-0,047
S64	-0,180	0,787	0,039	-0,156	-0,196	-0,048	0,164	0,018	-0,019	-0,207
S65	0,100	-0,156	-0,096	-0,077	-0,154	-0,194	0,059	0,666	-0,038	-0,046
S66	0,040	0,899	-0,011	-0,122	-0,148	-0,108	0,009	-0,064	-0,080	-0,025
S67	-0,260	0,436	0,052	-0,228	-0,289	0,267	0,368	-0,043	-0,142	-0,424
S68	-0,155	0,350	0,213	-0,255	-0,186	0,171	-0,281	-0,047	-0,334	0,240

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

* Detailed descriptions of sectors of the 1998 Input-Output table are given in the Appendices.

Appendix 8: Factor Analysis of Variables: Rotated Component Matrix (Service Industry Variables)

S69	0,499	0,629	0,119	0,037	-0,089	0,408	0,034	-0,040	0,046	-0,127
S70	0,108	0,165	0,232	0,288	-0,085	0,650	0,220	-0,090	0,183	-0,134
S71	0,435	0,166	0,566	0,477	-0,072	0,157	-0,057	0,193	0,046	-0,087
S72	-0,024	0,605	0,134	0,697	-0,164	-0,056	-0,014	-0,006	-0,081	-0,130
S73	0,850	-0,022	0,042	-0,021	0,126	-0,009	0,405	0,097	-0,063	0,007
S74	0,689	0,069	0,636	-0,100	-0,079	-0,007	-0,057	-0,006	-0,056	-0,020
S75	0,749	0,057	0,603	-0,006	-0,073	-0,028	-0,035	0,022	-0,065	-0,014
S76	0,828	-0,182	-0,035	-0,007	-0,004	-0,056	0,025	0,264	-0,118	0,144
S77	0,247	-0,220	-0,046	0,164	0,140	-0,051	0,267	0,110	-0,140	0,551
S78	-0,008	0,811	0,314	-0,002	-0,040	0,026	0,074	0,361	-0,015	-0,051
S79	0,355	0,158	0,713	0,070	0,083	0,025	0,283	0,391	-0,054	0,002
S80	0,097	0,469	0,453	-0,007	-0,094	0,280	0,068	0,416	0,019	0,082
S81	0,456	-0,093	-0,035	0,105	-0,138	-0,105	-0,020	0,669	-0,081	-0,104
S82	0,116	-0,051	-0,087	0,934	-0,124	-0,035	-0,052	-0,037	-0,014	-0,064
S83	0,982	-0,027	0,015	0,003	-0,059	0,037	0,010	0,027	-0,044	-0,021
S84	0,934	0,012	0,133	-0,010	0,180	0,129	0,045	0,082	-0,024	-0,031
S85	0,861	0,075	0,141	0,048	-0,070	0,045	0,322	0,182	0,008	0,028
S86	0,876	0,011	0,019	0,086	-0,194	0,135	-0,055	0,086	-0,003	-0,002
S87	0,296	0,042	0,855	0,090	-0,165	-0,050	-0,048	-0,062	-0,054	-0,073
S88	0,942	-0,080	0,014	0,140	-0,090	-0,007	-0,001	0,009	-0,092	-0,053
S89	0,593	0,064	0,064	0,239	-0,290	-0,155	-0,149	0,124	0,022	-0,118
S90	0,953	0,003	-0,008	0,054	-0,126	-0,008	-0,042	0,077	0,008	-0,035
S91	0,947	-0,070	0,032	0,130	-0,096	0,000	-0,071	0,057	-0,061	-0,052
S92	0,867	-0,044	-0,017	0,029	-0,079	-0,060	-0,086	0,089	0,035	-0,111
S93	0,914	0,090	-0,008	-0,046	-0,054	-0,043	0,221	0,107	0,003	0,016
S94	0,902	-0,028	-0,046	-0,038	-0,090	0,009	-0,088	-0,065	-0,012	-0,017
S95	0,557	0,120	0,063	-0,142	-0,166	0,115	0,035	0,335	0,200	-0,006

Appendix 9: Agglomeration of Paper and Publishing Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
2	Growing of vegetables, horticultural specialties and nursery products	112	Growing of vegetables, horticultural specialties and nursery products		
3	Growing of fruit, nuts, beverage and spice crops	113	Growing of fruit, nuts, beverage and spice crops		
8	Mining of coal and lignite	1010	Mining and agglomeration of hard coal		
		1020	Mining and agglomeration of lignite		
12	Mining and quarrying n.e.c.	1421	Mining of chemical and fertilizer minerals		
		1422	Extraction of salt		
		1429	Other mining and quarrying n.e.c.		
35	Manufacture of paper and paper products	2101	Manufacture of pulp, paper and paperboard	3411	low tech
		2102	Manufacture of corrugated paper and paperboard and of containers of paper	3419	low tech
		2109	Manufacture of other articles of paper and paperboard	3412	low tech
36	Publishing	2211	Publishing of books, brochures, musical books and other publications	3420	low tech
		2212	Publishing of newspapers, journals and periodicals	3420	low tech
		2213	Publishing of recorded media	3420	low tech
		2219	Other publishing	3420	low tech
37	Printing and service activities related to printing	2221	Printing	3420	low tech
		2222	Service activities related to printing	3420	low tech
		2230	Reproduction of recorded media	3420	low tech
58	Manufacture of office, accounting and computing machinery	3000	Manufacture of office, accounting and computing machinery	3825	high tech
73	Sale, maintenance and repair of motor vehicles, motorcycles; retail sale of fuel				
74	Wholesale trade and commission trade, except of motor vehicles & motorcycles				
75	Retail trade, repair of personal and household materials				
76	Hotels; camping sites and other provision of short-stay accommodation				
83	Post and telecommunications				
84	Financial intermediation, except insurance and pension funding				
85	Insurance				

86	Real estate activities		
88	Computer and related activities		
90	Other business activities		
91	Education		
92	Health and social work		
93	Activities of membership organizations		
94	Recreational,cultural and sporting activities		
Secondary Industries			
69	Production,collection and distribution of electricity		
71	Collection,purification and distribution of water		
79	Land transport;transport viapipelines		
81	Air transport		
89	Research and development		
95	Other service activities		

Appendix 10: Agglomeration of Engineering Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code	Sector Classification	ISIC Rev 2 Code	OECD Category
10	Mining of metal ores	1310	Mining of iron ores		
		1320	Mining of nonferrous metal ores except uranium and thorium ores		
50	Manufacture of basic iron and steel	2710	Manufacture of basic iron and steel	3710	medium low tech.
52	Casting of metals	2731	Casting of iron and steel	3710	medium low tech.
		2732	Casting of non-ferrous metals	3720	medium low tech.
54	Manufacture of other fabricated metal products; metal working service activities	2891	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	3819	medium low tech.
		2892	Treatment and coating of metals; general mechanical engineering	3819	medium low tech.
		2893	Manufacture of cutlery, hand tools and general hardware	3819	medium low tech.
		2899	Manufacture of other fabricated metal products	3819	medium low tech.
55	Manufacture of general purpose machinery	2911	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	3821	medium high tech.
		2912	Manufacture of pumps, compressors, taps and valves	3823	medium high tech.
		2913	Manufacture of bearings, gears, gearing and driving elements	3822	medium high tech.
		2914	Manufacture of ovens, furnaces and furnace burners	3823	medium high tech.
		2915	Manufacture of lifting and handling equipment	3822	medium high tech.
		2919	Manufacture of other general purpose machinery	3823	medium high tech.

57	Manufacture of domestic appliances n.e.c.	2930	Manufacture of domestic appliances n.e.c.	3824	medium high tech.
59	Manufacture of electrical machinery and apparatus n.e.c.	3110	Manufacture of electric motors, generators and transformers	3831	medium high tech.
		3120	Manufacture of electricity distribution and control apparatus	3831	medium high tech.
		3130	Manufacture of insulated wire and cable	3831	medium high tech.
		3140	Manufacture of accumulators, primary cells and primary batteries	3833	medium high tech.
		3150	Manufacture of electric lamps and lighting equipment	3829	medium high tech.
		3190	Manufacture of other electrical equipment n.e.c.	3839	medium high tech.
62	Manufacture of motor vehicles, trailers and semi-trailers	3410	Manufacture of motor vehicles	3843	medium high tech.
		3420	Manufacture of bodies for motor vehicles; manufac.of trailers and semi-trailers	3843	medium high tech.
		3430	Manufacture of parts and accessories for motor vehicles and their engines	3843	medium high tech.
63	Building and repairing of ships, pleasure and sporting boats	3511	Building and repairing of ships	3841	medium high tech.
		3512	Building and repairing of pleasure and sporting boats	3841	medium high tech.
64	Manufacture of railway and tramway locomotives and rolling stock	3520	Manufacture of railway and tramway locomotives and rolling stock	3842	medium high tech.
66	Manufacture of transport equipment n.e.c.	3591	Manufacture of motorcycles	3844	medium high tech.
		3592	Manufacture of bicycles and invalid carriages	3844	medium high tech.
		3599	Manufacture of other transport equipment n.e.c.	3849	medium high tech.
78	Transport via railways	6010	Transport via railways		

Secondary Industries				
51	Manufacture of basic precious and non-ferrous metals	2720	Manufacture of basic precious and non-ferrous metals	3720
53	Manufacture of fabricated metal products, tanks, reservoirs and steam generators	2811	Manufacture of structural metal products	3813
		2812	Manufacture of tanks, reservoirs and containers of metal	3813
		2813	Manufacture of steam generators, except central heating hot water boilers	3813
56	Manufacture of special purpose machinery	2921	Manufacture of agricultural and forestry machinery	3822
		2922	Manufacture of machine-tools	3822
		2923	Manufacture of machinery for metallurgy	3822
		2924	Manufacture of machinery for mining, quarrying and construction	3824
		2925	Manufacture of machinery for food, beverage and tobacco processing	3822
		2926	Manufacture of machinery for textile, apparel and leather production	3823
		2927	Manufacture of weapons and ammunition	3824
61	Manufacture of medical, precision and optical instruments, watches and clocks	2929	Manufacture of other special purpose machinery	3824
		3311	Manufacture of medical and surgical equipment and orthopaedic appliances	3851
		3312	Manufacture of instruments and appliances for measuring, checking purposes	3851
		3313	Manufacture of industrial process control equipment	3851
		3320	Manufacture of optical instruments and photographic equipment	3852
3330	Manufacture of watches and clocks	3853		
67	Manufacture of furniture	3610	Manufacture of furniture	3320
68	Manufacturing n.e.c.	3691	Manufacture of jewellery and related articles	3901
		3692	Manufacture of musical instruments	3902
		3693	Manufacture of sports goods	3903
		3694	Manufacture of games and toys	3909
		3699	Other manufacturing n.e.c.	3909
69	Production, collection and distribution of Electricity			
72	Construction	4010	Site preparation	
		4510	Building of comple	
		4520	Building installation	

		4530	Building completion		
80	Water transport	6110	Sea and coastal water transport		
		6120	Inland water transport		

Appendix 11: Agglomeration of Stone Based Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
11	Quarrying of stone, sand and clay	1410	Quarrying of stone, sand and clay		
33	Sawmilling and planing of wood	2010	Sawmilling and planing of wood	3311	low tech
41	Manufacture of pesticides, other agro-chemicals and paints, varnishes	2421	Manufacture of pesticides and other agro-chemical products	3512	medium low tech.
		2422	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	3521	medium high tech.
45	Manufacture of plastic products	2520	Manufacture of plastic products	3560	medium low tech.
46	Manufacture of glass and glass products	2610	Manufacture of glass and glass products	3620	medium low tech.
47	Manufacture of ceramic products	2691	Manufacture of non-structural non-refractory ceramic ware	3691	medium low tech.
		2692	Manufacture of refractory ceramic products	3610	medium low tech.
		2693	Manufacture of structural non-refractory clay and ceramic products	3699	medium low tech.
48	Manufacture of cement, lime and plaster related articles these items	2694	Manufacture of cement, lime and plaster	3692	medium low tech.
		2695	Manufacture of articles of concrete, cement and plaster	3692	medium low tech.
49	Cutting and finishing of stone and man. of other non-metallic mineral products n.e.c.	2696	Cutting, shaping and finishing of stone	3699	medium low tech.
		2699	Manufacture of other non-metallic mineral products n.e.c.	3699	medium low tech.
53	Manufacture of fabricated metal products, tanks, reservoirs and steam generators	2811	Manufacture of structural metal products	3811	medium low tech.

		2812	Manufacture of tanks, reservoirs and containers of metal	3813	medium low tech.
		2813	Manufacture of steam generators, except central heating hot water boilers	3819	medium low tech.
55	Manufacture of general purpose machinery	2911	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	3821	medium low tech.
		2912	Manufacture of pumps, compressors, taps and valves	3821	medium high tech.
		2913	Manufacture of bearings, gears, gearing and driving elements	3824	medium high tech.
		2914	Manufacture of ovens, furnaces and furnace burners	3824	medium high tech.
		2915	Manufacture of lifting and handling equipment	3824	medium high tech.
		2919	Manufacture of other general purpose machinery	3824	medium high tech.
56	Manufacture of special purpose machinery	2921	Manufacture of agricultural and forestry machinery	3822	medium high tech.
		2922	Manufacture of machine-tools	3822	medium high tech.
		2923	Manufacture of machinery for metallurgy	3822	medium high tech.
		2924	Manufacture of machinery for mining, quarrying and construction	3822	medium high tech.
		2925	Manufacture of machinery for food, beverage and tobacco processing	3822	medium high tech.
		2926	Manufacture of machinery for textile, apparel and leather production	3823	medium high tech.
		2927	Manufacture of weapons and ammunition	3823	medium high tech.
		2929	Manufacture of other special purpose machinery	3824	medium high tech.
79	Land transport; transport via pipelines				
87	Renting of machinery and equipment without operator and of personal and household				

goods					
Secondary Industries					
34	Manufacture of wood and of products of wood and cork	2021	Manufacture of veneer sheets; manufac. of plywood, laminboard, particle board	3312	
		2022	Manufacture of builders'carpentry and joinery	3319	
		2023	Manufacture of wooden containers	3312	
		2029	Manufacture of other products of wood; articles of cork, straw etc.materials	3312	
50	Manufacture of basic iron and steel	2710	Manufacture of basic iron and steel	3710	
59	Manufacture of electrical machinery and apparatus n.e.c.	3110	Manufacture of electric motors, generators and transformers	3829	
		3120	Manufacture of electricity distribution and control apparatus	3831	
		3130	Manufacture of insulated wire and cable	3839	
		3140	Manufacture of accumulators, primary cells and primary batteries	3833	
		3150	Manufacture of electric lamps and lighting equipment	3833	
		3190	Manufacture of other electrical equipment n.e.c.	3839	
71	Collection, purification and distribution of water				
74	Wholesale trade and commission trade,except of motorvehicles & motorcycles				
75	Retail trade, repair of personal and household materials				
80	Water transport				

Appendix 12: Agglomeration of Packaged Food Products Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
2	Growing of vegetables, horticultural specialties and nursery products	112	Growing of vegetables, horticultural specialties and nursery products		
7	Fishing	500	Fishing		
13	Production, processing and preserving of meat and meat products	1511	Production, processing and preserving of meat and meat products	3111	low tech
14	Processing and preserving of fish and fish products	1512	Processing and preserving of fish and fish products	3114	low tech
17	Manufacture of dairy products	1520	Manufacture of dairy products	3121	low tech
20	Manufacture of bakery products	1541	Manufacture of bakery products	3117	low tech
23	Manufacture of alcoholic beverages	1551	Distilling, rectifying and blending of spirits; ethyl alcohol production	3131	low tech
		1552	Manufacture of wines	3132	low tech
		1553	Manufacture of malt liquors and malt	3133	low tech
24	Manufacture of soft drinks; production of mineral waters	1554	Manufacture of soft drinks; production of mineral waters	3134	low tech
72	Construction	4510	Building of comple		
		4520	Building installation		
		4530	Building completion		
82	Supporting and auxiliary transport activities; activities of travel agencies				
Secondary Industries					
15	Processing and preserving of fruit and vegetables	1513	Processing and preserving of fruit and vegetables	3113	
46	Manufacture of glass and glass products	2610	Manufacture of glass and glass products	3620	
71	Collection, purification and distribution of water				

Appendix 13: Agglomeration of Production and Processing of Field Crops Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code	Sector Classification	ISIC Rev 2 Code	OECD Category
1	Growing of cereals and other crops n.e.c.	111	Growing of cereals and other crops n.e.c.		
4	Farming of animals	121	Farming of cattle, sheep, goats, horses, asses; dairy farming		
		122	Other animal farming; production of animal products n.e.c.		
5	Agricultural and animal husbandry service activities, except veterinary activities	140	Agricultural and animal husbandry service activities, except veterinary activities		
16	Manufacture of vegetable and animal oils and fats	1514	Manufacture of vegetable and animal oils and fats	3115	low tech
18	Manufacture of grain mill products, starches and starch products	1531	Manufacture of grain mill products	3116	low tech
		1532	Manufacture of starches and starch products	3116	low tech
19	Manufacture of prepared animal feeds	1533	Manufacture of prepared animal feeds	3122	low tech
21	Manufacture of sugar	1542	Manufacture of sugar	3118	low tech
25	Manufacture of tobacco products	1600	Manufacture of tobacco products	3140	low tech
40	Manufacture of fertilizers and nitrogen compounds	2412	Manufacture of fertilizers and nitrogen compounds	3529	medium high tech.
44	Manufacture of rubber products	2511	Manufacture of rubber tyres and tubes; rebuilding of rubber tyres	3551	medium low tech.
		2519	Manufacture of other rubber products	3559	medium low tech.
No Secondary industry					

Appendix 14 : Agglomeration of Textile Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
26	Manufacture of textiles	1711	Preparation and spinning of textile fibres; weaving of textiles	3211	low tech
		1712	Finishing of textiles	3211	low tech
27	Manufacture of other textiles	1721	Manufacture of made-up textile articles; except apparel	3212	low tech
		1722	Manufacture of carpets and rugs	3214	low tech
		1723	Manufacture of cordage, rope, twine and netting	3215	low tech
		1729	Manufacture of other textiles n.e.c.	3219	low tech
28	Manufacture of knitted and crocheted fabrics and articles	1730	Manufacture of knitted and crocheted fabrics and articles	3213	low tech
29	Manufacture of wearing apparel, except fur apparel	1810	Manufacture of wearing apparel, except fur apparel	3219	low tech
70	Manufacture of gas;distribution of gaseous fuels				
Secondary Industries					
5	Agricultural and animal husbandry service activities, except veterinary activities	140	Agricultural and animal husbandry service activities, except veterinary activities		
43	Manufacture of cleaning materials, cosmetics and other chemicals and man-made fibres	2424	Manufacture of soap and detergents, cleaning and polishing preparations	3523	
		2429	Manufacture of other chemical products n.e.c.	3560	
		2430	Manufacture of man-made fibres	3540	
30	Dressing and dyeing of fur;manufacture of articles of fur	1820	Dressing and dyeing of fur;manufacture of articles of fur	3232	
31	Tanning and Dressing of leather; manufacture of luggage, handbags, saddlery and harness	1911	Tanning and Dressing of leather	3231	
		1912	Manufacture of luggage, handbags, saddlery and harness	3233	
69	Production, collection and distribution of Electricity				

Appendix 15: Agglomeration of Natural Resources Based Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
6	Forestry, logging and related service activities	200	Forestry, logging and related service activities		
22	Manufacture of cocoa, chocolate, sugar confectionery and other food products n.e.c.	1543	Manufacture of cocoa, chocolate and sugar confectionery	3119	low tech
		1544	Manufacture of macaroni, noodles, couscous and similar farinaceous products	3121	low tech
		1549	Manufacture of other food products n.e.c.	3121	low tech
38	Manufacture of coke, refined petroleum products	2310	Manufacture of coke oven products	3540	medium high
		2320	Manufacture of refined petroleum products	3530	medium high
Secondary Industries					
9	Extraction of crude petroleum and natural gas	1110	Extraction of crude petroleum and natural gas		
34	Manufacture of wood and of products of wood and cork	2021	Manufacture of veneer sheets; manufac. of plywood, laminboard, particle board	3312	
		2022	Manufacture of builders'carpentry and joinery	3319	
		2023	Manufacture of wooden containers	3312	
		2029	Manufacture of other products of wood; articles of cork, straw etc. materials	3320	
44	Manufacture of rubber products	2511	Manufacture of rubber tyres and tubes; rebuilding of rubber tyres	3551	
		2519	Manufacture of other rubber products	3559	
67	Manufacture of furniture	3610	Manufacture of furniture	3320	
73	Sale, maintenance and repair of motor vehicles, motorcycles; retail sale of fuel				

Appendix 16: Agglomeration of Energy Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
9	Extraction of crude petroleum and natural gas				
65	Manufacture of aircraft and spacecraft	3530	Manufacture of aircraft	3845	high tech.
81	Air transport				
Secondary Industries					
7	Fishing				
12	Mining and quarrying n.e.c				
78	Transport via railways				
79	Land transport;transport viapipelines				
80	Water transport				

Appendix 17: Agglomeration of Chemicals Industry in Turkey (1998 input output table)					
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	OECD Category
39	Manufacture of basic chemicals, plastics in primary forms and os synthetics rubber	2411	Manufacture of basic chemicals, except fertilizers and nitrogen compounds	3511	medium low tech.
		2413	Manufacture of plastics in primary forms and of synthetic rubber	3560	medium low tech.
43	Manufacture of cleaning materials, cosmetics and other chemicals and man-made fibres	2424	Manufacture of soap and detergents, cleaning and polishing preparations	3523	medium high
		2429	Manufacture of other chemical products n.e.c.	3560	medium low tech.
		2430	Manufacture of man-made fibres	3529	medium high
Secondary Industries					
37	Printing and service activities related to printing	2221	Printing	3420	
		2222	Service activities related to printing	3420	
		2230	Reproduction of recorded media	3420	
42	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	2423	Manufacture of drugs and medicines	3522	high tech. industry
45	Manufacture of plastic products	2520	Manufacture of plastic products	3560	

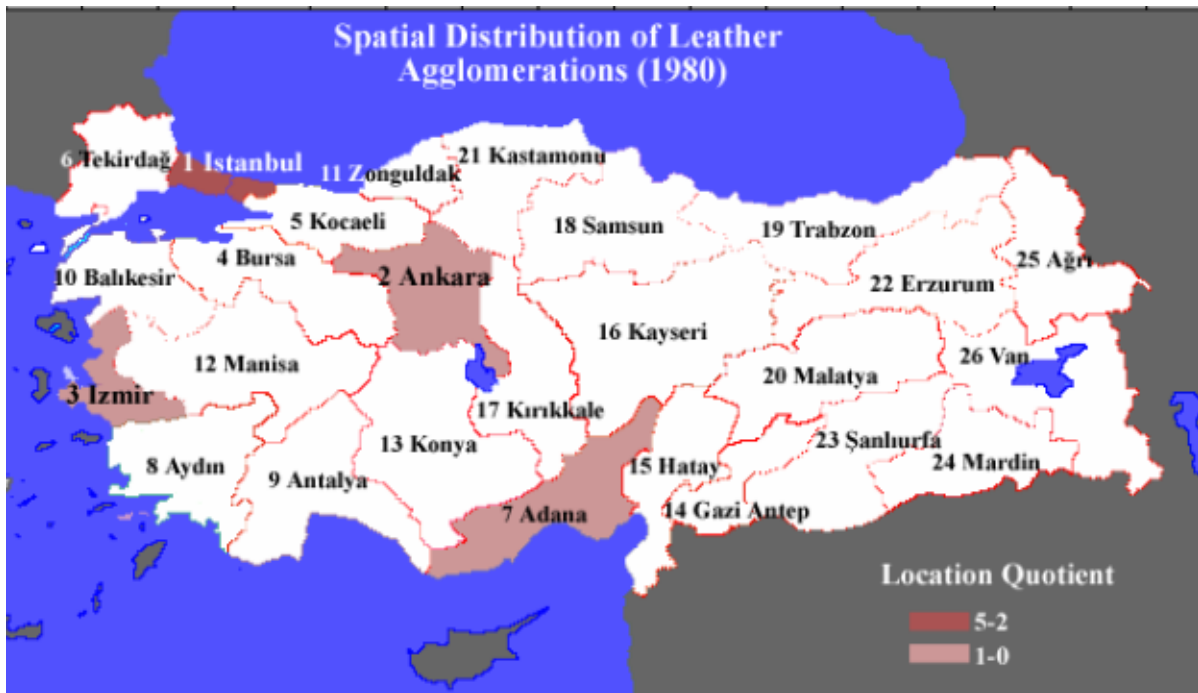
Appendix 18: Agglomeration of Leather Industry in Turkey (1998 input output table)					OECD
Code	Sector Classification	ISIC Rev 3 Code		ISIC Rev 2 Code	Category
31	Tanning and Dressing of leather; manufacture of luggage, handbags, saddlery and harness	1911	Tanning and Dressing of leather	3231	low tech
		1912	Manufacture of luggage, handbags, saddlery and harness	3233	low tech
32	Manufacture of footwear	1920	Manufacture of footwear	3240	low tech
Secondary Industries					
30	Dressing and dyeing of fur; manufacture of articles of fur	1820	Dressing and dyeing of fur; manufacture of articles of fur	3232	low tech
34	Manufacture of wood and of products of wood and cork	2021	Manufacture of veneer sheets; manufac. of plywood, laminboard, particle board	3312	
		2022	Manufacture of builders'carpentry and joinery	3319	
		2023	Manufacture of wooden containers	3312	
		2029	Manufacture of other products of wood; articles of cork, straw etc.materials	3320	
67	Manufacture of furniture	3610	Manufacture of furniture	3320	
77	Restaurants, bars and canteens				

Appendix 19: Location Quotients of Agglomerations of Industries (1980)

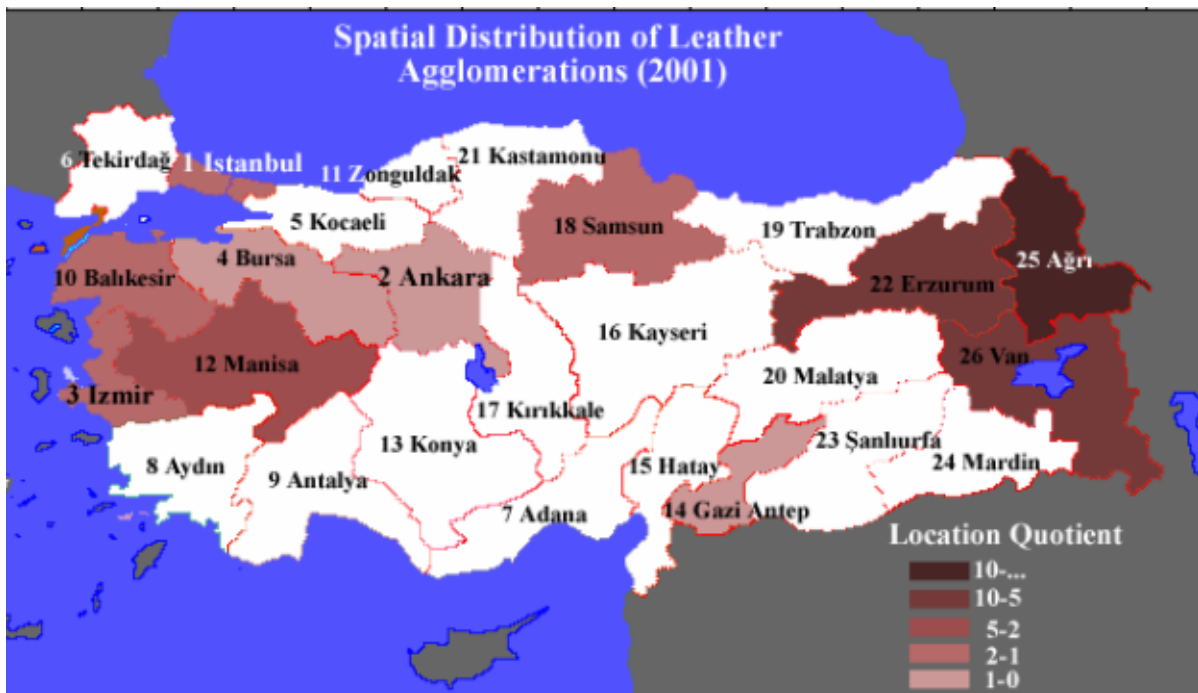
	Chemicals	Engineering	Leather	Paper and Publishing	Natural Resource Based	Packaged Food Products	Production and Processing of Field Crops	Stone Based	Textile
İstanbul (İstanbul)	1,79	1,05	2,53	1,74	0,52	0,62	0,10	1,35	1,14
Ankara (Ankara)	1,23	1,34	0,31	1,68	0,50	3,01	0,57	1,44	0,00
İzmir (İzmir)	0,42	0,60	0,60	0,62	0,60	1,85	2,45	0,75	0,90
Bursa (Bursa, Eskişehir, Bilecik)	0,65	1,21	0,00	0,00	0,12	1,54	0,67	0,50	1,76
Kocaeli (Kocaeli, Yalova, Bolu, Sakarya, Düzce)	2,74	1,60	0,00	0,64	1,37	0,55	0,72	1,44	0,00
Tekirdağ (Tekirdağ, Kırklareli, Edirne)	0,00	0,00	0,00	0,00	0,02	1,29	4,19	1,10	0,91
Adana (adana-mersin)	0,00	0,16	0,12	0,11	0,18	0,45	1,19	0,36	3,17
Aydın (Aydın-Denizli-Muğla)	0,00	0,37	0,00	5,96	0,11	0,50	0,18	0,59	2,21
Antalya (Antalya-Isparta - Burdur)	11,15	0,21	0,00	0,00	0,71	2,56	1,51	1,09	0,04
Balıkesir (Balıkesir-Çanakkale)	0,81	0,08	0,00	0,00	0,05	3,39	3,99	0,57	0,60
Zonguldak (Zonguldak-Karabük-Bartın)	0,00	3,59	0,00	0,95	0,00	0,00	0,00	0,00	0,00
Manisa (Manisa, Uşak, Kütahya, Afyon)	0,00	0,02	0,00	1,28	0,00	0,83	1,55	2,95	0,99
Konya (Konya- Karaman)	0,00	2,27	0,00	0,00	0,66	0,94	1,56	0,66	0,00
Gaziantep (Gaziantep-Kilis-Adıyaman)	0,00	0,00	0,00	0,00	0,20	1,20	1,02	0,82	2,97
Hatay (Hatay-Osmaniye-Kahramanmaraş)	0,00	3,28	0,00	0,00	0,03	0,06	0,14	0,07	0,41
Kayseri (Kayseri-Sivas-Yozgat)	0,00	1,01	0,00	0,00	0,09	0,77	0,58	0,62	2,30
Kırıkkale(Kırıkkale-Nevşehir-Kırşehir-Niğde-Aksaray)	0,00	0,00	0,00	0,00	0,00	1,94	0,00	4,49	0,77
Samsun (Samsun-Amasya-Çorum -Tokat)	0,00	0,17	0,00	0,00	0,60	0,35	5,70	0,98	0,05
Trabzon(Trabzon-Rize-Artvin-Giresun-Ordu-Gümüşhane)	0,00	0,14	0,00	0,66	19,32	0,07	0,39	0,24	0,00
Malatya (Malatya- Elazığ-Tunceli-Bingöl)	0,00	0,90	0,00	0,00	0,00	1,11	4,40	0,75	0,00
Kastamonu (Kastamonu-Sinop-Çankırı)	0,00	0,00	0,00	0,00	0,00	0,41	5,14	1,87	0,05
Erzurum (Erzurum-Erzincan- Bayburt)	0,00	0,10	0,00	0,00	0,34	3,52	3,28	0,50	1,07
Şanlıurfa (Diyarbakır-Şanlıurfa)	0,00	0,15	0,00	0,00	0,00	8,13	2,31	0,00	0,72
Mardin (Batman-Mardin-Siirt-Şırnak)	0,00	0,00	0,00	0,00	22,56	0,00	0,14	0,00	0,01
Ağrı (Kars-Iğdır-Ağrı-Ardahan)	0,00	0,00	0,00	0,00	0,00	10,13	0,35	2,09	0,00
Van (Van-Hakkari-Bitlis-Muş)	0,00	0,00	0,00	0,00	0,00	4,42	4,12	1,21	0,00

Appendix 20: Location Quotients of Agglomerations of Industries (2001)

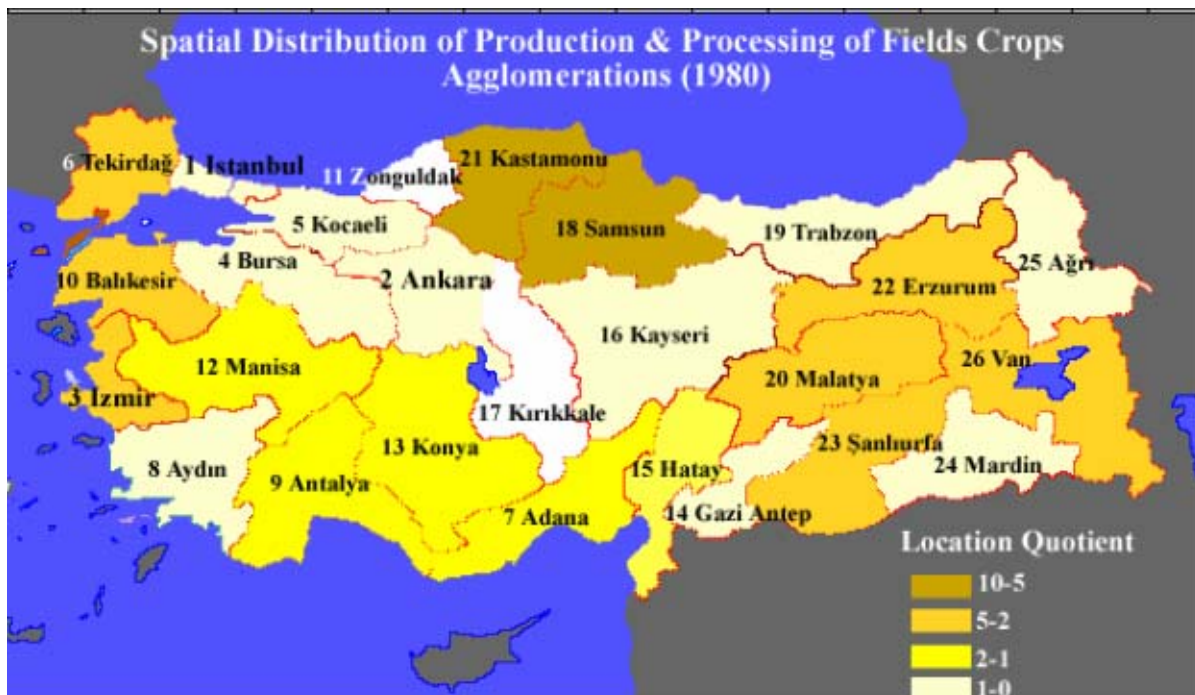
		Chemicals	Engineering	Leather	Paper and Publishing	Natural Resource Based	Packaged Food Products	Production and Processing of Field Crops	Stone Based	Textile
1	İstanbul (İstanbul)	2,11	1,01	1,82	1,61	0,60	0,39	0,11	0,82	1,16
2	Ankara (Ankara)	0,72	1,36	0,87	3,00	0,86	1,26	0,83	1,64	0,32
3	İzmir (İzmir)	0,14	1,09	1,35	0,99	0,47	1,97	2,75	0,97	0,71
4	Bursa (Bursa, Eskişehir, Bilecik)	0,01	0,88	0,20	0,37	0,70	1,41	0,14	1,07	1,31
5	Kocaeli (Kocaeli, Yalova, Bolu, Sakarya, Düzce)	1,87	1,52	0,00	0,19	2,50	0,94	0,22	1,86	0,30
6	Tekirdağ (Tekirdağ, Kırklareli, Edirne)	0,00	0,42	0,00	0,29	0,16	0,71	1,62	0,62	1,76
7	adana (adana-mersin)	0,00	0,51	0,00	0,66	0,94	0,86	1,59	1,20	1,27
8	Aydın (Aydın-Denizli-Muğla)	0,61	0,26	0,00	0,41	0,17	0,36	0,10	0,29	2,19
9	Antalya (Antalya-Isparta - Burdur)	2,28	0,60	0,00	0,00	0,00	2,98	4,81	1,87	0,17
10	Balıkesir (Balıkesir-Çanakkale)	0,00	0,02	1,94	1,48	0,00	8,79	2,70	0,87	0,14
11	Zonguldak (Zonguldak-Karabük-Bartın)	0,00	4,44	0,00	1,57	0,28	0,48	0,00	0,30	0,00
12	Manisa (Manisa, Uşak, Kütahya, Afyon)	0,57	0,31	2,49	0,44	0,16	2,69	2,21	2,16	0,56
13	Konya (Konya- Karaman)	0,00	2,56	0,00	0,98	0,56	1,55	1,97	1,14	0,14
14	Gaziantep (Gaziantep-Kilis-Adıyaman)	0,00	0,02	0,43	0,00	0,13	0,88	0,32	0,44	2,22
15	Hatay (Hatay-Osmaniye-Kahramanmaraş)	0,00	4,57	0,00	0,00	0,00	0,09	2,31	0,14	0,00
16	Kayseri (Kayseri-Sivas-Yozgat)	0,00	1,29	0,00	0,00	3,18	0,58	0,49	1,04	0,88
17	Kırıkkale(Kırıkkale-Nevşehir-Kırşehir-Niğde-Aksaray)	1,66	1,63	0,00	0,00	2,61	0,95	3,04	1,60	0,00
18	Samsun (Samsun-Amasya-Çorum -Tokat)	0,00	0,68	1,14	0,00	0,73	0,11	12,10	1,01	0,05
19	Trabzon(Trabzon-Rize-Artvin-Giresun-Ordu-Gümüşhane)	0,28	0,05	0,00	0,60	13,92	0,24	0,81	0,38	0,00
20	Malatya (Malatya- Elazığ-Tunceli-Bingöl)	0,00	2,16	0,00	0,00	0,07	1,75	9,44	0,00	0,00
21	Kastamonu (Kastamonu-Sinop-Çankırı)	0,00	0,00	0,00	5,25	0,00	0,00	5,85	2,70	0,00
22	Erzurum (Erzurum-Erzincan- Bayburt)	0,00	0,40	9,22	0,00	0,00	2,25	12,89	0,00	0,00
23	Şanlıurfa (Diyarbakır-Şanlıurfa)	0,00	0,64	0,00	0,00	0,00	5,91	0,80	1,41	0,59
24	Mardin (Batman-Mardin-Siirt-Şırnak)	0,00	0,00	0,00	0,00	10,60	1,39	1,27	1,26	0,00
25	Ağrı (Kars-Iğdır-Ağrı-Ardahan)	0,00	0,00	14,97	0,00	0,00	0,00	15,66	0,00	0,00
26	Van (Van-Hakkari-Bitlis-Muş)	0,00	0,00	9,28	0,00	0,00	1,68	12,66	0,00	0,32



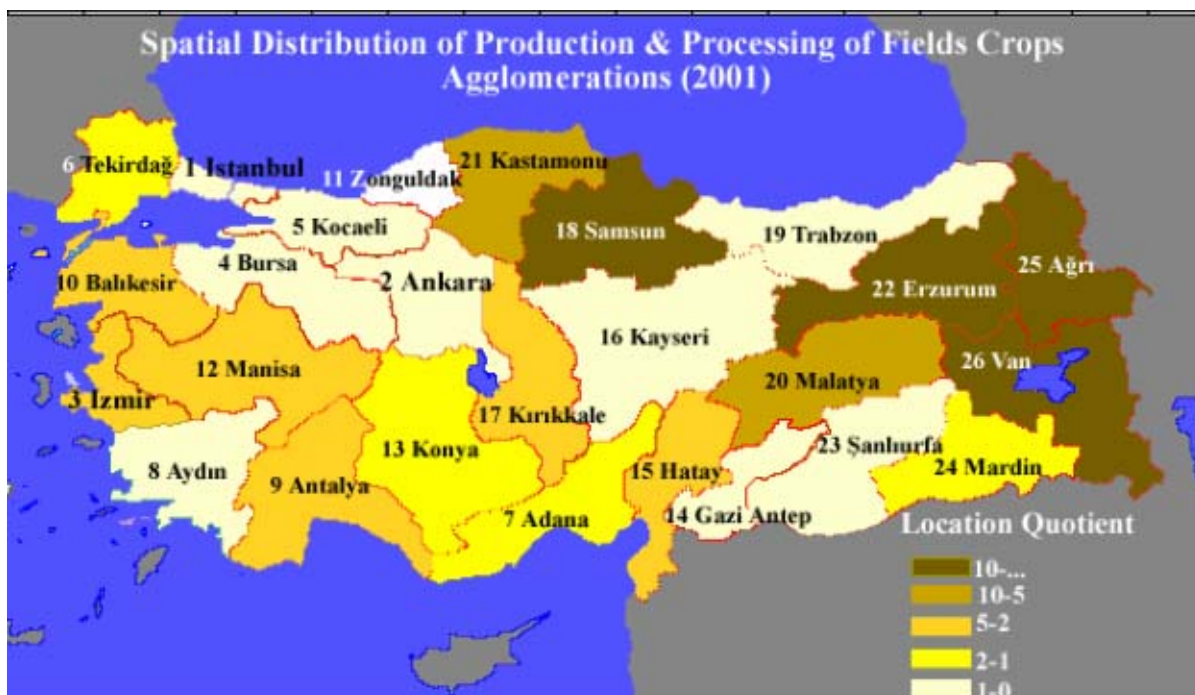
Appendix 21: Spatial Distribution of Agglomerations of Leather (1980)



Appendix 22: Spatial Distribution of Agglomerations of Leather (2001)



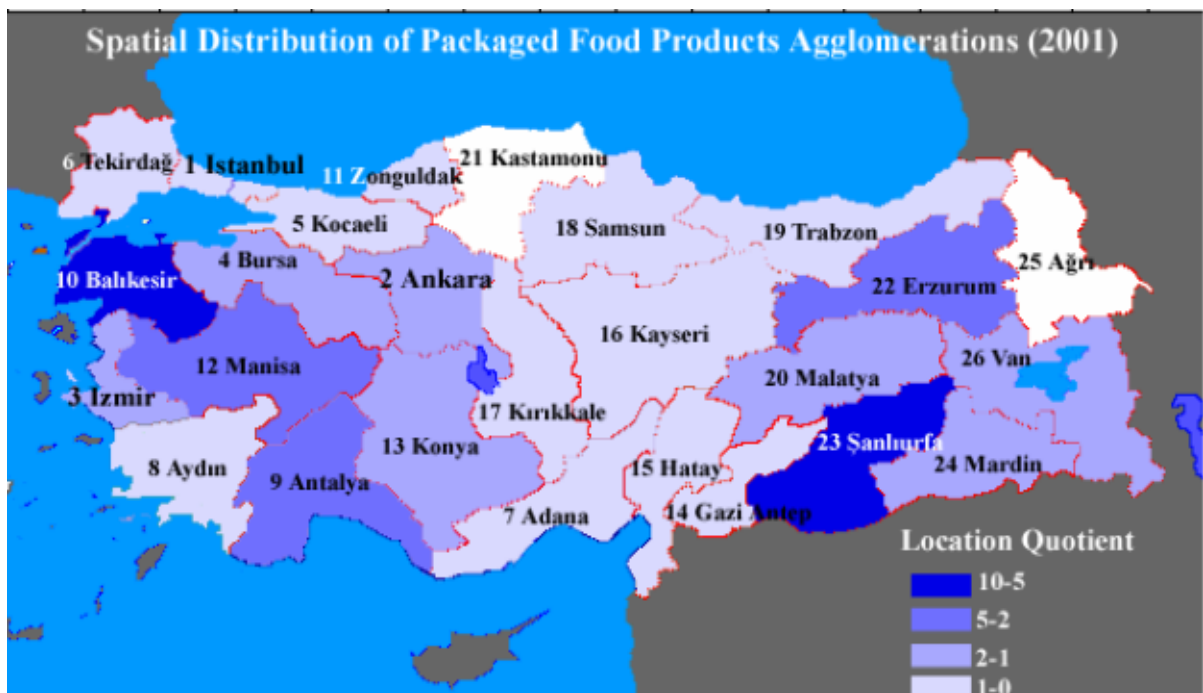
Appendix 23: Spatial Distribution of Agglomerations of Production and Processing of Field Crops (1980)



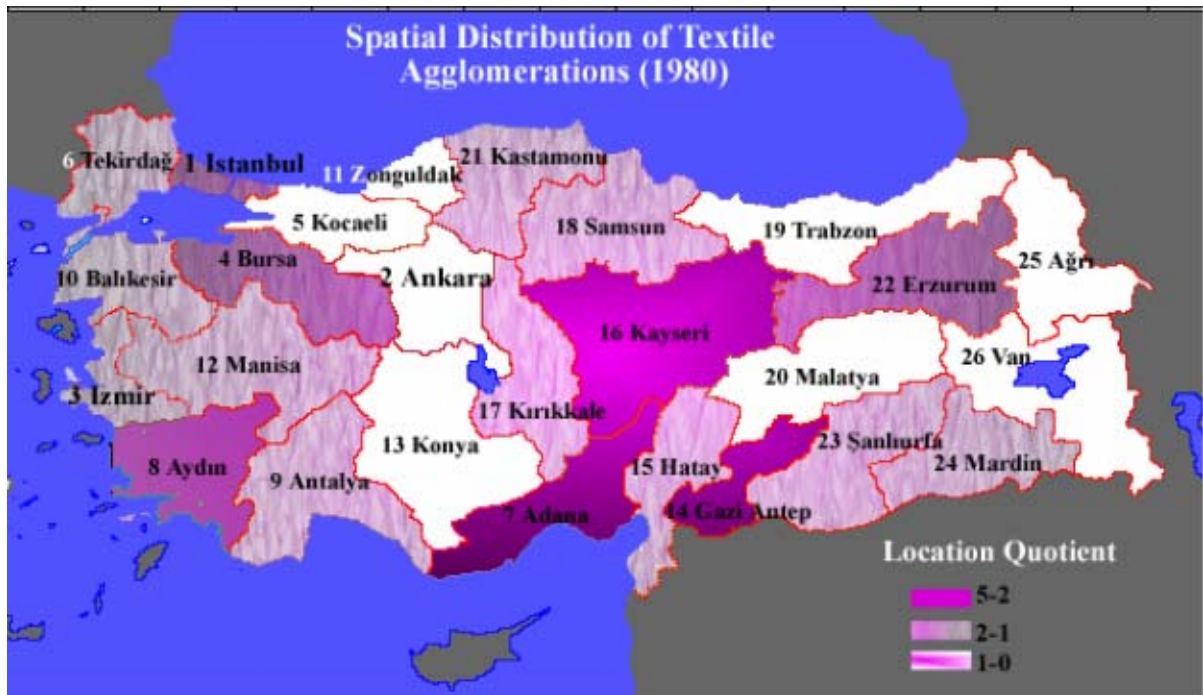
Appendix 24: Spatial Distribution of Agglomerations of Production and Processing of Field Crops (2001)



Appendix 25: Spatial Distribution of Agglomerations of Packaged Food Products (1980)



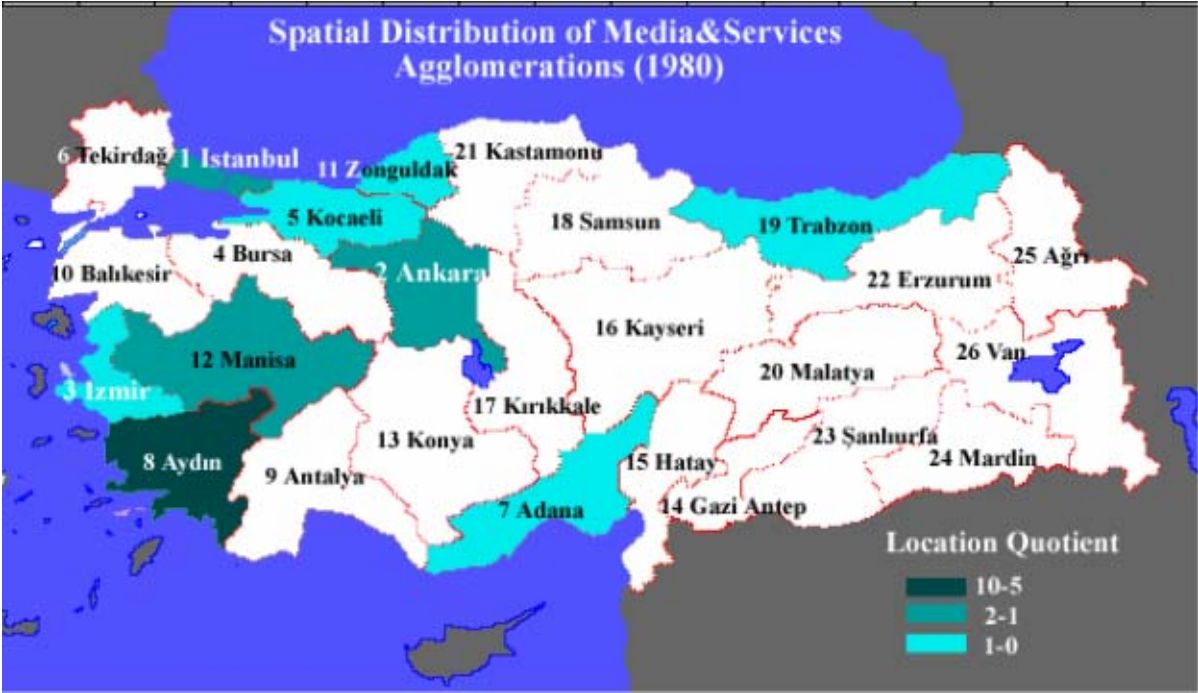
Appendix 26: Spatial Distribution of Agglomerations of Packaged Food Products (2001)



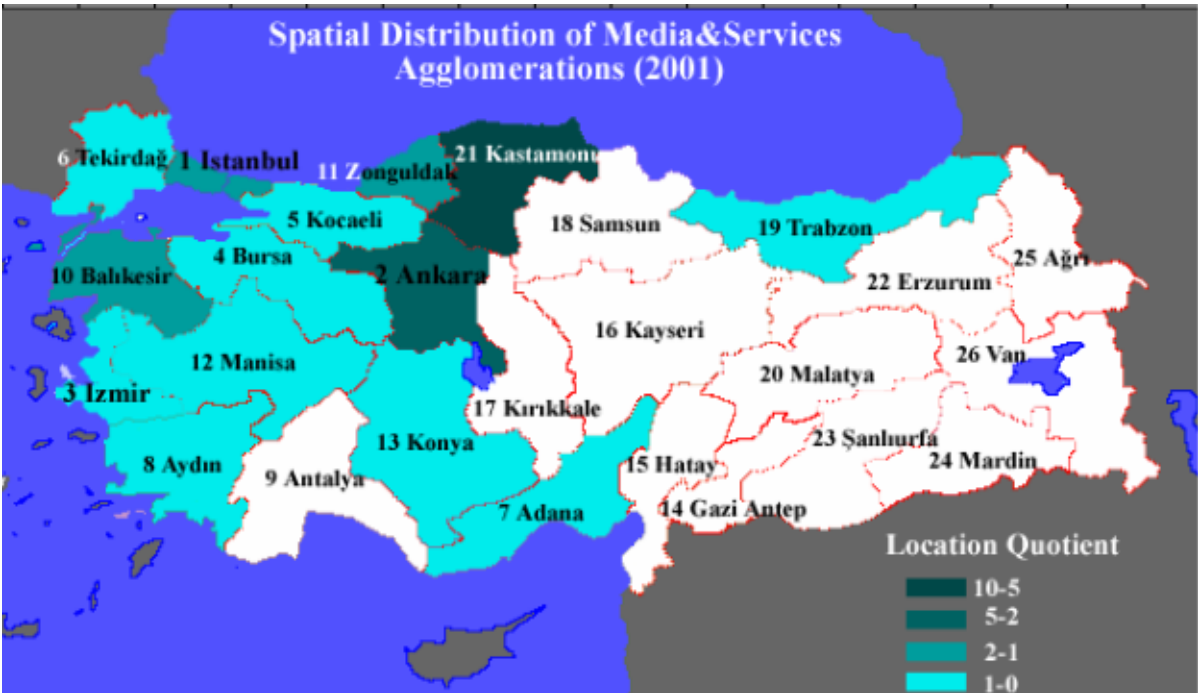
Appendix 27: Spatial Distribution of Agglomerations of Textile (1980)



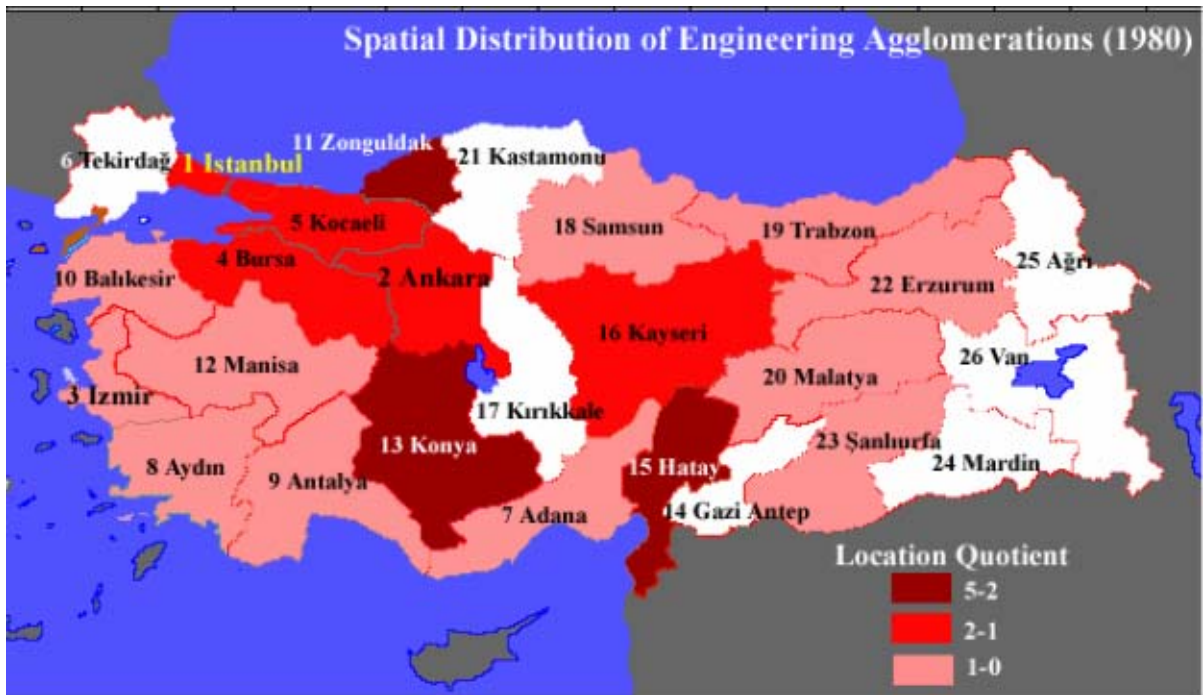
Appendix 28: Spatial Distribution of Agglomerations of Textile (2001)



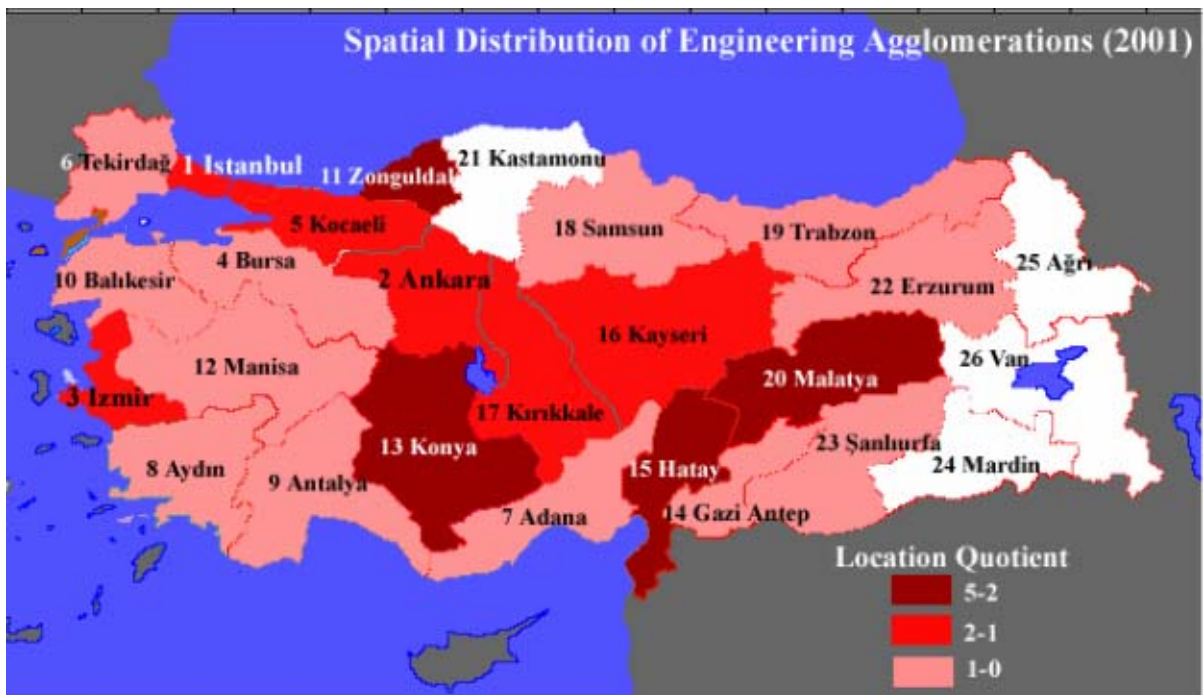
Appendix 29: Spatial Distribution of Agglomerations of Paper and Publishing (1980)



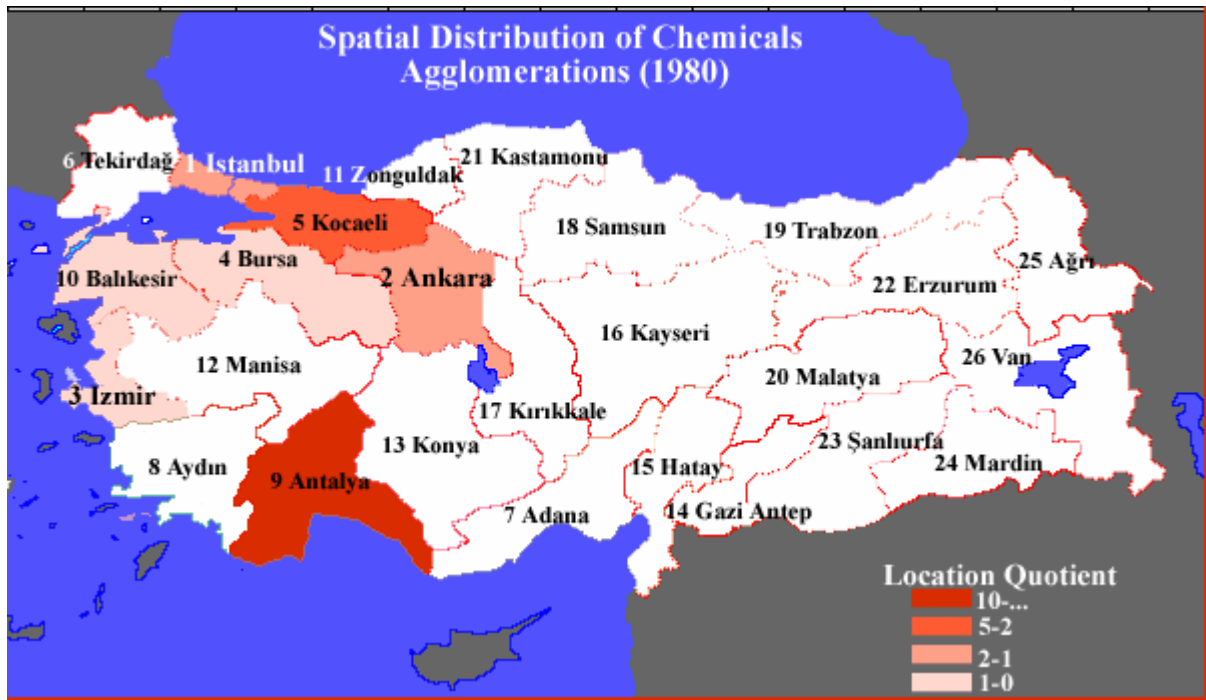
Appendix 30: Spatial Distribution of Agglomerations of Paper and Publishing (2001)



Appendix 31: Spatial Distribution of Agglomerations of Engineering (1980)



Appendix 32: Spatial Distribution of Agglomerations of Engineering (2001)



Appendix 33: Spatial Distribution of Agglomerations of Chemicals (1980)



Appendix 34: Spatial Distribution of Agglomerations of Chemicals (2001)

Curriculum Vitae

Pınar Falcıođlu was born on 28 November 1972, in İzmir. She received her BA degree in Business Administration from Dokuz Eylül University in 1994 and her MA degree in Banking from Marmara University in 1998. She has worked in İş Bank and Garanti Bank as a portfolio manager between years 1994-2003. Since 2004 she has been a lecturer at Işık University.

Publications

Falcıođlu, P. & Akgüngör, S. (2008). "Regional Specialization and Industrial Concentration Patterns in Turkish Manufacturing Industry: An Assessment For The 1980-2000 Period", forthcoming in European Planning Studies.

Akgüngör, S. & Falcıođlu, P. (2006). "Regional Specialization and Industrial Concentration Patterns in Turkish Manufacturing Industry: An Assessment For The 1980-2000 Period", paper presented at the International Conference of Regional Studies Association in Leuven, Belgium, June 8-9.

Falcıođlu, P. & Akgüngör, S. (2006). "Geographical Concentration Patterns and Innovativeness of Turkish Manufacturing Industry", paper presented at the DRUID Summer Conference in Copenhagen, Denmark, June 18-20.

Akgüngör, S.; Falcıođlu, P.; Kontbay, S. (2006). "Industrial Specialization in Turkey: An Assessment in the Context of European Integration", paper presented at the UEK-TEK conference in Ankara, September 11-13.

Akgüngör, S. & Falcıođlu, P. (2005). "European Integration and Regional Specialization Patterns in Turkish Manufacturing Industry", (in: Coskun Can Aktan-Ed., Selected Proceedings of the First International Conference,) İzmir, Turkey: Yaşar University, pp.291-307.