EXPORTS AND CLUSTERS: A SPATIAL ECONOMETRIC ANALYSIS ON ANKARA AND ISTANBUL OIZs

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ABSTRACT

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Organized Industrial Zones (OIZs) are used as a main and important industry policy tool in Turkey. In 2012, the number of OIZs is 263 with 148 active and 115 planned ones. Network between the firms reveal the knowledge spillovers which is inevitable for economic growth of a country for neo-classical economists.

In this thesis, existence of intra-OIZ and intra-industry knowledge spillovers in Ankara and Istanbul is tested by the help of an export decision function. As it considers the spatial dependence between the regional units the spatial

econometric method is preferred for the analysis. The data set is taken from the "Field Research Survey" of Small and Medium Enterprises Development Organization (SMEDO). It consists of 62,137 firm level observations from 24 manufacturing industries in 81 provinces between 2004 and 2007. After the cleaning process of the data, 1545 and 1172 observations are left for Ankara and Istanbul, respectively.

The results show that the size of the firm (which is proxied by logarithm of total labor), technology (which is proxied by computer usage), organizational proximity and foreign language knowledge of the administrator are the common determinants of export decision for Ankara and Istanbul for both intra-IOZ and intra-industry relations when spatial dependence is not ignored. Besides these variables, in Ankara percentage of high skilled labor is significant while in Istanbul cluster proximity is significant. Moreover, for Ankara while for intra-OIZ relations the spatial effect is one third of the total effect, it is one fourth of the total effect for intra-industry relation. For Istanbul one fourth of the total effect is from spatial effects for both intra-OIZ and intra-industry relations.

Keywords: Geographical Agglomerations (Clusters), Organized Industrial Zone (OIZ), Spatial Econometrics, Knowledge Spillovers, Export

ÖZ

İHRACAT VE KÜMELER: ANKARA VE İSTANBUL OSB'LERİNİN MEKANSAL EKONOMETRİK ANALİZLE İNCELENMESİ

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Organize Sanayi Bölgeleri (OSB), Türkiye'deki başlıca ve önemli endüstri politikalarından birisidir. 2012 yılında, OSB'lerin sayısı, 148'i faaliyette ve 115'i de planlanan olmak üzere toplamda 263'tür. Firmalar arasındaki ağlar, neo-klasik iktisatçılarca öngörülen bir ülkenin iktisadi büyümesi için kaçınılmaz olarak gerekli olan bilgi saçılmalarını ortaya çıkarmaktadır.

Bu tezde, amacımız Ankara ve İstanbulda OSB-içi ve endüstri-içi bilgi saçılmalarının olup olmadığını bir ihracat kararı fonksiyonu kullanarak test etmektir. Çalışmada, bölgesel birimler arasında mekansal bağımlılığı dikkate almasından dolayı mekansal ekonometri metodu tercih edilmiştir. Veri seti olarak Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı (KOSGEB) tarafından toplanan "Saha Araştırması Anketi" kullanılmıştır. Bu veri setinde 2004 ve 2007 yılları arasında 81 ilden 24 imalat sanayine ait 62.137 firma düzeyinde gözlem bulunmaktadır. Veri temizlendikten sonra Ankara için 1545 ve İstanbul içinde 1172 gözlem kalmıştır.

Mekansal bağımlılık gözardı edilmediğinde, Ankara ve İstanbul için OSB-içi ve endüstri-içi ilişkilerde firma büyüklüğü (toplam işçilerin logaritması ile temsil edilen), teknoloji (bilgisayar kullanımı ile temsil edilen), organizasyonel yakınlık ve yöneticinin yabancı dil bilgisi, ihracat kararının ortak belirleyicileridir. Bu değişkenlerin yanı sıra, Ankara'da yüksek yetenekli işçilerin oranı, İstanbul'da ise küme yakınlığı anlamlıdır. Ankara'da OSB-içi ilişkilerde toplam etkinin üçte biri mekansal etkilerden kaynaklanırken endüstri-içi ilişkilerde bu oran toplam etkinin dörtte biridir. İstanbul'da her iki ilişki için de toplam etkinin dörtte biri mekansal etkilerden ortaya çıkmaktadır.

Anahtar Kelimeler: Coğrafi Yığılmalar (Kümeler), Organize Sanayi Bölgeleri (OSB), Mekansal Ekonometri, Bilgi Saçılması, , İhracat

To My Love, S.D.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

LIST OF ABBREVIATIONS

DPT	Devlet Planlama Teşkilatı (State Planning Organization)
CNC	Computer Numerical Control
EDC	Enterprise Development Center
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
ISIC	International Standard Industrial Classification
IZ	Industrial Zone
KOSGEB	Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı (Small and Medium Enterprises Development Organization - SMEDO)
MAR	Marshall-Arrow-Romer
ML	Maximum Likelihood
MNE	Multinational Enterprise
NACE	Nomeclature Generale des Activities Economiques dans les Communautes Europeenes (French, EU classification system)
NUTS	Nomenclature of Territorial Units for Statistics
OIZ	Organized Industrial Zone
OLS	Ordinary Least Squares
PLC	Programmable Logic Controller
R&D	Research and Development
SAM	Spatial Autoregressive Models
SEM	Spatial Error Models
SIC	Standard Industry Classification

SIS	Small Industrial Site
SIZ	Small Industrial Zoen
SMEDO	Small and Medium Enterprises Development Organization
SMEs	Small and Medium Enterprises
STDC	SMEDO Technology Development Zone
TDZ	Technology Development Zone
TEPAV	Türkiye Ekonomi Politikaları Araştırma Vakfı (Economic Policy Research Foundation of Turkey)
TP	Technology Park
TURKSTAT	Turkish Statistical Institute
WTO	World Trade Organization

CHAPTER 1

INTRODUCTION

1.1. Motivation

One of the main industry policies in Turkey is establishing Organized Industrial Zones (OIZs), Technology Development Zones (TDZs) and Industrial Zones (IZs)[1]. First OIZ in Turkey was established in Bursa 1969. Till 2007, there have been 70 active OIZs. In 2012, this number is 263 OIZs with 148 active ones and 115 planned ones. The expectation of being in geographically agglomerated firms is not only to interact with each other but also to transfer knowledge among them. As far as we know, the interaction between the firms is tested not yet in Turkey. This is mainly due to the lack of appropriate data and analysis (econometric) tools.

The OIZs are from the cluster (geographical agglomeration) idea which is first suggested by Marshall (1920) and have got stronger support by Porter in 2000's. In geographical agglomerations (clusters), firms are benefitting from the (positive) "externalities" (knowledge spillovers) that other firms produce. Neo-classical economists and the endogenous growth theoreticians emphasize

[1] In Turkey, two laws on OIZs and TDZs, and one act on IZs are effective.

the importance of knowledge and knowledge spillovers in their theories and models.

Clusters are always known to be encouraged because of the knowledge spillovers but the main question arises whether there is “knowledge spillovers” exist in clusters. Our starting point is to analyze the knowledge spillovers in clusters with a Turkish OIZ application. The question is stronger when the analyzing unit is clusters. The ambiguity depends on whether or not OIZs are considered as “clusters”. Due to this ambiguity, the hypothesis of this study is changed to investigate if OIZs can be considered as clusters by analyzing the existence of (spatial) knowledge spillovers. As far as we know, the econometric method at least spatial econometric method is not used yet for analyzing the efficiency of OIZs.

1.2. Question Addressed

The industrial policy in Turkey has been based on establishing OIZs, TDZs and IZs especially after 2000s. The main hypothesis is to analyze whether the firms in the OIZs are influenced from neighboring firms in OIZs in the knowledge spillovers context by estimating the export decision function. In another words, our main aim is to test spatial dependence in OIZs to understand the cluster dynamics behind.

As a sub-hypothesis, the industrial dynamics in a province are also tested. According to MAR (Marshall, Arrow, Romer) knowledge spillover theory which is explained in detail in Chapter 2, firms are more influenced by the firms from the same industry in a region or province. In our analysis, in accordance with the main hypothesis, in testing of the sub-hypothesis, we use the Ankara and the Istanbul OIZ data only instead of whole Ankara and Istanbul data from Small and Medium Enterprises Development Organization (SMEDO) sample.

To emphasize the importance and difference of spatial econometric analysis, we do the standard econometric analysis for comparison.

The main hypothesis of this study is,

H_1: The knowledge spillover between the firms in OIZs for Ankara and Istanbul do not exist.

The sub-hypothesis of this study is,

H_2: The knowledge spillovers between the firms from the same industry in OIZs for Ankara and Istanbul do not exist.

1.3. Data and the Methodology

In this study, we utilize data from “Field Research Survey” which is done by Small and Medium Enterprises Development Organization (SMEDO). It is a unique data set for 62,137 firms from 24 industries in 81 provinces between 2004 and 2007. According to Turkish Statistical Institute (TURKSTAT), it is assumed to be approximately 250,000 small and medium enterprises (SMEs). The data set covers the one fourth of SMEs in Turkey. It is a unique data set due the information of firms’ location whether they are in OIZs, TDZs or IZs or not. Nevertheless data has several problems which are also discussed in Chapter

5. Besides the problems of the data set, it has information about valuable issues such as firms' relations with the OIZs.

In this study, our main hypothesis is on OIZs. Ankara and Istanbul provinces are chosen for analysis due to the highest observation number for OIZs in SMEDO data. The cleaning process of the data explained in detail in Chapter 5. In the cleaned data, in Ankara 1545 firms and in Istanbul 1172 firms declare that they do perform in OIZs.

One of the knowledge transfer mechanism is trade which is explained in Chapter 2. We prefer export decision which is binary variable in the analysis of knowledge spillovers. In the export decision, firms are in need of some necessary information. The firms around is a source of information for a firm which is deciding to export or not. The export decision model is constructed in accordance with the export function literature review in Chapter 3. In Chapter 5, the selected variables from the SMEDO data for the model are explained in detail.

In the spatial econometrics method, the spatial dependence between the firms is taking into consideration different from the standard econometric methods. As our hypothesis is to test whether the firms are affected by (geographically) nearby firms, spatial econometrics is the most appropriate econometric tool to use. In the spatial econometrics, contiguity matrices are formed for the econometric analysis different than standard econometrics. Estimation with spatial dependence is difficult and different than standard estimation techniques. In Chapter 3, the spatial econometric method is discussed in detail.

To test the hypothesis of interaction between the firms in the OIZs, the contiguity (weight) matrix is constructed as under the assumption of the firms in an OIZ are neighbors. For the sub-hypothesis of intra-industry relations in a province, the contiguity (weight) matrix is formed as the firms from the same industry in a province are assumed to be neighbors.

Both micro and spatial econometric estimation is done for the export decision function for Ankara and Istanbul with SMEDO data. Microeconometric estimation is performed to compare the results of spatial econometric estimation. In micro econometric estimation, standard probit estimation is used. In the spatial econometric estimation, to estimate the spatial probit model, Gibbs sampling method is employed.

1.4. Organization of the study

This study has six chapters including this one. In this first chapter, the motivation behind our hypothesis is clarified. The hypothesis of this study is explained. The data and the methodology are also summarized.

The second chapter is mainly on literature review of knowledge spillovers and clusters (geographical agglomerations). As our hypothesis is related to the knowledge spillovers, the theories on knowledge spillovers are summarized. The distinguishing properties of the three main theories- MAR (Marshall-Arrow-Romer), Jacobs and Porter- are revealed. Moreover, the definition and importance of clusters are questioned. In the last part of this chapter, cluster policy in Turkey is examined.

The third chapter of this study is on the model and the methodology. We start with the literature on export function which is summarized. We prefer to use spatial econometric methods in this study. The methodology part starts with defining the spatial dependence and estimation with spatial dependence. In this part, we explain spatial models and their estimation method for both continuous and limited dependent variables.

Export in Turkey is investigated in the fourth chapter. Export behavior in Turkey by provinces is visualized by the help of the maps for TURKSTAT data, which is macro level data; and SMEDO data, which is firm level data. For the map analysis, SMEDO data is aggregated on the province level. The maps are the primary analysis of the spatial dependence. The centers and satellites are easily seen by the help of the maps. Maps provide visual support for the spatial econometric analysis.

In the fifth chapter, the micro and spatial econometric estimation results of SMEDO data are demonstrated. Before starting to the econometric analysis, the definition and the summary statistics of the variables are presented. The export decision function is estimated for whole Turkey, Ankara and Istanbul with probit function in the micro econometric analysis. In the spatial econometric analysis, the OIZ data for Ankara and Istanbul is used separately. For both provinces, the export decision function is estimated by Bayesian spatial probit model with Gibbs sampling method. In the spatial econometric estimation, two weight matrix is used for intra-OIZ and intra-industry relations for Ankara and Istanbul OIZs.

Conclusions and the policy implications is the last chapter of this study. First of all, the micro and spatial econometric estimation results are summarized. Micro, meso and macro policy implications of the findings are also discussed. Finally, further research subjects are suggested.

CHAPTER 2

KNOWLEDGE SPILLOVERS AND CLUSTERS

2.1. Introduction

In this chapter, literature on knowledge spillovers and clusters are reviewed. Knowledge spillovers, which are crucial to the economic growth of a nation, were first introduced into economic literature by the neo-classical economists especially with Marshall (1890). As Porter (1990, 1996, 2000) emphasized, knowledge is better spilled in geographically nearby firms. Clusters (geographical agglomerations) are the best way to increase knowledge spillovers. Firstly, the theories and types of knowledge spillovers are investigated and then the definition, importance and identification of clusters are analyzed. Finally, the cluster policy in Turkey is questioned.

2.2. Economic History of Knowledge

From the beginning of economic history, economists have aimed to find a way to increase "the wealth of the nations"[2]. Early economists such as mercantilists

[2] First book of the economic theory is known as Adam Smith's "The Wealth of Nations" which is published in 1776.

and physiocrats, tried to explain the underlying factors of the wealth of nations based on gold reserves and land. Latter economists, with limited resources such as capital and labor, constituted exogenous[3] and endogenous growth models to explain the dynamics of economic growth and the development of countries.

An exogenous growth model is basically based on the idea that the growth of economies, with a fixed stock of labor and capital, depends on the exogenous factors[4] such as growth of technological progress and growth of the labor force. The model has this name because it assumes technology as an exogenous variable. One of the shortcomings of this model is its failure to explain how and why technological progress occurs. Moreover, it fails to clarify the differences between developed and under developed countries since the theory assumes all countries converge to the same point eventually. According to the model, the countries reach the “steady-state” level which is the final destination of the model by “only” the rate of capital accumulation. Finally, the system works under only decreasing returns to scale which is one of its pitfalls. The model has several bottlenecks which prevents it from being a perfect model to explain the growth and sustainability of growth of the countries.

Endogenous growth or the new growth theory introduces knowledge as an endogenous variable into the economic system which is inevitable for sustainable growth for high-income economies. This extension fulfills the deficiency of the exogenous growth models. In endogenous growth models, private R&D expenditures are not only a channel which relaxes the working of

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[3] It is also known as the neo-classical growth model or Solow–Swan growth model.

[4] Solow (1956) extended the Harrod (1939)-Domar (1946) model and introduces technology into the system. In Harrod-Domar model, the exogenous factor is the savings rate while in Solow it is the technology. Here it is referred to the Solow model which especially referred as exogenous growth model.

the system under monopoly with perfect competition with the patent rights but are also the source of technological progress which is the main engine of economic growth. According to this theory, the system could also be employed under constant or increasing returns to scale by means of positive externalities and spillover effects. Without the existence of knowledge spillovers, the system would not work properly.

One of the contributions of the endogenous growth theory is that it emphasizes the importance of knowledge spillovers which is basically "externalities[5]" (Breschi and Lissoni, 2001). As in a Grossman – Helpman – Romer - type endogenous - growth, it might be between countries which are trade partners (Hirose and Yamamoto, 2005) or as in Anselin et al. (1997) local spillovers among the provinces (or states) might exist. Whatever the type of knowledge spillover it is, either between nations or provinces or industries, the country always benefits from these externalities resulting from trade, R&D or FDIs.

Before going into the details of knowledge spillovers, it is necessary to define what knowledge is. "Knowledge" does not have one clear-cut definition. In a broader sense, knowledge is defined "as compromising all cognitions and abilities that individuals use to solve problems, make decisions and understand incoming information" by Döring and Schnellenbach (2004, 3) in a simple way. In a narrower sense, knowledge has two dimensions: one is the verbally defined knowledge which is called explicit or objective knowledge and, the other one is called tacit or subjective knowledge which can be learned by doing and cannot be verbally defined (Dosi, 1988: Matusik and Hill, 1998). As knowledge is

[5] The simplest definition of externalities is "an effect emanating from one activity that has consequences for another activity, but is not directly reflected in market prices" (Beaudry and Schiffauerova, 2009, 320).

"non-rivalrous[6]", it is conveyed through individuals, firms, provinces and countries. It is also "partially excludable" by patents to ensure innovation and R&D. If the individuals or the firms do not realize the benefits of having ideas or knowledge, they will not pursue new ideas.

Knowledge spillovers which serve as the engine of endogenous economic growth can be defined as a benefit of innovation (knowledge) accumulates not only to the innovator benefits, but also "spills over" to other firms (Branstetter, 2001). Zucker et al. (1998, 65) defines this terminology as "positive externalities of scientific discoveries on the productivity of firms which neither made the discovery themselves nor licensed its use from the holder of intellectual property right-lay a central role in the literature as causes of both economic growth and geographic agglomeration". According to Mare (2004, 8), the condition for spillover to occur is "accumulation of an input has an unintended (and unrewarded) positive effect on productivity". Based on the spillover, the firm, the province or the country benefits from increase in productivity, decrease in costs or competitive advantage from nearby firms, provinces or countries without any payment.

How the knowledge transfer occurs is not clearly stated (Jaffe, 1986: Jaffe, 1989: Jaffe et al., 1993). Romer (1986, 1990) emphasized the importance of these knowledge transfer mechanisms but he did not mention how this would happen or through which channel. If knowledge is conveyed through informal conversations, geographical proximity is important in spreading the knowledge. (Jaffe, 1986: Jaffe, 1989). For example, in Silicon Valley, according to Saxenian (1994) the most important knowledge transfer mechanism is informal conversation in an informal social network.

[6] It can be simply defined as "(to know) an idea does not in any way stop you know it" (Mare, 2004, 16)

Arrow (1962) and Krugman (1991) emphasized in their studies that there is no direct measure to identify the existence of knowledge spillovers so they focused on the importance of new knowledge and they measured it with R&D intensity or R&D-sales ratio. Although it is more easily tested with the availability of the appropriate data and techniques, still some difficulties exist for analyzing the knowledge spillovers directly.

The main difficulty in testing spillovers is separating this effect from both "pre-existing pattern of geographic concentration of technologically-related activities" (Jaffe et al., 1993) and "natural (resource) advantage" (Ellison and Glaeser, 1997). As the intra-industry interaction becomes stronger, industrial density depends on other industries to locate geographically. When a firm uses natural resources as an input, since transportation costs are one of the main cost items, it prefers to produce near the natural resource. This is known as "natural advantage". Consequently, in the estimation of the existence of knowledge spillovers, these reasons result in overestimating the effects.

Technological improvements and knowledge spillovers always get the attention of both theoreticians and politicians because of their importance - they are always seen and believed to be the main engine of economic growth as proved in neoclassical growth theory[7] (Aghion and Howitt, 1998: Romer, 1994). Three theories and three types of knowledge spillovers exist in the literature, which will be explained in detail.

[7] The importance of "invention" in economic growth is emphasized firstly with the work of Rae (1834).

2.3. Theories and Types of Knowledge Spillovers

Different theoreticians have different assumptions, findings and policy implications about knowledge spillovers. Especially three theories, Marshall-Arrow-Romer (MAR), Jacobs and Porter, come into prominence. These are important in the sense that they focus basically on technological knowledge spillovers. In this part, it is focused on the similarities and the differences between these theories and also on the results and the findings of the applied studies. Knowledge spillovers are realized through three channels; foreign direct investments, research and development expenditures and trade.

2.3.1. Theories of Knowledge Spillovers

MAR, Jacobs and Porter externalities are the three main approaches which have tried to explain technological externalities between the firms. As Glaeser et al. (1992, 1128) indicates, the main objective of the theories is "they try to explain simultaneously how cities are form and they grow". The two theories, MAR and Jacobs, were studied one versus another while Porter externalities is tested as a sub-hypothesis of MAR. . One of theories stresses the importance of within(intra)-industry externalities, while the other one emphasizes the between(inter)-industry externalities. The researchers investigate the issue by testing the existence of intra (within) or inter (between) industry effects.

Marshall-Arrow-Romer (MAR) type of externalities are developed first by Marshall in 1890 and improved by Arrow and Romer in 1962, 1986, respectively. MAR externalities are basically higher concentrations of an industry which fosters knowledge to spill easier into the city and firms. Employment concentration ratios of an industry in a city, which is a proxy for

MAR externalities, indicate the localization level of the industry. This is basically true for mature industries. Marshall (1920) emphasized the importance of a labor pool, specialized inputs and a flow of information for industry localization. For Arrow (1962), knowledge spillovers are more important for highly R&D-intensive industries.

Jacobs (1969) types of externalities are defined by the words diversification and urbanization. The bigger the city, the higher the knowledge transfers. The firm in an industry benefits most from the proximate industries nearby. Unlike MAR externalities, Jacobs (1969) is in favor of local competition which promotes growth and innovation. This idea emerges from industries which are newly established or high-tech industries.

Porter (1990) sticks into MAR externalities by extending it. In MAR externalities, local monopoly is the element which maximizes the spillovers while Porter (1990) emphasizes the importance of local competition rather than local monopoly. For Porter (1990), the firms benefit mainly from spillovers when they are geographically near to a competitive environment. This is also the basic argument for the geographical agglomerations (clusters) which is advocated as the best milieu for productive, competitive and innovative firms as the source of growth.

A forementinoned three theories have agreed with the idea on the advantage of geographical agglomerations but their main difference is on the industrial division in the city. According to MAR externalities, the specialization of one industry in a region is better than the mere of industries. Jacobs (1969) focused on the idea of interrelations of the industries and argues that a firm benefits more from a related industry which is not in the same industry as the firm but in a highly interacted industry. Porter sticks to the MAR's idea that localization of an industry is an advantage when there is competition in the industry.

The differences and common points of these three theories are summarized at Table 2.1..

Table 2.1. Basic concepts of MAR, Jacobs and Porter externalities[8]

MAR Externalities	Jacobs Externalities	Porter Externalities
Specialization	Diversification	Competition
Localization	Urbanization	Localization
Local Monopoly	Local Competition	Local Competition
Big industry advantage	Big city advantage	Clustering advantage
For mature industries	For new high-tech industries	

For the empirical literature on testing the hypothesis of specialization over diversification[9], the findings of Glaeser et al.(1992), Harrison et al. (1996) and de Lucio et al. (1996) support Jacobs externalities while Henderson et al. (1995) and Henderson (1997) found strong evidence for MAR externalities. Beaudry and Schiffauerova (2009) summarized the main findings of the 67 reviewed articles on this subject. 23 of them support MAR externalities while 26 side with Jacobs externalities. Nevertheless, nearly one third of the studies

[8] Beaudry and Schiffauerova (2009, 320) demonstrates the sources of knowledge within a table. In this table, they indicate that specialization is the source for MAR externalities while diversity and competition is features of Porter externalities; on the other hand Jacob externalities attributes to specialization and competition. De Lucio et al. (2002) indicate specialization for MAR externalities, diversity for Jacobs and competition for Porter.

[9] Most of the time Porter externalities are tested as a sub hypothesis of MAR externalities. According to Beaudry and Schiffauerova (2009), only 25 out of 67 articles investigates the three types of externalities; on the other hand, others just focus on two theories (MAR and Jacobs) only.

have found evidence for the existence of both externalities. The ambiguity in the results might depend on various reasons explained by Frenken et al. (2005) as variations in the definitions, intra-industrial linkages and spatial scale. Furthermore, every author used a different indicator to calculate the MAR and Jacobs externalities even some (Loikkanen and Susiluoto, 2002) used only one variable (Hirschman–Herfindahl index) to distinguish them according to the sign of the variable.

Glaser et al. (1992) and Henderson et al. (1995) used employment growth as the explained variable while de Lucio et al. (2002) used productivity growth. Different variables are used to measure the externalities. Beaudry and Schiffauerova (2009) indicate that location quotient and own-industry employment are common indicators (used in %75 of the studies) for MAR externalities, the Hirschman–Herfindahl index is the most common one for Jacobs externalities which have different indicators for a variety of purposes.

The existence of the MAR and Jacobs externalities also depends greatly on the geographical unit which is chosen to be analyzed. It is much stronger - simultaneous positive results of both externalities and the magnitude of the relation- when the unit is smaller (Glaser et al., 1992: Beaudry and Schiffauerova, 2009).

Glaeser et al. (1992)[10] is one of the most inspiring articles in this area. They analyzed the growth of the largest industries for 170 cities between the period of 1956 and 1987[11] in USA. They studied only the highest six growth rate two-

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[10] This article is cited more than 3100 times since it is published.

[11] They did a cross-sectional analysis for 1987. They use the data of 1956 as a base year to calculate the growth rates.

digit industries. They rationalized this issue by indicating that "externalities are permanent" and can be seen in the larger industries only. Moreover, their second reason is that they focused only on the "regionally specialized industries". This can be questionable and may be the bottleneck of the paper[12]. They did not cover the newly formalized industries and important industries which were smaller than core industries like high-tech. They found evidence in favor of Jacobs externalities where intra-industry relations are important in the growth of cities. They are aware that they analyzed the mature industries only. They failed to justify the hypothesis of MAR vs. Jacobs for mature vs. newly formalized industries. Nevertheless, they conclude in favor of Jacobs externalities for mature industries.

Harrison et al. (1996) studied the effect of similar manufacturing firms on the firms' technology adoption in the machinery industry. The firms which are located in the sub-urban areas are more likely to easily adapt to automation technology. More interestingly, they found no effects of other firms when they control for firm size.

Kelley and Helper (1999) tested the hypothesis of localization (MAR externalities) vs. urbanization (Jacobs externalities) on the adoption of new technology[13]. They used two national surveys for 314 firms from 21 industries. They justified both hypotheses. Furthermore, they found that Jacobs externalities were more sensible to the size of the firm. For technology adoption, smaller firms benefited better than the larger ones from a diverse

[12] They choose only six industries perhaps just because of the ease of calculation. To calculate Jacobs' externalities, they simply generate a diversity measure which is the sum of the other five industries.

[13] They use CNC (Computer Numerical Controlled) usage as new technology which reduces machine and labor per unit of output (Kelley, 1994).

environment. In other words, Jacobs externalities have higher importance for small firms.

De Lucio et al. (2002) investigated 50 Spanish provinces from 1978 to 1992 for 26 manufacturing industries. They used productivity instead of labor which is more commonly used. They did not find evidence for either Jacobs or for Porter externalities. They found evidence for MAR externalities although up to a certain point it affects productivity growth[14] negatively. After that point, intra-industry externalities affect positively because of knowledge spillovers. They conclude that "technological spillovers take place when there is a high degree of specialization" (de Lucio et al., 2002, 255).

Van der Panne (2004, 597) tested the Marshallian hypothesis vs. Jacobs for Netherlands by exploiting a new database by "screening the trade journals for new product announcements". He generated not only three indices for specialization, diversification and competition but also "ring variables[15]" to calculate the regional effects. For 98 regions and 58 industries, he found strong evidence in favor of Marshallian specialization knowledge spillovers for the Netherlands.

2.3.2. Types of Knowledge Spillovers

Knowledge flows by means of goods or direct investments among countries. Three main sources of technological knowledge spillovers have been identified in the literature: foreign direct investments (FDI), research and development

[14] They indicate that their results are robust for different industry growth proxies which are productivity, employment or value added.

[15] He assumes that within a 20-35 kilometres distance, regions are neighbours.

investments (R&D) and trade. “International R&D collaboration, publications in technical and scientific papers, and the migration of scientists and skilled labor” are also other channels of transferring knowledge from one country to other (Cincera and Van Pottelsberghe de la Potterie, 2001, 2).

Recent articles on international spillovers highlight the role of FDI as a knowledge transmission mechanism. Technological knowledge is not only transferred by goods, but also FDI. Countries foster and sometimes subsidize foreign investments. Especially for “technology-intensive” industries, the technology transfer from multinational firms is necessary for developing countries. As Branstetter (2006) stated this is also the case for Singapore and Malaysia.

Different FDI proxies and functions are used in the literature for analyzing the effect of FDI. In a study by Blomstrom and Sjoholm (1999), they questioned the influence of foreign ownership which is used as a proxy for FDI on productivity level of firms. Another firm level study by Branstetter (2006) used patent citations as a dependent variable and prefers to utilize different affiliates for FDI as a proxy.

Blomstrom and Sjoholm (1999) questioned the effects of FDI for a developing country (Indonesia) context. Most developing countries require local partners for foreign investors to ensure or encourage technological spillovers. They did not find any evidence to support this idea. Nevertheless, they found labor productivity is much higher in foreign-owned firms than the local ones whatever the degree of ownership. More interestingly, they asserted that only non-exporting firms benefited from these spillovers generated by foreign firms.

Branstetter (2006)'s paper is different and more important than the other papers in this area since he studied the bilateral effects of FDI on knowledge spillovers for USA and Japan by using the firm-level patent citations data. Not only the effects of Japanese firms which are investing in American firms but also, the effects of American firms on the investing Japanese firms were investigated. He found evidence on the bilateral effects of FDI which increased the flow of knowledge. On the other hand, the magnitudes of the effects for two countries are distinct. Japanese firms received knowledge spillovers through R&D and product innovation. Knowledge flows to American firms were stronger when Japanese firms cooperated with the firms which perform non- R&D activities as opposed to our expectations.

The research on R&D and trade spillovers is limited when compared with research which investigates FDI spillovers. Before the spatial econometric tools were developed, the economists tried to figure out a way to unlock the mechanisms of spillovers. One of the main articles is Coe and Helpman (1995)[16]. In their study, R&D spillovers are calculated with foreign R&D stock weighted by the fraction of imports in GDP. They tried to analyze the effects of the spillovers from international trade, especially from imports. They found strong evidence on that foreign R&D has a positive effect on domestic R&D even this effect is higher when the country is more open to trade. One of the pitfalls of their analysis was the assumption that share of import and foreign R&D is linear.

One of the most inspiring articles on R&D spillovers is Audretsch and Feldman's (1996)[17] work. They studied the effect of new knowledge which

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[16] This article is cited more than 3700 times since it is published.

[17] This article is cited more than 3300 times since it is published.

they proxied by industry R&D, university R&D and skilled labor on gini of production[18] and gini of innovation which shows geographical concentration. For this analysis, they combined several databases and surveys. One of the pitfalls of their study is that every variable was from different years due to data limitations. They concluded that the industries for which the knowledge spillovers were important tended to cluster spatially.

Trade is also a knowledge transfer channel. When countries exchange goods, they also trade technology and may also unwillingly transfer knowledge. Imports are viewed as a better way for technology transfers as compared to exports. In a competitive world, demand also sets and enforces production capabilities and capacities. This is called “learning by exporting”. The exporting firm learns from its foreign competitors to be competitive.

Countries which are trade partners convey the knowledge easier than those which are not. The firms which have a foreign owner also have the advantage of entering into new markets. MNEs have also affected the nearby firms by buyer-supplier relations or out-sourcing contracts. Foreign network relations have a positive effect on the possibility of a firm to export as all these interactions decrease the cost of collecting knowledge on new markets of firms (Sjoholm, 2003: Roberts and Tybout, 1997).

Strong evidence has been found for the international knowledge spillovers and now the main focus is on whether these spillovers are symmetric or not (Coe and Helpman, 1995: Eaton and Kartum, 1996). When the effect of intra- and inter-national spillovers are compared, both have significant power to explain

[18] Gini of production is defined as “gini coefficient of four-digit SIC industry value-added across states weighted by national value-added for the industry” while gini of innovation is defined as “gini coefficient of four-digit SIC industry count of innovations across states weighted by national innovation count for the industry” (Audretsch and Feldman, 1996, 635)

the economic growth of nations although intra-national relations have an advantage over the international ones as shown by Coe and Helpman (1995).

As for the transmission mechanism of knowledge spillovers through trade, in particular imports, Coe and Helpman (1995), in their study at the macro level, constructed an R&D spillover pool by taking the sum of foreign countries' R&D stocks weighed with the fraction of imports from these countries in GDP. However, one pitfall of their analysis is the assumption of a linear relationship between the share of imports and foreign R&D. This is still one of the most pioneering study in this area, an important conclusion is that total factor productivity growth of one country not only depends on its own R&D stock but also on the ones of its trade partners.

One of the most inspiring articles about cities is the work of Glaeser et al. (1992). It emphasized that knowledge spillovers are more effective in cities due to the intensive communication between people. These knowledge spillovers also affect the probability of the export of a firm. “Firms are more likely to export; the larger is the local concentration of export activity” (Aitken et al., 1997).

Kneller (2007, 111) also noted the studies that export spillovers are limited. Knowledge spillover studies were done mostly on R&D or productivity spillovers. Besides this, in the applied studies of export spillovers, as a proxy most of the time FDI is used.

Aitken et al. (1997) examined whether spillovers associated with one firm’s export activity reduced the cost of exporting for other firms. The logic behind their idea is that there are localized spillovers which are associated with nearby firms. They considered especially two types of the export-spillovers: the first one is all export activities generate spillovers, second one is multinational enterprises (MNEs) generate spillovers only.

Carlton (1983) found that the geographic concentration of firms in an industry makes a location more attractive to entering firms. Aitken et al. (1997) concluded that locating near to other exporters has no effect although locating near to multinationals have positive effects.

Branstetter (2006) analyzed bilateral effects of FDI on Japan and USA. He also mentioned that for further research, his paper could be extended to analyze the impact of bilateral effects of exporting to Japan and USA. He also indicated that the emphasis would be on either "learning by exporting[19]" or patent citations. As far as we know, this analysis has not been done yet.

2.3.3. Regional Knowledge Spillovers

Knowledge flows much more easily nowadays as compared to fifty or hundred years ago. Co-locating in the same area obviously makes it easier for knowledge to flow, but is it that important for exploiting the knowledge that is spilling? As Wallsten (2001) asserted that "some knowledge flows through mechanisms unrelated to geography, such as the internet and journals", however, as Beaudry and Schiffaureva (2009) mentioned that the spilling knowledge depends on the type of knowledge. If concern with tacit knowledge, then geographical boundaries matter[20]. Tacit knowledge[21] spills more easily in

[19] For empirical papers on the "learning by exporting" channel, check Aw et al. (2000: 2001), Bernard and Jensen (1999) and Clerides et al. (1998). In general, these authors have failed to find evidence for "learning by exporting".

[20] For a detailed survey of localized knowledge spillovers, check Breschi and Lissoni (2001).

an environment where the people or firms are geographically close (Anselin et al., 1997: Feldman and Audretsch, 1999). Especially this is true when the “communication between the people is more intensive” (Glaeser et al., 1992, 1126).

Endogenous growth models stress the importance of knowledge spillovers in growth (Romer, 1986: Romer, 1990). Arrow (1962) is the first to emphasize the role of tacit knowledge in the production of capital goods in endogenous growth theory. After the 1990’s, the focus was on the geographic dimensions of knowledge spillovers. Especially after the success of Silicon Valley in California, the researchers increased studies on agglomerations (clusters). The main question is whether or not the knowledge is geographically bounded. In other words, how important is the geographical proximity for knowledge to flow.

Marshall (1920) was the first to stress “location matters”. Krugman (1991) also indicated that especially for tacit knowledge “geographic boundaries matters” because of the cost of knowledge transfer which increases with distance. Audretsch and Feldman (1996) take one step further and argue whether the “proximity and location matters” or not. Their answer was that depending on the importance of new knowledge[22], clustering spatially becomes crucial for the industry which needs (new) knowledge. By clustering, they can not only exploit the knowledge that spills but also easily do exploration.

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[21] Tacit knowledge is also known as “know-how” or “learning-by-doing” and opposite of “explicit knowledge” which can be codified and transmitted to other people easily. Tacit knowledge involves learning and skill. It cannot be simply verbally defined. One of the examples of tacit knowledge is to know how to ride a bicycle which cannot be codified and learned by just reading.

[22] They proxied new knowledge by industry R&D, university R&D, and skilled labor.

Growth of regions especially cities or provinces depends on the within (intra) or between (inter) industry relations. Geographical concentration of industries is diversified. All the theories on knowledge spillovers depend on the idea of geographically bounded areas; firms interact with each other more easily and convey tacit knowledge through social networks. Industrial differences are important for geographical clustering because of location of the production (Jaffe et al., 1993) or because of the new economic knowledge (Audretsch and Feldman, 1996).

The main factor that affects the location of production is transportation costs (Krugman, 1991). Geographical concentration of industries also depends on the use of natural resources. When an industry uses a natural resource as an input, the firms in that industry prefer to choose a location near to the source of the resource because of transportation costs (Loesch, 1954: Fuchs, 1962). Not only has the natural resource affected the location of production but also other specialties of the industry will have role in decision of location. For example capital-intensive industries also tend be clustered (Shelburne and Bednarzik, 1993).

To distinguish the influence of knowledge spillovers from the location choice is a challenge for researchers. Nevertheless, Audretsch and Feldman (1996) found that the effect of knowledge spillovers is more influential than location of production for innovative firms to cluster. They indicated that the industries which are R&D-intensive and used skilled labor are tending to locate geographically nearby to utilize knowledge spillovers.

Jaffe (1986, 1989), Jaffe et al. (1993) and Audretsch and Feldman (1996) found evidence on regional knowledge spillovers however the main problem on this subject is data limitation which causes researchers to analyze in larger regional units like nations or states as emphasized by Wallsten (2001). Most of the firms cluster in smaller geographic units[23] than cities or provinces, the researcher needs information about the distances between the firms in the clustered area for analyzing and this information does not exist. Data limitations are an obstructive issue for researchers. Audretsch and Feldman (1996) also complained about the lack of spatial data. They use "state" as the spatial unit of observation because of the lack of data on a city and a county level.

2.4. Clusters (Geographical Agglomerations)

As in Porter type of externalities, knowledge spills better in an environment where firms are geographically nearby. Geographical agglomerations (clusters) are the best way to make knowledge to spillover. There is not one clear-cut definition of clusters. Every economist emphasizes one component in it. In this part, the properties of a cluster are investigated to find out the components of it. The importance of the subject is also analyzed. Finally, how to identify a cluster is questioned in this section.

2.4.1. Definition of Cluster (Geographical Agglomerations)

The cluster idea stems from Marshall's work (1890, 1920). Porter (1990, 2000) carried from the idea to its mature state. In the first definitions, the division of labor was the most emphasized term and it was suggested that if the labor division in a cluster was effective, cluster could be defined as an industrial district (Marshall, 1890). Porter, then, (2000, 16) defined a cluster as a "geographically proximate group of interconnected companies and associated

[23] One third of venture capital in USA lies in 2 mile distance of Sand Hill Road, California (Wallsten, 2001).

institutions in a particular field, linked by commonalities and complementarities." The necessary condition for a cluster is "a geographic concentration of competitive firms or establishments in the driver industry or industries" (Hill and Brennan, 2000, 68). Thus, it can be assumed that "geographic proximity" is the main condition for the existence of a cluster.

Another condition for a cluster is that those firms had to be "competitive". If this condition is not met, i.e. there is not a competitive environment in the driver industry/industries; they are called "industrial complexes" instead of a cluster (Hill and Brennan, 2000, 68). Hill and Brennan (2000, 67) along with Enright (1996, 191) argued that the most important characteristic of a cluster is how they convey the competitive advantage. The reason behind this is explained as the buyer-supplier relationships (with other industries in the region), common technologies, common buyers, common distribution channels, or common labor pools as explained by Enright (1996, 191)**.**

The third condition for clusters is the network that they have established. Cook and Memedovic (2003, 2) is defined clusters with the emphasis on networks. "Clusters can be characterized as a dense network of economic actors, who work together very closely and who have intensive exchange relationships". Can geographically concentrated competitive firms with no network be considered clusters? The answer is obvious that we cannot call them clusters. In a cluster, knowledge and most importantly tacit knowledge conveys through networks.

There are different cluster definitions from different authors. For example, one of these definitions is "a cluster is defined as a group of enterprises spatially close and specialized in the development of a similar or the same product" (van Dijk and Rabellotti, 1997, 542). This definition might be true for instance for

ICT firms. In a cluster, firms do not have to produce the same or similar product but complementary products.

Adam Smith's economic self-interest is now the glue that keeps clusters together. Wherever there is self-interest, there is an individual competitiveness which makes the clusters survive (and be successful) (Bergman and Feser, 1999, chapter 2; Enright 1996, 191). Still, there is not a certain and defined way to evaluate the "success" of clusters[24].

Lastly there are three types of clusters as Porter (1990) draws:

i. Vertical Clusters: firms that are part of the same value (product) chain
ii. Horizontal Clusters: firms that are in the same industry (product)
iii. Innovation Clusters: firms that exchange (tacit) knowledge.

Vertical Clusters are the mostly analyzed ones because of their importance. They are important in understanding the effects of "big firms" especially MNEs. With the buyer-supplier relationship (supply chain) analysis, vertical clusters are investigated. Horizontal clusters are easily detectable by checking industrial concentration ratios. Innovative clusters are the most difficult ones to analyze. The firms in an innovative cluster have to be in either buyer-supplier relation or the same industry. The knowledge spilled between the firms may also tacit which is not easily detectable.

2.4.2. Importance of Clusters

Some argue that the widespread popularity of the cluster approach is mainly due to a fascination with and a desire to emulate the Silicon Valley model and

[24] Due to Çaglar and Kurtsal (2011), this is mainly because of the lack of data.

also Porter's and others' effective marketing of the cluster approach (Martin and Sunley, 2003). Cluster-based economic development obviously promotes innovation and productivity growth. As Singh (2003) noted, clusters encourage also collaboration and creating tacit knowledge. Pietrobelli and Barrera (2002, 542) further claimed that clustering supports scale economies (from specialization), scope economies (from product differentiation) and external economies (from knowledge convey).

Clusters allow local firms to compete and cooperate at the same time. Local firms compete with each other for capturing the market share and cooperate to cope with the traditional competitors. This is one of the critical advantages of clusters (The Cluster Consortium, 1999, 42). Competition and cooperation among the firms ensure "mutual growth" for both the firms and the region. Besides, this mutual growth verifies increasing returns to scale (Hill and Brennan, 2000, 66).

One of the glaring that clusters have taken attention is their externalities that they create. These externalities which pioneer "collective learning" are also one of the reasons why firms agglomerate together. This idea supports Shaver and Flyer (2000)'s assumption that "firms with the weakest technologies, human capital, training programs, suppliers, or distributors have little to lose and a lot to gain; therefore, these firms are motivated to geographically cluster". The reason behind this is to benefit from these externalities.

A cluster can have competitive power for a certain amount of time but for long term sustainability, it is supposed to continuously renovate itself. After the 1990s, the developments in the major industrial centers show the importance of re-constructing, continuous learning and compatibility (Eraydin, 2011).

For policy makers, cluster-based development is encourage-full because it is easier to achieve. Besides there is lots of the successful examples, like Silicon Valley,. Policy makers' role[25] is inevitable and active for a cluster both "to form", like Niagara Ontario's Wine Cluster and Bangalore's Software Cluster; and "to continue", like Saskatoon's Plant Biotechnology Cluster and Taiwan's Semi-Conductor and Telecommunications Clusters. Even if the cluster is mature, like Ottawa's Silicon Valley North, government actions support the evolution (Singh, 2003, 11-14). Another way of intervening in the regional economies is when governments can establish institutions like Arizona's Strategic Planning for Economic Development or Indian Institute of Science and Hindustan Aircraft Limited.

2.4.3. Identification of Clusters

As for different industries, it is possible to construct one exact cluster theory. For one cluster, geographic patterns of production could depend on the location of inputs and markets and for another, economies of scale.

The clusters sometimes are not easy to detect even if they are significant. For example, "In Massachusetts, there proved to be more than 400 companies connected in some way to medical devices, representing at least 39,000 high paying jobs. The cluster was all but invisible, buried in several larger and overlapping industry categories such as electronic equipment and plastic products." (Porter, 2000, 18)

[25]Government actions can vary such as: adopting a national policy of cluster-based economic development; funding cluster assessment/analysis and strategy development; increasing R&D spending and tax incentives; infusing technology through incubation/industrial/research parks; utilizing laboratory facilities; funding marketing and advertising; and, government procurement and restructuring programs and services.

Identification of a cluster is a problem for analysts who want to find the driver industries which are significant for the region's economy. There are several ways of identifying a cluster:

i. Employment concentration ratios
ii. Network analyses
iii. Value-chain analyses
iv. Surveys

One of the advantages of being a member in a cluster is to exploit the advantage of the labor pool. Employment concentration ratios, which is employment in a industry for a specific region divided to the industry average of the country, indicates either there is an agglomeration in that region or not. Network analysis[26] of the buyer-supplier relations will show the closeness of the relationship which is an indicator of knowledge spillovers. Diamond cutter of Porter (2000) is an example of the value-chain analyses. To analyze the cluster, firm-level data is more appropriate nevertheless; the availability of the firm level data is limited. To overcome this limitation, surveys are applied to identify a cluster.

2.5. Clusters in Turkey

It is necessary to mention about the cluster policy of Turkey. Firstly, regional policy is summarized, and then cluster policy is analyzed. It is also important to refer to the history and the legal side of Organized Industrial Zones (OIZs). Finally, whether the OIZs are cluster-type construct is questioned.

[26] This analysis is depending on the idea of "spider web". Pajek program is one of the suitable one to carry out a network analysis.

2.5.1. Regional Policy of Turkey

In order to evaluate the development of the Turkish Regional Policy in historical discourse, one can explain it in three periods. In the first period which started with foundation of the Republic to the year 1963, the main concern of the planned construction was not the regional development, but construction itself. In this period, the planning was defined as a mean to prepare the residential areas and as a result of this method the service and manufacturing industries concentrated on the western cities of the country. Due to this planning, regional development was neglected in this period (Atlan, 2007, 1).

By the 1960s, there was a balanced and stabilized regional development policy in Turkey by means of five year plans, integrated development plans, rural development plans, investment incentives, priority regions for development and SIS (Small Industrial Sites) (Arslan, 2005, 291: Atlan, 2007, 2).

By encouraging industrial entrepreneurs to locate their new institutions in the OIZs or SISs is another instrument for supporting regional development. However, Turkey has not been using these instruments efficiently and commonly in comparison to international equivalents (Arslan, 2005, 291).

In addition to these instruments, another modern instrument for regional developments such as Technological Development Zones (TDZs) (2001), Industrial Zones (2002) and Agencies for Regional Developments (2006) have become issues for regional development politics.

2.5.2. Cluster Policy in Turkey

The main objective of industrial policy in Turkey, referred to as “industry-based growth”, since 1963 has been in the form of five-year development plans. However, there was a shift in the application of this policy. In 1980, import substitution policy was abandoned and a totally different policy has been applied, that of export-oriented industrialization.

The recent changes in the world and the Turkish economy have triggered development of new industrial policies. In the recent decades, industrialization was the main goal, but now the competitiveness. The policies and strategies for competitiveness constitute an important argument for clustering (DPT, 2007, 164).

Clusters and value chains are one of the inevitable approaches for high productivity and innovation which are the main conditions for competitiveness. Clusters are both a repulsive power for export and attraction centers for foreign investments. For these reasons, clusters are favored in national and local development plans in most of the countries as in Turkey. It is a new strategy for how local firms can be articulated to the global value chain and also how governments can increase the performance of the firms. Besides this, both Turkey and international experiences show that not only macroeconomic policies are too general for competitiveness but also micro level interventions are ineffective and waste of resources. Meanwhile clustering approach is between the micro and macro policies (DPT, 2007). It can be treated as a meso level policy tool for increasing productivity and innovation.

Clusters are defined in the development plan as “a web that composed of information-producing institutions, supplier institutions and customers who create added value” (DPT, 2007, 165).

There are several advantages of industrial policies based on clusters (DPT, 2007, 168):

i. to restructure the industrial policy,
ii. to format the roles of government, private sector, NGOs and universities for competitiveness,
iii. to constitute a constructive dialog mechanism between the business and government,
iv. beyond the general problems, to create solutions for the bottlenecks of competitiveness,
v. to focus not only on problems but also on opportunities.

Regional Economies are synergic systems that have physical and relational values. The globalization process which is easen and fastens the knowledge transfer contributes to these physical and relational values. Regions are important aspects of underdeveloped economies as they are in developed economies.

The regional development policies, which are tools for minimizing the socio-economic gaps among the regions, can be evaluated according to traditional and modern aspects. The first one usually has the large companies as the main national agents whereas the latter adds value to the SME as it has potential of the regional development with providing SMEs human resources and investments (Ivanisin, 2004, 44).

In Turkey, the OIZs have been established for SMEs by the time the planned economy period is started. They have been established in order to utilize the regional potential. Especially after the year 2000, with the promulgation of the OIZ law, the capacities of the OIZs have been increased with fortification of the OIZ authority.

Nowadays, the OIZs' progress after the promulgation of the law is designated to promote the SME's development, to enhance their production potential and diminish the regional discrepancies. This law is further aimed to enforce an environmental-friendly industrialization policy located outside the city-centers. Increasing the number and the effectiveness of the OIZs is seen to be vitally important for improvement of the Turkish economy to ensure economic growth and sustainability.

Eraydin (2011) indicated the main problems of cluster policy in Turkey. First of all, it is not possible to establish a competitive industrial cluster in every region so it is important to form clusters which are specialized in several subjects. She also emphasized that constructing OIZ is not supposed to be the main purpose of industrial policy; they are supposed to be treated as a policy instrument only. In this study, it is analyzed that whether the cluster policy efficient or not by investigating the existence of the knowledge spillovers in OIZs.

2.5.3. The history of OIZs

The first cluster, northern silk textiles, appeared in Italy in the 13^{th} century (Bozarth et al., 2007). When the cotton production moved from England to the U.S. in 1885, this is caused England to establish planned clusters in the textile industry. In the same year, a report which was published on the economic development of North America stressed the importance of the creating "Industrial Zones" to support industry. Constructing industrial zones was seen as an appropriate tool for fostering industrialization to enhance economic growth. For this purpose, the first OIZ was established in Manchester, England namely the Trafford Park[27] which was founded in 1887 and, in the USA, the first accomplishment of the OIZ plan was in 1899. Trafford Park has special importance in the sense that it is the first planned OIZ and still the largest one in Europe. In 1905 and 1909 private enterprises constructed two Industrial Zones, "Central Manufacturing" and "Clearing" in Chicago. These two also ranked as the first samples of modernist ones, i.e. they can be considered the ancestors of the 21st century ones, of the Industrial Zones. These first applications were meant to boost the earnings of the private enterprises (Eyuboglu, 2003, 3-4: Onat, 1969, 9-12).

For the applications in England, it seems that the main aim was to overcome unemployment in underdeveloped areas. Especially after the Great Depression of 1929, the unemployed workforce from the mining, steel and ship-building industries flooded into the developed industrial zones. Until the early 30s, there was no known regional policy established in England (Pitfield, 1978). In 1934, to avoid over immigration of the workforce, to overcome the problem of high unemployment rates and to promote the recovery of these regions, "Special Areas[28] (Development and Improvement) Act went into effect. In 1936, "Special Areas Reconstruction Association (SARA)" with a nominal capital of £1 million was established. The law of "Special Areas Amendment Act" was established in 1937. With this law, in Scotland and Wales five industrial zones (special areas) were established

[27] For the details of the history of Trafford Park, check Scott (2001).

[28] Four determined "special" areas are: West Central Scottland, West Cumberland, North East England and South Wales.

As for Turkey, establishing the OIZs was started by the 1960s. In this period, industry was thought to be the leading sector. In addition to these, industrialization with social and economic growth has been seen as the long-term goals of the Turkish economy. With these long-term targets, the first OIZs were established in Bursa with economic credit from the World Bank in 1962. Afterwards, a budget for further OIZs investments has been allocated within the Ministry of Industry and Trade and establishment of OIZs were included in the five-year plans. 99% of the costs of the infrastructures of the OIZs have been met from this budget and the remaining costs from the local administrative units and local chamber of commerce and industry (OSBUK, 2007, 1).

Thereby, OIZs can be seen as a mean of city planning and as well as an instrument for economic development. OIZs are important for regional development in three ways. Firstly, the environmental concerns are considered in rapidly urbanizing settlements. Secondly, efficiency in production is considered by providing facilities like public services, infrastructures vs.. Last, but not least, important is collecting the firms that have similar production capabilities in the same region into clusters in order to create synergy, diminish the production costs and increase the efficiency (Caglar, 2006, 312).

In Turkey, the 21st century has begun a new era in which there is a convenient milieu with available local institutes for industrial investments for special areas (industrial zones). Especially in the ninth development plan, there is a special reference to the importance of the OIZs. However, the importance of the OIZs should not only be stressed in the development plans, but in practice also.

2.5.4. Legal Side of the Cluster Policy in Turkey

Geographical agglomerations are one of the most important tools in the planned development of Turkish industry. In Turkish industrial policy, two laws and one act is directly concerned with the geographical agglomerations (clusters):

i. Organized Industrial Zones Law, Law Number: 4562 Date of Promulgation: April 12, 2000
ii. Technology Development Zones Law[29], Law Number: 4691, Date of Promulgation: June 26, 2001
iii. Industrial Zones Act, Act Number: 4737, Date of Promulgation: January 19, 2002.

OIZ can be simply defined as an industrial district, which is organized by the government to constitute for furtherance the public interest. The OIZs have tax exemptions and have privileges under the law. Furthermore, OIZs` administrative workers and other workers are civil servants.

OIZ is defined and also reasoned in the related law as “the good and service production zones, which are formed by allocating the land parcels, the borders of which are approved, for the industry in a planned manner and within the framework of certain systems by equipping such parcels with the necessary administrative, social, and technical infrastructure areas and repair, trade, education, and health areas as well as technology development regions within the ratios included in zoning plans and which are operated in compliance with the provisions of this Law in order to ensure that the industry gets structured in

[29] Last amendment for this law is done on March 2011. For details of this amendment check, (sagm.sanayi.gov.tr/userfiles/file/TGB%20güncel%dökümanlar/6170%20sayılı%20KANUN%20.pdf).

approved areas, to prevent unplanned industrialization and environmental problems, to guide urbanization, to utilize resources rationally, to benefit from information and informatics technologies, and to ensure that the types of industries are placed and developed within the framework of a certain plan"(Organized Industrial Zones Law, Law Number: 4562 Date of Acceptance: April 12, 2000) (www.sanayi.gov.tr).

Technology Development Zone (TDZ) is defined in the related law as "A site which has an academic, economic and social structure or a techno-park which has these characteristics, where companies using high/advanced technology or companies that aim at new technologies produce/develop technology or software by benefiting from the opportunities of a particular university or higher technology institute or Research & Development centre or institute, where the companies work to change a technological invention into a commercial product, method or service, thus contributing to the development of the region, which is in the premises or close to the same university, higher technological institute or the Research & Development centre or institute" (Technology Development Zones Law, Law Number: 4691, Date of Acceptance: June 26, 2001) (www.sanayi.gov.tr).

Industrial zone (IZ) is defined in the related law as "IZ shall mean the manufacturing zones to be established within the scope of this Act, in order to promote investments, attract savings of Turkish labourers working abroad to the investments in Turkey, and increase the flow of foreign capital into Turkey". The purpose of this Act is to lay down rules for the establishment, management and operation of industrial zones with a view to promoting investments, attracting savings of Turkish laborers working abroad to the investments in Turkey, and increasing the flow of foreign capital into Turkey. This Act governs organization of an Industrial Zones Coordinating Committee, the establishment of industrial zones and any authorizations and incentives pertinent to the investments to be made within such zones. (http://www.sanayi.gov.tr/Files/Mevzuat/endustri-bolgeleri-kanunu-15042010171747.pdf)

The basic reason to establish OIZs and TDZs is to provide for the needs of the physical infrastructure in the industry and technology experience. They are not only sound tools to improve the investment environment but also a strong side of the Turkish industry (DPT, 2007). OIZs are one powerful way to eliminate the many bureaucratic obstacles to market access in Turkey. Currently, 70 OIZs[30] are active throughout most mid-and large-scale companies to provide an efficient production environment. In the starting days, they were used as an urban policy tool but nowadays they are the main industrial policy tool. Viewed from an economic perspective, the OIZs main contribution is to improve the environment in the local scale (DPT, 2007).

These three laws are all milestones of the industrial policies but their main concern is different from the others. The OIZs are urbanized zones for goods and service production in sound production areas, TDZs are to encourage the firms that are producing technology, and IZs are to promote investments to Turkey from immigrant Turkish people.

Although OIZ concept in the industry policy was started 49 years ago, almost half of the OIZ were established within the last 6 six years. They are becoming more effective and inevitable. Since 1962, the number of OIZ increased from 148 to 49,481.40 hectare square. The construction of the OIZ has been triggered by the year 2002 that is 61 OIZ projects have been established between 2002

[30] The number of active OIZs is 148 by the end of 2011. This DPT document is from 2007 and we stick to the statements.

and 2009 whereas there were 71 before 1962 to 2002. Also with the 115 planned OIZs with different states, this number will be 263 with 689,780.92 hectare square[31] (www.sanayi.gov.tr: www.osbuk.org.tr).

Except Artvin, in every province at least one OIZ is planned or actively operating. After the planned ones get active, in Kocaeli, Bursa and Izmir there will 13 OIZ in each whereas in Ankara this number will be 12 and for Istanbul it will be 8. When the square meters of OIZs per person in each province is ranked, the top three provinces will be Bilecik, Eskisehir and Usak. In this rank order list, Kocaeli, Ankara, Bursa, Izmir, and Istanbul is 13th,25th, 30th, 33th and 77th respectively[32] (www.osbuk.org.tr).

The enactment of a law after 2001, which was designed to enable the initiators, researchers and the universities to cooperate for developing new technology for production, allowed new approaches to technology development. Within the framework of this law, 32 are active and 11 are under construction "Technology Development Zones (TDZs)" were established. There are 1451 firms in these centers and 12743 people are working in these firms. (www.sanayi.gov.tr)

2.5.5. Are OIZ's clusters?

There is an ambiguity of the issue as to whether the OIZs in Turkey are assumed to be clusters or not. Some authors (Caglar and Kurtsal, 2011: Gursoy, 2011), emphasize that OIZs are not exactly clusters. OIZ are established to form clusters as a government policy. They are not evaluated whether they are successful or not yet. The main problem of analyzing clusters and OIZs is the

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[31] The detailed list of OIZs and their states are listed in Appendix A.2.1..

[32] The detailed rank order of provinces are listed in Appendix A.2.2..

lack of appropriate data. Moreover, there is not reliable success criterion to assess their performance. None of the studies on Turkey, as far as it is known, has analyzed on a firm level data and spatial econometrics tools yet.

In Turkey, there is a perception on that "an industry in a city" is a cluster such as the Machinery industry in Ankara and the Textile industry in Gaziantep[33]. In research done for Izmir, Hasar and Morova, Ineler (2011) found agglomeration in 14 industries. They choose 6 of them to perform cluster field research. Not enough analysis has been made, to say whether OIZs in Turkey can be considered clusters or not. As we focus on the Chapter 2, to identify a cluster is not easy and also there is not only one way to detect it. OIZs are not spontaneously founded, only if they exhibit the properties of clusters, can they be called clusters.

As it is shown in Chapter 2, to identify a cluster there are three necessary conditions which are i. geographical concentration, ii. competitiveness, and iii. network. OIZs for sure fulfill the first condition, but it has to be analyzed as to whether the second and third conditions are fulfilled as well.

In this study, as we will explain in detail in the following chapters, we will use the spatial econometric analysis of export function. Export values are an indicator of competitiveness and with the spatial analyze, we will be able to test the network among the firms. With the appropriate technique we will try to identify whether the OIZs are clusters or not. At least, we will able to say whether they are knowledge sharing environments or not.

[33]For detailed one check http://www.clusterturkey.com/TR/Map/ClusterMap.aspx , Access date: 13.03.2012.

CHAPTER 3

THE MODEL AND THE METHOD

3.1. Introduction

In a research which analysis the export behavior of firms, the researcher might choose either the decision to export or the total value of exports for analyzing. As our main concern is on knowledge spillovers, the total value of exports might be misleading and hinder our understanding of the dynamics of knowledge spillovers on a firm level study. In a region or a province, several large firms or multinational enterprises (MNEs) mislead the analysis. In a study analyzing knowledge spillovers, the focal point is on the interaction between the regions or provinces or firms. Furthermore, the important issue is whether or not the firm has the knowledge. In this study, the knowledge which is spilling is to learn the necessary information for exporting. The firm that exports needs some critical information or knowledge such as connections in the foreign market. Therefore, not the volume of exports but the decision to export is more meaningful for the analysis.

In this chapter, we will briefly investigate the export function which is used in applied studies and the estimation methodology that we will use. First of all, the determinants of export function are analyzed. Finally, we will focus on estimation methodology, particularly spatial econometrics. We briefly explain the difference from the standard econometrics. We illustrate the spatial models for both continuous and limited dependent variables.

3.2. The export function

In this part, our aim is to ascertain the determinants of the export function. This issue can be investigated at either macro, meso or micro level. Before the 1990's, the studies were mainly focused on the macro level, but with the availability of the firm level datasets, later studies were made predominantly at the micro level. At the macro level, the studies mainly focus on the one country or cross-country analysis (Andersson and Ejermo, 2008: Alguasil et al., 2002: Montobbio and Rampa, 2005) meanwhile at the micro level, the primary concern of the studies is to investigate the export behavior on the firm level (Wakelin, 1998: Rodriguez and Rodriguez, 2005: Barrios et al., 2003). Comparison of the industries are studied at the meso level (Kumar and Siddharthan, 1994: Dijk, 2002) especially comparison of high-tech industries and low-tech industries.

At macro level studies, mainly the effect of FDIs, technology and efficiency issues are centered in the debate. Giles and Williams (2000) review more than a hundred and fifty empirical papers and concluded that although export and economic growth has a positive correlation, the direction of the effect is ambiguous. The structure of the economy, for example openness in this case, or the political situation of the country, for example the liberalization level, is crucially important in trade (Alguasil et al., 2002). Technology is also one of the important factors which influence the country's export volume. Andersson and Ejermo (2008) find that the effect of technology specialization, which is proxied by patents to export specialization in regions, is valuable.

Research on meso level studies is much more when compared to studies on the macro and micro levels. This is because export behavior on the industry level is greatly affected by the firm's characteristics (Kumar and Siddarthan, 1994, 289). Dijk (2002) investigates the export behaviour of Indonesian firms using a database covering all manufacturing firms active in 1995. The sample includes 28 industries at the three-digit level. Kumar and Siddhartan (1994) studies 13 manufacturing industries in India and they assert that technology is an important factor in explaining export behavior especially in low-tech and medium-tech industries.

At micro studies, the common finding is that exporters when compared to non-exporters are more productive, more efficient, more technological and also larger in size (Aw et al., 1998: Bernard and Jensen, 1999: Bleaney and Wakelin, 2002: Aitken et al., 1997: Bernard and Jensen, 1999: Clerides et al., 1998). Most of the studies in this area show that productive firms are more likely to export which can be explained by the self-selection hypothesis (Clerides et al., 1998: Aw et al., 1998: Bernard and Jensen, 1999). Self-selection is defined as "that exporters learn from their contacts in the export market and this results in the adoption of better production methods and higher productivity. Alternatively, the higher productivity of exporting firms reflects the self-selection of more efficient producers into a highly competitive export market (Aw et al., 1998).

The relationship between firm size and trade has been investigated by many studies (e.g. Berry, 1992; Muranda, 1999). Muranda (1999) defines the firm size in terms of employment level for the textile and clothing firms in

Zimbabwe since those industries are relatively labor-intensive. Sterlacchini (1999) explains the reasons behind the positive relationship between firm size and export performance as economies of scale in production and in export marketing, higher capacity for taking risks, better opportunities to raise financing and sufficient managerial, financial, R&D, and marketing resources. Dijk (2002) points out an inverted U-shaped relationship between firm-size and export propensity**.** Similarly, according to Wakelin (1998), this U-shaped relation comes from the fact that very large firms become more oriented towards the domestic markets due to a domestic monopoly giving them no incentive to export even though the size is an advantage in exporting**.**

In the literature, R&D expenditures are often used as a proxy for the innovation capacity of firms. The findings are ambiguous. Although Wagner (2001) finds a positive relationship between R&D expenditures of German firms and their exports, Lall and Kumar (1981) finds a negative relationship between them in a sample of 100 Indian firms.

Knowledge and technology accumulation in a region is mutually related according to Andersson and Ejermo (2008). They also confirm that export specialization and knowledge specialization in a region are related with an analysis of 17 countries and 81 regions. They utilize export prices as a dependent variable and patent citations for technology specialization.

Da Rocha and Christensen (1994, 114) summarize the motives to export as unexpected opportunities; government export incentives; satisfied domestic market; seeking more profits; market diversification; management's desire to export; possession of a unique product to export. Some of the other factors which motivates firms to export are the availability of excess capacity, the management's familiarity with the countries to which the products are exported to; the management's familiarity with the language of the foreign market and entry of domestic rivals into exporting.

Muranda (1999) investigates the factors which have an influence in driving 122 Zimbabwean firms in the textile and the clothing industries to export their products. He finds that the benefits which were associated with export incentives include, the need to channel excess production capacity to profitable use, escaping from intensifying domestic competition mainly arising from imports, and the possibility of large profits from exporting are the factors influencing the export decision of firms in the sample.

Bhavani et al.(2001) evaluates the variables affecting the export decision of the 310 firms operating in the textile garment and the apparel industry in Delhi. They find that the scale advantages, the efforts in accessing markets (share of sales expenses) and access to capital are some factors affecting the firms' export decision.

Javalgi et al. (1998) examines 20,204 manufacturers in the Midwestern state of Ohio in the USA to determine whether or not the influence of the firm's characteristics on the propensity to export differs for manufacturers and manufacturing-based service providers. The variables examined are, the number of employees, total sales, years in business, international trade activity (exporter/non-exporter), and firm ownership. The results of the study indicate that the value of using a firm's characteristics to predict export behavior differs for manufacturing firms and manufacturing-based service providers.

In spite of the amount of literature published on export performance in the last two decades, only a limited number of studies have addressed technological issues (Nassimbeni, 2001). The factors potentially influence the behavior of

Indian enterprises considered in Kumar and Siddharthan (1994, 290) study are: technology, firm size, advertising and promotion, capital intensity, MNE association, policy factors.

Lefebvre et al., (1998) take into account traditional measures of R&D activities as well as a broad range of R&D-related capabilities to further our understanding of the export behavior of SMEs in terms of volume and final destination of sales. They attempt to address the following research questions: i) Which R&D-related capabilities (including R&D intensity) best discriminate the non-exporters from the active exporters? Furthermore, which of these capabilities discriminate exporters based upon the final destination of the exports? ii) Which R&D-related capabilities are the strongest determinants of export intensity according to different export destinations? (Lefebvre et al., 1998)

Nassimbeni (2001) presents the results of an empirical research conducted on a sample of 165 small Italian manufacturing firms. Exporters and non-exporters are compared in terms of technology, ability to innovate, and a number of other structural factors. Then, a predictive model of the export propensity of small units is presented which processes the factors that better distinguish exporting from non-exporting enterprises. In brief, exporting and non-exporting units were compared in terms of three classes of factors: i) Technology levels: ii) Capacity to innovate, iii) Firm's characteristics. He just uses two subgroup comparisons by the chi-square test.

Rodriguez and Rodriguez (2005) analyze the influence of a firm's technological capacity on both its decision to export and its export intensity from a sample of Spanish manufacturing firms using the non-linear regression models. Their findings show that product innovations, patents and process innovations positively and significantly affect both the decision to export and the export intensity. R&D spending intensity is not significant in the decision to export, although it is significant in export intensity.

Wakelin (1998) considers the role of innovation in determining export behavior for a sample of UK firms including both innovating and non-innovating firms. Export behavior is defined both as the probability of a firm exporting and the propensity to export of the exporting firms. An empirical model of the determinants of export behavior is estimated, and the determinants are found to vary between innovating and non-innovating firms. Non-innovative firms are found to be more likely to export than innovative firms of the same size. However, the number of past innovations has a positive impact on the probability of an innovative firm exporting. The paper concludes that the capacity to innovate changes the behavior of the firm relative to non-innovating firms.

Lachenmaier and Woessmann (2004) test empirically whether innovation causes exports using German micro dataset. Their instrumental-variable methodology identifies variation in innovative activity which is caused by specific impulses and obstacles reported by the firms, which can reasonably be viewed as exogenous to firms' export performance. They find that innovation attributable to this variation leads to an increase of roughly 7 percentage points in the export share of German manufacturing firms.

The implications of the results of Wakelin (1998) for government policy are considerable if it appears that the existence of innovations at the industry level improves the probability of all firms exporting, both innovative and non-innovative. The innovative environment can, thus, act as an encouragement mechanism to export. This relationship is not confirmed for the propensity to export, where no positive spillovers were found. Secondly, low unit labor costs appear to play a small role in export behavior at the firm level for innovating firms. Innovating firms with higher unit labor costs are more likely to export and have a higher propensity to export. In addition, higher average wages have a positive impact on export behavior for both innovating and non-innovating firms, possibly reflecting the importance of skills in export behavior.

The problem with studying cross section data is that some variables are affected by time lag. Researchers working on that subject point out the problem although offer no solution for it (Rodriguez and Rodriguez, 2005; Wakelin, 1998). The econometric analysis with cross section data causes to ignore the influence of time.

Multinational enterprises are expected to export more. Ramstetter (1999) justifies this expectation. Special features of the administrator are also making it easier to export. Some of the characteristics are the level of education, age, foreign language knowledge (Obben and Magagula, 2003).

As far as we know, no studies are found on analyzing the spatial effects on the export function either at regional or at a provincial level. In summary, on the firm level studies, export is affected by a firm's characteristic such as the firm's size and the age of the firm; technology and innovation - especially variables which show the innovative capabilities of the firm; FDI; and the characteristics of the administrator.

At Table 3.1, independent variables which are used in the export decision function in the literature are summarized. Some variables (age, size) are common but most of them are subject or data specific.

Table 3.1.: The summary table for the independent variables used for export decision in the literature

Author	**Dependent**	**Independent**
Aitken et al. (1997)	X(0,1)	Industry Concentration, Local Export Concentration, MNE Export Activity, Plant FDI (USA, Europe, Japan, other), Tariffs on Output, Quotas on Output, Price Index(Construction, Machinery, Transportation, Office Equipment, Raw Material, Electiricity), State-Industry Wage
Barrios et al. (2003)	X(0,1) X/sales	Age, Age2, Size, Size2, Productivity, Wage, R&D Intensity, Domestic R&D, MNE R&D, R&D interaction, Domestic Export, MNE Export, Export Interaction
Bernard & Jensen (2004)	X(0,1)	X(-1), X(-2), Employment, Wage, Non-prod./Emp, Productivity, New Product, Industry Exchange Rate, Multi-plant Dummy, Multinational Dummy, State Exporters, Industry Exporters, State-Industry Exporters
Rodriguez & Rodriguez (2005)	X(0,1) X/sales	RD/Sales, Product Innovation, Number of innovation in products, Patents, Number of Patents, Process Innovation, Number of Employees, Foreign Capital, Technology Intensive Sector
Roper & Love (2002)	X(0,1) X/Sales	Part of a Multiplant Group, Graduate Employees, RD Department in Plant, RD in Plant, Plant Employment, Plant Employment2, Product Innovation, Regional GDP per capita, Sector dummy, Regional Supply Shain,
Sjoholm (2003)	X(0,1)	District Export, Size, Skill(Share of Labor Higher than Primary School), Capital Stock per Labor, R&D, Age, Import, Foreign Ownership, Spillovers
Wagner (2001)	X/Sales	Firm Size, Firm Size2, Branch Plant Status, Craft Job, Percentage of Jobs Demanding University Degree, R&D/Sales, Patents, Product Innovation, Industry Dummies
Wakelin (1998)	X(0,1) X/Sales	Average Capital Intensity, Average Wages, Size, Size2, Number of Innovations used in the Sector, Unit Labor Cost, Dummy for Innovating Firms, Number of Firm Innovations

3.3. The Method - Spatial Econometrics

To analyze whether there is knowledge spillovers intra/inter region or provinces or OIZs, our preference is to use the spatial econometric methods. We will also verify our choice. First, we will briefly explain what spatial analysis and dependence is.

The roots of spatial analysis arise from the question of whether or not "space matters". Actually, the real question is whether or not a spatial unit which might be a region, province or a country is affected by its neighbors. This is explicitly defined by Tobler (1979)'s First Law of Geography, "everything is related to everything else, but closer things more so". The spatial econometric method is an appropriate tool to analyze whether or not the "space matters".

Spatial dependence can be formalized either as a correlation form (Viton, 2010) or as a functional form (Le Sage, 1998). The correlation form is,

$$Corr\ \ y_i, y_j\ \ = E\ \ y_i y_j\ \ - E\ \ y_i\ \ E(y_j) \neq 0, \qquad (3.1)$$

and the functional form is,

$$y_i = f(y_j) \qquad (3.2)$$

also for both form the constraint is,

$$y_i \neq y_j \qquad \text{i=1, …., n} \qquad (3.3)$$

where n indicates the total number of spatial units and i refers to the spatial unit of observation and j is the neighboring units of i. Both forms represent the same situation. For a spatial dependence to exist either the correlation equation does not hold or the functional form holds. In this case, it simply means that the concerned spatial unit is affected by the neighboring units.

Positive spatial autocorrelation is on focus most of the time since it is more meaningful than the negative one. Positive spatial autocorrelation can be defined as a spatial unit surrounded by similar values. For example, a spatial unit with high values is encircled by high values and the same can be said for low values. Negative spatial autocorrelation indicates that a spatial unit which has low values of a random variable is surrounded by high values or vice versa. It is similar to a checkerboard pattern and it is not meaningful to check for negative spatial autocorrelation. Positive spatial autocorrelation is easier to hypothesize and interpret (Anselin and Bera, 1998: Viton, 2010, LeSage, 1998).

What happens if spatial dependence is ignored? Ignoring the spatial dependence results in underestimating the real variance of the data. In the positive spatial autocorrelation case, "the sample mean will have less precision" (Ward and Gleditsch, 2008, 10). Consequently, type 1 error occurs, ie. the null hypothesis will be rejected when it is true. This causes problems for estimating and interpreting the results.

Ward and Gleditsch (2008, 28) give some suggestions as how to perform a spatial analysis:

i) Map the data, especially the dependent variable,

ii) Calculate Moran's I to detect spatial correlation,

iii) Estimate with spatial lag model,

iv) Compare the spatial lag model with the non-spatial model.

Especially for small data sets, Ward and Gleditsch (2008, 16) advise to use visual representations to check for spatial dependence. It is also necessary to perform a spatial autocorrelation test to show that space matters for the analysis. Estimation with spatial effects is different from the standard econometrics. In spatial estimation, the weight matrix is determined as a priori and this issue is very controversial. Latter in this chapter the reasons for this debate are investigated.

In this part, first we distinguish the difference between the spatial dependence and the heterogeneity. We continue with the connectivity and the weight matrices. Then, we focus on the spatial autocorrelation tests especially on Moran's I test. We briefly explain the estimation methodology for continuous and limited dependent variables.

3.3.1. Spatial Dependence and Heterogeneity

The main difference between standard and spatial econometrics is that the latter takes into account the spatial effects. There are two types of spatial effects; the first and the most common one is spatial dependence and the second one, which is rarely seen, is spatial heterogeneity (Anselin, 1988).

Spatial dependence[34] (or spatial autocorrelation) is briefly externalized by Tobler's first law of geography which is "everything is related to everything else, but near things are more related than distant things" (Tobler, 1970)[35]. Anselin (1988, 11) defines the spatial dependence as "the existence of a functional relationship between what happens one point in space and what

[34] The best known work about this subject is the Cliff and Ord's (1973) work.

[35] In his study, he simulates the urban growth in Detroit in USA.

happens elsewhere". The distance has the main role in spatial dependence. As Anselin (1988, 9) indicates that testing for spatial dependence is very similar to testing for time dependence.

The second type of effect is spatial heterogeneity which can be defined as "the lack of stability over space" (Anselin, 1988, 9). Spatial heterogeneity is straightforwardly connected with the location of the spatial unit. A very basic example of this is the rich north and the poor south. Rich counties of a country lie in north and poor regions cluster in the south. Most of the time to handle spatial heterogeneity, (country/regional/provincial/county) dummy variables are included for different spatial units (Anselin, 1988: Ward and Gleditsch, 2008)

The main question is which estimation method is better - standard or spatial econometrics. The problem may also be presented as to whether or not to use a spatial model is better than to estimate an OLS model with dummy variables. The answer lies in the "parsimony" of the models. Spatial autocorrelation models have a lower log likelihood[36] value than the OLS models with dummy variables which are very popular since they are easily applicable although they still include residual spatial clustering. If the main concern is to have the model which has the best fit or the highest log likelihood, the OLS with dummy variables is better than the spatial model although these models do not originate the spatial (regional/provincial) differences which can be seen as an advantage of spatial models (Ward and Gleditsch, 2008).

Some authors (Wallsten, 2001: Van Stel and Nieuwenhuijsen (2004) have the available data, but instead of performing spatial econometric methods, they used other techniques. Van Stel and Nieuwenhuijsen (2004) discuss spatial

[36] In the Maximum Likelihood (ML) method, the higher the loglikelihood, the better the model.

techniques, but they prefer to do a logit with regional dummies to analyze inter-regional spillovers[37]. They rationalize their choice as they "don't have an a priori assumption about the spatial context" of their model (Van Stel and Nieuwenhuijsen, 2004, 399).

Wallsten (2001) also analyzes small and high-tech firms which receive R&D grants from a federal programme. He investigates the spatial effects on the firm-level by the sum of the firms within different distances (i.e. 0.1, 0.5, 1, 2, 3, 4, 5, 10, 20 and 50 miles). He has all the distances between the firms with the help of the geographic information system tools. Nevertheless, he did not do a spatial econometrics analysis; he used density variables, such as the number of firms within a distance. This might be the shortcoming of the study.

Van der Panne (2004) is also similar to Wallsten (2001) in the sense that he has all the spatial locations, but he used these geographic distances to create "ring variables[38]". Although he performed Moran's I statistics, he did negative binomial and logit estimation methods instead of spatial econometric methods.

On a country level study, the provinces in a region are assumed to act similarly in the OLS models with regional dummy variables while they are assumed to be performing differently in spatial analysis. In a spatial analysis, the distinction is made for the effect of Italy and Ireland on Greece although Italy's and Ireland's effect is assumed to be same in the dummy variable method. Another advantage of the spatial estimation methods is that the distances between the spatial units are taken into consideration for understanding the regional or provincial

[37] They analyze 40 regions in NUTS 3 level betweeen 1987-1995 in Netherlands.

[38] To find the neighboring regions, he uses 20-35 kilometers as a distance measure and multiplies the main variables with this measure.

differences with help of contiguity matrices. Actually, the dummy variable method is a subset of spatial models (Ward and Gleditsch, 2008).

3.3.1.1. Spatial Contiguity and Weight Matrices

The main difference between the standard and the spatial estimation is that the weight matrix is used. Weight matrix basically indicates the neighbors and their distance from the analyzed spatial unit. Weight matrix is formed from contiguity matrix. Contiguity and weight matrix is one of most controversial issues in spatial econometrics. First, we summarize the properties of these matrices then we continue with their pitfalls.

Spatial autocorrelation (or spatial dependence) is analyzed through binary contiguity between the spatial units. This technique is taken from the studies of Moran (1948) and Geary (1958). Contiguity matrix is a $N \times N$ matrix where N is the number of spatial units. According to this technique, the neighbors are indicated by 0-1 values. Diagonal elements of this matrix are 0 because a spatial unit is not a neighbor of itself (Anselin, 1988). Furthermore, in this technique, if a spatial unit does not have any neighbors, it will be excluded from the analysis.

There are different constraints for being neighbors. The three most common – rook, bishop and queen contiguity – have taken their names from chess. Rook contiguity is the most commonly used one. If the two spatial units (region, country or province) have a common border or boundary, they are treated as neighbors. In practice, usually “snap distance” is used. When two spatial units have a common boundary longer than the “snap distance”, they are considered to be neighbors. If two spatial units share a common vertex or cross at a point, it is called a bishop contiguity. In applications, when the common boundary is shorter than the “snap distance”, spatial units are called neighbors. Queen contiguity involves both the rook and the bishop contiguity. If the two spatial units either share a boundary or a vertex, it is simply a queen contiguity. For queen contiguity, the size of the boundary does not matter; it is enough for it to have any boundary (Anselin, 1988: Le Sage, 1998: Ward and Gleditsch, 2008: Viton, 2010). Le Sage (1998) includes linear contiguity to this list as a fourth one. If the spatial unit of interest shares a common eastern or western border, it is called a linear contiguity.

There are also other approaches for constructing a contiguity matrix like “second-order” or “general distance band”. Second-order contiguity is when a neighbor of a neighbor of a spatial unit is treated as a neighbor. It can also be applied for second-order rook, bishop and queen contiguity. “General distance band” contiguity is when two spatial units are closer than “given” distance, they assumed to be neighbors. No certain rules to determine this “given” distance. Different weights and distances can be used (Ward and Gleditsch, 2008: Viton, 2010). It is a very controversial issue to determine “given” distance. For example, the distance between Australia and New Zealand is 4000 kilometers. If this distance is used for all countries, France is going to be a neighbor for all African countries. Gleditsch and Ward (2001) used 500 kilometers for countries to be considered neighbors; Beck et al. (2006) also used this distance to construct the contiguity matrix.

All the approaches that are analyzed till here depend on geographical distance or proximity. During the last decade, the researchers prefer to use different proximities rather than the geographical one. According to Boshma (2005), five dimensions of proximity exist. They are cognitive, organizational, social, institutional and geographical proximity.

Claeys and Manca (2009) utilize the trade and economic development indicator, and cultural proximity (linguistic diversity) to create the weight matrix in addition to geographical proximity. Beck et al. (2006) uses the volume of trade flows between the countries to construct an appropriate weight matrix to prove that connectivities are beyond geographical distances. Lacombe (2004) try to differentiate between inter-state and intra-state effects by constructing two different weight matrices. One of the weight matrices is constructed by using the three nearest intra-state neighbors and the other is constructed by using the three nearest neighbors in the bordering states.

Cliff and Ord (1973, 1981) extended the (binary) contiguity matrices to measure the potential interaction between the spatial units. It is called Cliff-Ord weight matrix or commonly known as weight matrix ,W. Cliff and Ord (1973, 1981) suggest in their studies to use weight matrix from different measures. Basically inverse distance, negative exponential of distance or relative length of the borders are recommend by them (Anselin, 1988). Actually the difference between the contiguity and the weight matrix is that contiguity matrix is formed from the distance between the spatial units, on the other hand, inverse distance is used for weight matrix.

Most of the ones suggested for the weight matrix are related to the physical locations of the spatial units on a map or simple (binary) contiguity (Anselin, 1988). When distance is prefered, the inverse distance or negative exponential of distance is used for constructing a weight matrix. But if binary contiguities are chosen for analysis, then they should be row-standardized for the weight matrix. By row-standardizing the weight matrix, we are actually taking the average of the neigbours. To make row-standardized weight matrix, each row is summed up and each element in each row is divided by the sum of the row. In a row standardized weight matrix, each row sums up to one (Ward and Gleditsch, 2008).

The construction of the weight matrix is the most controversial issue in spatial analysis. According to Ward and Gleditsch (2008), there is no written right approach for constructing a weight matrix. Anselin (1988) also stresses that no agreement on weight matrix should be used or preferred. Anselin (1988) give some suggestions on this subject. First of all, "weight matrix should be chosen judiciously" (Anselin, 1988, 21). Also, "weight matrix should bear a direct relation to an 'theoretical conceptualization of the structure of dependence' rather than reflecting an ad hoc description of spatial pattern" (Anselin, 1988, 21).

The main problem about the weight matrix is that null hypothesis is rejected or not rejected according to the specified weight matrix a priori (Ward and Gleditsch, 2008). Weight matrix is assumed to be exogenous. This will generate problems for the spatial estimation and the interpretation of the results (Anselin, 1988). The first problem about the estimation process is that a priori specified weight matrix might cause a spurious relationship. Another problem is when the main aim of the study is to analyze the spatial structure, it is assumed to be known before the data analysis.

Spatial lag of y is created with the specified weight matrix a priori. Spatial lag of y is shown as:

$$y_L = \text{Wy} \tag{3.4}$$

where W is the row standardized weight matrix.

3.3.1.2. Spatial Autocorrelation Tests

The existence of spatial dependence must be tested in order to understand whether or not the space matters before we proceed to the spatial estimation methods. Moran’s I, Geary c and Getis Ord test are examples of spatial autocorrelation tests. Since the most commonly and generally used test is the Moran’s I test, we focus on this test and briefly mention the others.

Moran’s I (Moran, 1950a: Moran, 1950b) test is simply the correlation between the variable of concern (y) and the spatial lag of it (y_L). The test is easy to apply since the residuals from any regression are needed for application. Formally, the Moran’s I test is represented with a summation notation (Ward and Gleditsch, 2008, 23) or matrix notation (Anselin, 1988, 101).

Moran’s I test with a summation notation (Ward and Gleditsch, 2008, 23):

$$I = \frac{n \quad {}_{i} \quad {}_{j \neq i} w_{ij}(y_i - y)\,(y_i - y)}{(\quad {}_{i} \quad {}_{j=1} w_{ij}) \quad {}_{i}(y_i - y)^2} \tag{3.5}$$

Moran’s I test with a matrix notation (Anselin, 1988, 101: LeSage, 1998, 71):

$$I = \frac{N}{S} \quad \frac{e'We}{e'e} \tag{3.6}$$

Simplified version (with a row-standardized weight matrix) of Moran’s I test in equation 3.6 (Anselin, 1988, 102: LeSage, 1998, 71):

$$I = \frac{e'We}{e'e} \tag{3.7}$$

where y is the dependent variable or the variable of concern,

w_{ij} is the i-j elements of the row-standardized (the sum of each row equals to one) weight matrix in equation 3.5,

e is a vector of OLS residuals,

W is the spatial weight matrix,

N is the number of observations,

S is the standardization factor which is equal to the sum of all elements in the weight matrix.

In equation 3.7, Moran's I test is equal to the coefficient (β) from a OLS regression of We on e ($We = \beta e + \in$) instead of e on We ($e = \beta We + \in$) which will indicate an autoregressive spatial process (Anselin, 1988).

Moran's I is also known as a test of z score with first and second moments (mean and variance). Moran's I result assumed to be asymptotically normal. The mean of the test is (Ward and Gleditsch, 2008, 23),

$$mean\ I \ = \frac{-1}{n-1} \qquad (3.8)$$

The variance of the Moran's I is (Ward and Gleditsch, 2008, 23),

$$var\ I \ = \frac{n^2\ n-1\ \frac{1}{2}\ \ _{i\neq j}(w_{ij}+w_{ji})^2-n(n-1)\ \ _k(\ \ _j w_{kj}+\ \ _i w_{ik})^2-2(\ \ _{i\neq j} w_{ij})^2}{n+1\ (n-1)^2(\ \ _{i\neq j} w_{ij})^2} \qquad (3.9)$$

If the dependent variable is standardized as z_i, Moran's I is simply (Ward and Gleditsch, 2008, 23),

$$I = \frac{1}{2} \quad c_{ij} z_i z_j \qquad \forall i \neq j \tag{3.10}$$

The null hypothesis of Moran's I test is the spatial independence or no spatial autocorrelation. The sign of the test also indicates a signal for positive or negative spatial autocorrelation. Anselin (1988) also emphasizes and is careful about the interpretation of the Moran's I since the null hypothesis of zero spatial autocorrelation is explicit although the alternative is not. Alternative hypothesis of zero spatial autocorrelation does not necessarily indicate the existence of a spatial autocorrelation. Wald and Gleditsch (2008, 44) warn about another aspect of the test which is the weight matrix. They stress that one must be careful when using the test since it depends totally on the weight matrix.

Also there are other tests like Geary's c and Getis Ord (G) test besides Moran's I (Claeys and Manca, 2009):

$$C = \frac{N-1}{2S_0} \frac{{}_{i}^{N} \; {}_{j}^{N} w_{ij}(x_i - x_j)^2}{{}_{i=1}^{N}(x_i - x)^2} \tag{3.11}$$

$$G = \frac{{}_{i}^{N} \; {}_{j}^{N} w_{ij} x_i x_j}{{}_{i=1}^{N} x_i x_j} \tag{3.12}$$

The outcome of the Moran's I test lies between +1 and -1. As the statistics is closer to +1, the stronger is the positive spatial autocorrelation, and vice versa. Geary's C test results between 0 and 2. In this test, 0 and 2 indicates positive and negative spatial autocorrelation, respectively. Also, 1 shows that there is no spatial autocorrelation. In Getis Ord test, 0 hints that there is no spatial autocorrelation. Moreover, the higher the value of the test, stronger is the relationship (Claeys and Manca, 2009: Curtis, 2006).

3.3.2. Estimation with Spatial Dependence

Estimation with spatial dependence is different from the standard econometric estimation. The main difference lays in the contiguity and the weight matrices which were determined in the beginning of the study. As we are interested in cross-sectional analysis of the data, we do not give details of the time series and the panel data estimations of spatial analysis. Initially, we start with defining by standard econometrics. An econometric model is mostly estimated by ordinary least squares (OLS) method or maximum likelihood (ML) method. There are other estimation techniques other than these two, but we briefly explain only the standard econometrics. Standard regression for cross section data is,

$$y_i = x_i\beta + \epsilon \tag{3.13}$$

General form of the regression is,

$$y = X\beta + \epsilon \tag{3.14}$$
$$\epsilon \sim N(0, \sigma^2 I)$$

where y is the dependent (endogenous) variable or variable of concern,
x is the set of independent (exogenous) variables,
β is the coefficient of estimation or parameter vector related to dependent variable,
∈ is the independent error term.
i is the cross sectional unit

OLS estimates of the coefficient of regression is,

$$\beta = (X'X)^{-1}X'y \tag{3.15}$$

Log likelihood function for the standard regression is,

$$lnL\ \ \beta, \sigma^2\ \ = -\frac{N}{2\ln\ 2\pi} - \frac{N}{2\ln\ 2\sigma^2} - \frac{(y - X\beta)\prime(y - X\beta)}{2\sigma^2} \tag{3.16}$$

To show the differences between the standard and the spatial econometrics, we introduced a form of regression. Throughout the next section we will go into detail on the spatial dependence models. As we have seen before, spatial dependence has two types, spatial autocorrelation and spatial heterogeneity. When an econometric model has spatial autocorrelation, it is called a spatial autoregressive model (SAM) or a spatially lagged y model. When an econometric model has spatial heterogeneity, it is called a spatial error model (SEM). The general form for a spatial linear regression for cross-section data is (Anselin, 1988, 34),

$$y = \rho W_1 y + X\beta + \epsilon \tag{3.17}$$

$$\epsilon = \lambda W_2 \epsilon + \mu \tag{3.18}$$

$$\mu \sim N(0, \Omega) \tag{3.19}$$

The diagonal elements of error covariance matrix Ω as:

$$\Omega_{ij} = h_i\ \ z\alpha \qquad\qquad h_i > 0 \tag{3.20}$$

where x, y and ϵ_i is defined before,

ρ is the coefficient of spatial autoregressive structure for the dependent variable (spatial autoregressive model),
λ is the coefficient for spatial autoregressive structure for the disturbance ϵ (spatial error model),
μ is the white noise error term.

The disturbance μ is taken to be normally with a general diagonal covariance matrix Ω. Equations 3.17, 3.18, 3.19 and 3.20 constitute the general form of the econometric model. Under some restrictions, specific models are obtained:

i) If $\alpha = 0$, it follows $h = \sigma^2$. The model will be homoscedastic. If $\alpha \neq 0$, the model will have a heteroscedasticity problem which should be solved.

ii) If $\rho = 0,\ \lambda = 0,\ \alpha = 0$; the model will be $y = X\beta + \epsilon$. This is basically a classical linear regression model with no spatial effects.

iii) If $\lambda = 0,\ \alpha = 0$; the model will be $y = \rho W_1 y + X\beta + \epsilon$. This is spatial autoregressive model (SAM). The spatial lag is in the dependent term.

iv) If $\rho = 0,\ \alpha = 0$; the model will be $y = X\beta + (I - \lambda W_2)^{-1}\mu$. This is a spatial error model (SEM). Spatial lag is in the disturbances (error term).

v) If $\alpha = 0$; the model will be $y = \rho W_1 y + X\beta + (I - \lambda W_2)^{-1}\mu$. This is a mixed regressive spatial autoregressive model (SAM) with a spatial error model (SEM). It means this model has spatial both the dependent variable and the error (disturbance) term.

In spatial analysis, several issues are important. We do not have these problems in ordinary or standard econometric analysis. The most important and the most controversial one is the weight matrix. We need neighboring and distance to calculate the weight matrix. It is a complex issue. This is not our main concern. We did not go into detail on this subject. We can briefly explain with an example (Ward and Gleditsch, 2008, 20). The USA shares a border with Mexico and Canada. If sharing a border is used for connectivity matrix, USA is a perfect neighbor with these two countries. When the distance is calculated, Washington D.C. is 3000 kilometers from Mexico City, on the other hand she is 700 kilometers away from Ottowa. The easiest and simplest approach is to form a binary contiguity matrix which takes value 1 for neighbors, 0 otherwise. Furthermore, the length of the borders can be used; this time the situation is vice versa (the borderline with Canada is approximately 8900 kilometers, while with Mexico City 3169 kilometers). The question is whether the effects of these two countries are similar or not. In one option (distance), the effect of Mexico City is higher than Ottowa, for the other option (borderline) vice versa. Ward and Gleditsch, (2008, 20) suggests to “use the length of the borders between countries or the distance between the average of the ten largest population centers in each country”. The selected weight matrix will totally influence the spatial analysis.

The second important problem in spatial analysis is the missing spatial data. Imputation is one approach to solve the problem (Ward and Gleditsch, 2008). In time series or cross-sectional analysis, deletion of the data is a solution, but for spatial data, such missing values create “holes”. In spatial analysis, we exploit the maps to construct weight matrices. In any form of (contiguity, distance, borderline, etc.) weight matrices, for the region which does not have available data, actually we are erasing the region from the map. The region is still there, but we are ignoring the effect of this region to other regions. This will mislead the analysis and also over/under estimate the spatial effects. Finally, some observations may not be linked to other observations. For example, in a country based analysis, New Zealand is not within 200 kilometers of any other country and it does not have any borders with another country.

3.3.2.1. Spatial Models for Continuous Variables

In standard econometrics, different estimation techniques are used for continuous and latent variables. In this part, for continuous variables the models which have spatial dependence either in the dependent (endogenous) variable or in the disturbance (error) term are investigated. Spatial autoregressive models (SAM) are appropriate to use when spatial dependence is in the independent variable. Spatial error models (SEM) are suitable when it is believed that spatial dependence is in the error term.

Ward and Gleditsch (2008, 69) affirmed on the comparison of the two models that one model is not superior to the other. They are not nested so they can be compared with tests for non-nested models. They also assert that the results of the test will not lead to a conclusion, i.e. not supporting one model and log likelihoods of the two models will be close.

3.3.2.1.1. Spatial Autoregressive Models (SAM)

Spatial autoregressive models (SAM) are also referred to as spatially lagged y models by Anselin (1988). The spatial autoregressive model (the spatial lag y model) is appropriate to use when the dependent variable y_i is affected its neighbors. Briefly, variable of concern of a spatial unit is influenced by the neighboring unit, i.e. the value of y_i is affected by the value of y_j.

The first order spatial autoregressive model is (Anselin, 1988: Ward and Gleditsch, 2008),

$$y_i = \beta_0 + \beta_1 X_i + \rho w_i y_i + \epsilon_i \tag{3.21}$$

General matrix form of SAM model is,

$$Y = \rho WY + X\beta + \epsilon \tag{3.22}$$

$$\epsilon \sim N(0, \sigma^2 I).$$

where Y is dependent (endogenous) variable or variable of concern,

X is the independent (exogenous) variables

W is the row-standardized weighting matrix,

WY is the spatial lag of independent variable and also show the average value of neigbors,

β is the coefficient of estimation,

ρ is the spatial lag parameter

ϵ is the error (disturbance) term.

$\sim N(0, \sigma^2 I)$ shows that the error term is distributed normally with a constant variance.

Equation 3.21 is the row form of equation 3.22 such as w_i is the row i from matrix W.

To check the validity of the null hypothesis, the significance of the spatial lag parameter is controlled. If $\rho = 0$, it indicates that there is no effect of the neighbors, i.e. no spatial dependence. In this case, OLS will be appropriate and there is no need to use a SAM model. When $\rho \neq 0$, this will show that spatial lag is effective and OLS will be biased, i.e. “not converge to their ‘true’ values” (Ward and Gleditsch, 2008). It can be shown that OLS is biased when spatial dependence exists with matrix notation. The estimated ρ is (LeSage, 1998, 45: Anselin, 1988, 58),

$$\rho = (y'W'Wy)^{-1}y'W'y \qquad (3.23)$$

$$\begin{aligned} E(\rho) &= E\left[(y'W'Wy)^{-1}y'W'(\rho Wy + \epsilon)\right] \qquad (3.24) \\ &= \rho + E\left[(y'W'Wy)^{-1}y'W'\right] \end{aligned}$$

Since $E(\rho) \neq \rho$, OLS estimates are biased.

3.3.2.1.2. Spatial-Error Models (SEM)

Spatial (-ly correlated) Error Models (SEM) are also referred to as spatial autoregressive disturbance models or spatial moving average model by Anselin (1988). In SAM models, spatial dependence enters into the model from the dependent variable although in SEM, it enters into the model from the error (disturbance) term, i.e. “the errors of a model are spatially correlated” (Ward and Gleditsch, 2008, 65). The reason behind the spatial correlation of error terms is the unmeasured factors related to the dependent variable or just for unknown reasons (Anselin, 1988: Ward and Gleditsch, 2008, 65).

Spatial error model is (Anselin, 1988: Ward and Gleditsch, 2008):

$$y_i = x_i\beta + \varepsilon_i \tag{3.25}$$

$$\varepsilon_i = \lambda w_i \delta_i + \epsilon_i \tag{3.26}$$

The combination of the two equations will lead us to the following equation,

$$y = x_i\beta + \lambda w_i \delta_i + \epsilon_i \tag{3.27}$$

General matrix form of SEM is,

$$y = X\beta + \lambda W\delta + \epsilon \tag{3.28}$$

$$\epsilon \sim N(0, \sigma^2 I)$$

where Y is dependent (endogenous) variable or variable of concern,
X is the independent (exogenous) variables
W is the row-standardized weighting matrix,
Wδ is the spatial lag of error term,
β is the coefficient of estimation,
ρ is the spatial lag parameter
ϵ is the spatially uncorrelated error (disturbance) term,
δ is the spatial part of the error term,
λ is the spatial autoregressive coeffient or the vector of parameters that show the spatial relation of the error terms,
$\sim N(0, \sigma^2 I)$ shows that the error term is distributed normally with a constant variance.

Spatial correlation between the error terms are measured with the coefficient, λ. The significance of the coefficient indicates the validity of the null hypothesis of spatial dependence in the error terms. When $\lambda = 0$, it simply means that there is no spatial correlation in the error terms and that the model will be standard linear regression.

When $\lambda \neq 0$, we do not reject the hypothesis of spatial correlation in the error terms. In this case, OLS estimates, which did not include the spatial dependence, will still be unbiased although the standard errors of the coefficient estimates will be biased.

The main difference between the SAM models and the SEM models is in the consistency of the coefficient estimates of β. Different from SAM, SEM estimates will be unbiased and consistent when spatial dependence in the error term is ignored. On the other hand, standard errors might be incorrect and estimates of the coefficients also might be inefficient. The coefficient estimates of β will be smaller in SAM then SER because SAM pictures the immediate effects rather than the long-run ones (Ward and Gleditsch, 2008).

3.3.2.1.3. Estimation Method of the Spatial Lag/Error Models

In standard econometrics, the OLS estimator is still consistent even if a lag dependent variable is included in the model while it is not consistent when the error terms are correlated, i.e. autocorrelation exists. In spatial econometrics, this is not valid in both cases. For a spatial model, the OLS estimator overestimates because it does not take into consideration spatial clustering. It can be thought that spatial lag is like an omitted variable in the OLS estimation, thus OLS estimates are not appropriate estimators (Anselin, 1988, 57-8: Ward and Gleditsch, 2008, 68). In a spatial model, OLS estimates of SEM are consistent while it is not valid for SAM. For both situations, ML estimation is more efficient than the OLS estimation (McMillen, 2006).

Ward and Gleditsch (2008) focus on the effects of democracy level in one country to its GDP level. They use a row-standardized contiguity matrix (they called it connectivity matrix) if the countries have borders within 200 km of one another. They find a larger (almost double) positive coefficient for the independent variable with the standard OLS estimation than for the spatially lagged y model. They also find ρ significant and positive. They compare the I statistics and log likelihood values to find the better model. They find that spatial model fits better than the OLS estimation. They estimate the SAM model both by using ML and OLS. When they compared the results, they concluded that OLS estimates underestimated fitted values of the independent variable although overestimate the spatial lag variable.

Ward and Gleditsch (2008) suggest two alternative estimation methods for spatial analysis. One of them is two stage instrumental variable estimation. In this method, "X" and "WX" are treated as they are exogenous and "W^2X" is used as an instrumental variable for the spatial lag of the dependent variable. The second but not the most commonly used (Anselin, 1988, 57), but also the best (Anselin, 1988, 81) estimation method is maximum likelihood (ML) estimation[39]. This estimator is consistent and asymptotically efficient for spatial analysis.

[39] For formal derivation of ML for spatial econometrics, check Cliff and Ord (1981), Ripley (1981) and Upton and Fingleton (1985).

The general specification of the model when spatial dependence exists is,

$$y = \rho W_1 y + X\beta + \epsilon \qquad (3.29)$$

$$\epsilon = \lambda W_2 \epsilon + \mu \qquad (3.30)$$

with $\mu \sim N(0, \Omega)$ and the diagonal elements of error covariance matrix Ω as:

$$\Omega_{ij} = h_i \;\; z\alpha \qquad\qquad h_i > 0 \qquad (3.31)$$

The error term is,

$$\in = y - \rho W y - X\beta = \;\; I - \rho W \;\; y - X\beta \qquad (3.32)$$

The estimator for β:

$$\beta = (X'X)^{-1} X' \;\; I - \rho W \;\; y \qquad (3.33)$$

The log likelihood function for the SAM is (Ward and Gleditsch, 2008, 67),

$$lnL \;\; \beta, \sigma^2, \rho \;\; = ln \;\; I - \rho W \;\; - \frac{N}{2 \ln \; 2\pi} - \frac{N}{2 \ln \; 2\sigma^2} - \frac{(y - \rho W - X\beta)\prime (y - \rho W - X\beta)}{2\sigma^2} \qquad (3.34)$$

The loglikelihood function for the SEM is (Ward and Gleditsch, 2008, 67),

$$lnL \;\; \beta, \sigma^2, \lambda \;\; =$$
$$ln \;\; I - \lambda W \;\; - \frac{N}{2 \ln \; 2\pi} - \frac{N}{2 \ln \; \sigma^2} - \frac{(y - \lambda W y - X\beta + \lambda W X\beta)\prime (y - \lambda W y - X\beta + \lambda W X\beta)}{2\sigma^2} \qquad (3.35)$$

3.3.2.2. Spatial Models for Limited Dependent Variables

The models and the estimation method for limited dependent variables are different from the continuous variables. Limited dependent variables can be either binary or latent variables. Logit or probit models are used for estimating the binary variables. Tobit models are used for estimating the latent variables. We briefly explained these models. We focus more on these models when spatial dependence exists (Greene, 2003, 667: LeSage, 1998, 187).

The logit model is,

$$Prob\ \ y = 1\ \ = \frac{e^{X\beta}}{1+e^{X\beta}} \tag{3.36}$$

The probit model is,

$$Prob\ \ y = 1\ \ = \Phi(X\beta) \tag{3.37}$$

Where the function $\Phi(.)$ is "commonly used notation for the standard normal distribution" (Greene, 2003, 666) and also "denotes the cumulative normal probability function" (LeSage, 1999b, 205).

Probit and logit estimation gives almost the same results. On theoretical grounds, there is no justification for one model over the other (Greene, 2003, 667).

The tobit model is,

$$y_i^* = x_i\beta + \epsilon \tag{3.38}$$

$y_i = 0 \; if \; y_i^* \leq 0$ (3.39)

$y_i = y_i^* \; if \; y_i^* > 0$

LeSage (1998, 187) points out that two main problems arises when these models have spatial dependence. One of the problems is heteroscedasticity in the errors. It exists by construction. It can be shown as follows;

$\epsilon = y - y$ (3.40)

If y =0, $\epsilon = -\rho WY - X\beta$ (3.41)

If y =1, $\epsilon = 1 - \rho WY - X\beta$

Moreover “heteroscedastic errors are functions of β and ρ" (LeSage, 1998, 187). The second problem is “predicted values can take on values outside the (0,1) interval”.

$\lim_{\rho WY + X\beta \to +\infty} Prob \;\; y = 1 \;\; = 1$ (3.42)

$\lim_{\rho WY + X\beta \to -\infty} Prob \;\; y = 1 \;\; = 0$ (3.43)

LeSage (1998, 1999a, 2000, 2004) focused on the spatial analysis of limited dependent variables. As LeSage (1998, 188) stressed that little work has done about this subject. Untill LeSage, only McMillen (1992) have worked on this.

3.3.2.2.1. Spatial Probit Models

In standard econometrics, for binary variables, either logit or probit models are used for estimating. None of them has an advantage over the other. In spatial econometrics, Franzese and Hays (2008, 5) mentions these models, especially spatial probit, attracts the attention of the researchers. Spatial logit were also used by Dubin (1997), Lin (2003) and Autant and Bernard (2006). Although it is difficult to differentiate between non-spatial logit and probit models in terms of efficiency, spatial probit has the advantage over the logit one because it has "relatively greater feasibility of working with n-dimensional normal (as opposed to extreme-value) distributions as necessary to incorporate the interdependence directly" (Franzese and Hays, 2008, 5).

Probit has types for both SAM and SEM. The structural form of spatial probit for autoregressive models is (Franzese and Hays, 2008, 6),

$$y^{*} = \rho W y^{*} + X\beta + \epsilon \qquad (3.44)$$

Equation 3.44 can be shown in a reduced form as,

$$y^{*} = (I - \rho W)^{-1} X\beta + \varepsilon \qquad (3.45)$$
$$\varepsilon = (I - \rho W)^{-1} \epsilon$$

By the measurement equation, y* which is a latent variable is connected to the y which is an observed binary-outcome (Franzese and Hays, 2008, 7):

$$y_i = \begin{matrix} 1 \; if \; y_i^{*} > 0 \\ 0 \; if \; y_i^{*} \leq 0 \end{matrix} \qquad (3.46)$$

The marginal probabilities are estimated as (Franzese and Hays, 2008, 7),

$$p \;\; y_i = 1 \;\; x_i) = p(\in_i < \frac{I - \rho W \;\; ^{-1} X\beta \;\; _i}{\sigma_i}) \qquad (3.47)$$

The structural form of spatial probit for error models is (Franzese and Hays, 2008, 8),

$$y^{*} = X\beta + \varepsilon \qquad (3.48)$$
$$\varepsilon = (I - \lambda W)^{-1}\epsilon$$

The marginal probabilities are estimated as,

$$p\ \ y_i = 1\ x_i) = p(\in_i < \frac{x_i\beta\ \ _i}{\sigma_i}) \qquad (3.49)$$

It is also possible to estimate SAM and SEM together for probit in one model, but as Franzese and Hays (2008, 6-8) stated they did not attact theattention of researchers.

3.3.2.2.2. Spatial Tobit Models

In the tobit model, there is an unobserved part of the data because of censoring. z_i indicates the latent variable which is the unobservable part of the data. Censoring of the data might be smaller than a “limit” value - left (generally at 0)- or higher than a “limit” value - right censoring. The left censoring occurs as $z_i \leq limit$ which generates a observed variable, $y_i = limit$. The right censoring present as $z_i \geq limit$ which produce an observed variable, $y_i = limit$ (LeSage, 1999a: LeSage, 1998)

The model for SAM and SEM for continuous variables is still valid for the spatial tobit model. The pdf of z_i, latent variable, is (LeSage, 1998, 1993),

$$f\left(z_i \mid \rho,\beta,\sigma\right) = \begin{cases} \left[1-\Phi\left(\frac{y_\iota}{\sigma_{ti}}\right)\right]^{-1} \exp\left[-\frac{(z_i-y_\iota)^2}{2\sigma_{ti}}\right] & \text{if } z_i \leq 0 \\ 0 & \text{if } z_i \geq 0 \end{cases} \quad (3.50)$$

3.3.2.2.3. Estimation Method for Spatial Probit and Tobit

Analyzing data sets with continuous dependent variables are easier than those with binary or limited dependent variables since the dependent variable, y, appears on both sides of the equation ($y = \rho W_1 y + X\beta + \epsilon$). With new computer technology, it is possible to maximize the likelihood function with simulation (Ward and Gleditsch, 2008, 83).

Several estimation techniques are suggested for the spatial probit models. Firstly, McMillen (1992) suggested an EM algorithm (Franzese and Hays, 2008). Moreover, LeSage (1998, 1999a) offers the Gibbs sampling method for estimation.

Expectation Maximization (EM) algoritm[40] founded on the basis of the ML method for the latent variables. As LeSage (2000) points out it is not easy to apply to spatial tobit models but it is more appropriate in the estimation of spatial probit models. The basic steps for the spatial probit model are as follows. First, it is assumed β and ρ for SAM and β and λ for SEM. The expectations were constructed according to this values. The next step is to maximize the loglikelihood function[41]. This is done untill the loglikelihood function converges (McMillen, 1992, 342).

[40] The EM algoritm is first explained in Dempster et al. (1977).

[41] The loglikelihood for functions for SAM and SEM is given in section 3.3.2.1.3..

LeSage (1999a, 155-6)[42] explains the basic estimation steps with the Gibbs sampler for the spatial probit and the tobit models. The steps are basically as follows. It starts with arbitrary values for β^0 and ρ^0. Subscript 0 indicates the arbitrary initial values to find σ. This σ is used in the calculation of β. In the next step, with estimated values of σ and β, ρ is predicted. Finally, in the last step, all these estimated values are used in the prediction of y.

One of the drawbacks of the EM algorithm is that ML has numerous problems which should be solved before using it. As Greene (2003) points out, in the presence of heteroscedasticity, maximizing the loglikelihood is a serious problem.

Gibbs sampling has an advantage over ML to deal problems of non-constant variance and outliers (LeSage, 1999a, 153: LeSage, 1999b, 226-7: LeSage, 1998, 189). Another drawback of the EM algorithm is that it is not applied to tobit models in which the likelihood function is more difficult to analyze than probit models. In the study of LeSage (2000), it is explained in detail and supported by theoretical evidence why Gibbs sampling is better than Mc Millen's (1992) EM algorithm.

In this study, our preference is to use LeSage's (1998, 1999a, 1999b, 2000) Gibbs sampling method in the estimation of spatial probit and tobit models because it works perfectly under the heteroscedasticity and the outlier problem.

[42] LeSage (1998, 194) explain Gibbs Sampling for standard econometrics.

3.4. Conclusion

In this chapter, we started with explaining the determinants of the export function. Then, we focused on the method that we are planning to use.

The export decision function is estimated with spatial econometric methods to uncover the firm level effects. Firstly, it is necessary to define the determinant of the export function. The firm's characteristics such as firm size, skilled labor; industry characteristics; technology, i.e. R&D expenditures, patents; FDI are the most common and most commonly used variables which are thought to determine the export decision.

To carry out a spatial econometric analysis, a priori assumption about spatial dependence is necessary. Mainly, two types of spatial dependence exist; either in the dependent variable or in the error term. The most popular test used to identify the spatial dependence is Moran's I test. Spatial econometric methods are totally different from the standard econometrics. For our analysis, it seems to be the most appropriate and most efficient technique to use.

CHAPTER 4

EXPORT IN TURKEY AND IN THE SAMPLE BY PROVINCES

4.1. Introduction

In this chapter, the export behavior in Turkey is studied by aggregated, macro level TURKSTAT data, (i.e. provincial level) and SMEDO micro level, (i.e. firm level). Data is analyzed by provinces and by OIZs for provinces in detail. Total export values by provinces which are declared by TURKSTAT have several bottlenecks discussed in this chapter. The firm level data collected by SMEDO also has disadvantages although it contains valuable information such as the location of the firm which allows us to make a spatial analysis of the firms located in OIZs. While analyzing, maps[43] are used to visualize both the situation and the distribution of Turkish exporters in provinces and in OIZs. With the help of the maps, the centers and the satellites can be easily identified.

[43] The maps are drawn by ArcGIS programme. For details about the programme, check http://www.esri.com/software/arcgis/index.html.

4.2. Export in Turkey

According to the trade profile of Turkey in the World Trade Organization (WTO) in April 2009[44], Turkey ranked 33rd level on the export list, but when intra-EU trade was excluded it ranked 22nd. Although it ranked quite high, its share in the total world exports was 0.77 in 2007. 79.6 percent of the exports were in the manufacturing industry in merchandise trade. 57.2 percent of the exports' destination was the European Union (27). (http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=TR)

The export share in GDP[45] with 1998 prices in 2002 and 2008 was 23.8% and 25.4%, respectively. The export volume of Turkey was 132 billion US dollars in 2008 and it was 102 billion US dollars in 2009. The decrease in exports was 23% for these years. The exports were 36 billion US dollars in 2002. Over seven years, the increase in exports was 183% which means it almost doubled.

4.2.1. Distribution of Export by provinces

The first five top exporters are shown at Table 4.1., were Istanbul, Bursa, Izmir, Ankara and Kocaeli both in 2002 and 2009 by the same rank ordering. More than 50% of the exports were carried out in the large province of Istanbul, which is the main center of production in Turkey. In 2002 and 2009, Istanbul was carrying out 58% and 54% of the total exports, respectively. In six years'

[44] All the figures are the latest avalibale ones.

[45] GDP is calculated with Expenditure Method - Share of Expenditure on the Gross Domestic Product at 1998 prices.

time, Istanbul increased its exports by 50 billion US dollars while the percent share in the total decreased by 3.78%.

In 2002, the sum of the five cities exports was 83.16% of the total exports while it was 80.04% in 2008. In 2009, this sum is equaled to 78.52%; this decreasing trend was seen in exports in the five major exporter provinces. Other cities also increased their share. Kocaeli and Ankara slightly increased their share when compared to total exports; the other three cities lost their shares in total, although all these five provinces at least doubled their exports in nominal terms.

Table 4.1: The first five provinces in export in 2009[46]

No	Province	US Dolars (000)	share(%)
34	Istanbul	55,541,325	54.39
16	Bursa	9,057,157	8.87
35	Izmir	6,117,777	5.99
6	Ankara	4,909,196	4.81
41	Kocaeli	4,557,639	4.46

Source: TurkStat

TurkStat data is collected from the Undersecretariat of Customs of Turkey. In Turkey there are eighteen[47] Head of Customs and Custody Offices[48]. The details about the data collection process is in Appendix 4.2..

[46] Detailed list of all provinces is in Appendix 4.1.1..

[47] Ankara, Antalya, Bursa, Edirne, Gaziantep, Gurbulak (Agrı), Habur (Sırnak), Hakkari, Hopa (Artvin), Istanbul, Iskenderun (Hatay), Izmir, Izmit, Malatya, Mersin, Samsun, Sinop and Trabzon

[48] In appendix 4.3., you can find the map of borderlines of Head of Customs and Custody Office. Except Ankara and Malatya, all the others are either borderline or coastline provinces.

In Map 4.1. [49,50]:, the statistical data are classified according to the NUTS3[51] and the darker color indicates the cities which have higher export values. Therefore, on the first level Istanbul comes first with $55,541,325 of the export capacity. Ankara, Izmir, Kocaeli and Bursa with $ 2,952,488 to $9,057,157 export capacity are on the second level. On the third level, there are Gaziantep, Hatay and Denizli with an export capacity of between $1,134,975 and $2,952,488. Adana, Mersin, Antalya, Kayseri, Konya, Eskisehir, Tekirdag, Aydin, Manisa, Kahramanmaras, Zonguldak, Trabzon, Mardin, Sirnak and Hakkari are on the fourth level with $ 364,675 to $ 1,134,975 export capacity. The remaining provinces of Turkey are on the last level with $19 to $ 364,675 export capacity.

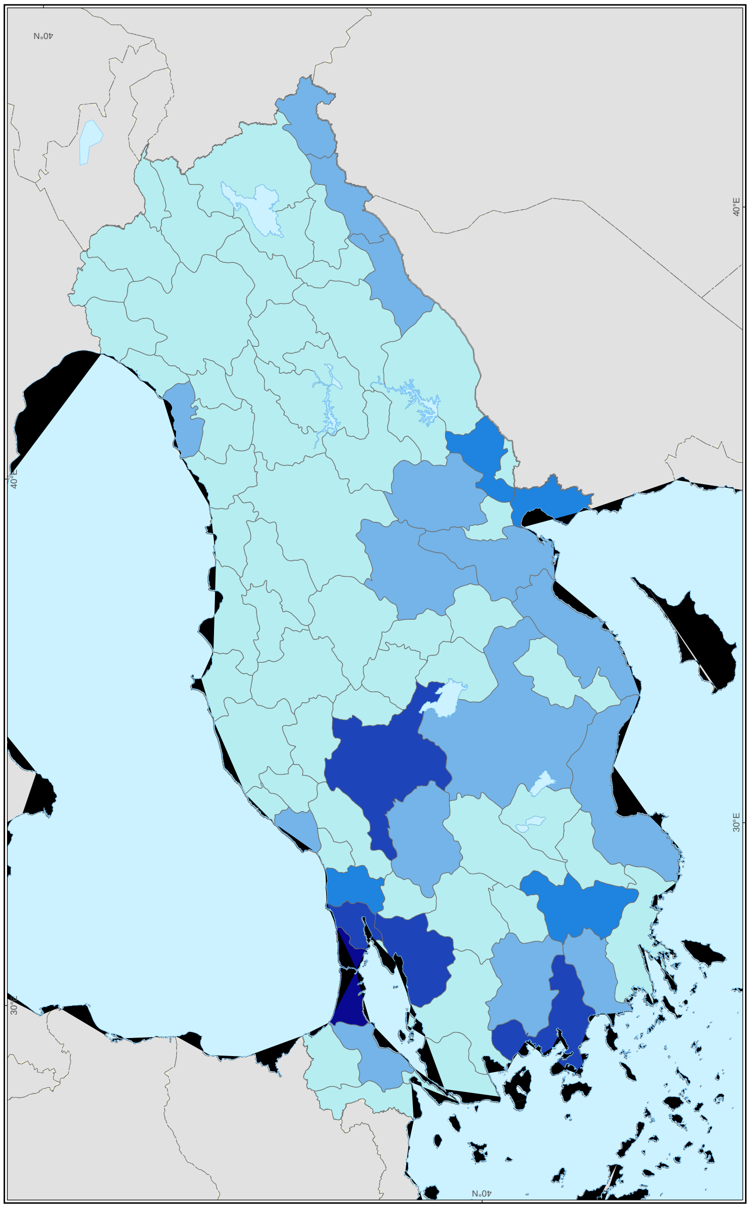
In the map, the first observation is the existence of the three hubs, Istanbul, Ankara and Izmir which are also the largest cities in terms of population in Turkey. The highest exporting provinces are either related to these hubs or located on the borders/seasides. Ankara is an interesting case in the sense that, it is not on the borders/seasides, but Ankara has the advantage of being the

[49] In appendix 4.4., there is the map with the name of the provinces.

[50] In ArcGıs programme, different methods are used for legend intervals; manual, equal interval, defined interval, quantile, natural breaks (jenks), geometric interval and standard deviation. In this thesis, natural breaks (jenks) with five classes are used as a mapping method. In ArcGis website, the method is defined as “Classes are based on natural groupings inherent in the data. ArcMap identifies breakpoints by picking the class breaks that best group similar values and maximize the differences between classes. The features are divided into classes whose boundaries are set where there are relatively big jump in the data values” (webhelp.esri.com/arcgisdesktop/9.2/index.cfm?topicname=natural_break_(jenks)) (Access date: 15.07.2012).

[51] NUTS classification is a standard European classification for data collection to compare the different states with same standard. Three basic classifications are used. For Turkey in NUTS1, there are 12 regions while in NUTS2 there are 26 sub-regions. NUTS3 is classified by provinces consists of 81 provinces of Turkey. For details of NUTS classifications, check http://tuikapp.tuik.gov.tr/DIESS/SiniflamaSurumDetayAction.do?surumId=164&turId=7 (Access date: 14.7.2012).

Map 4.1: 2009 Export Values (000 US $) (5 level)



Legend

TR_NUTS3

exp2009

- 19 - 364675
- 364675 - 1134975
- 1134975 - 2952488
- 2952488 - 9057157
- 9057157 - 55541325

Source: TurkStat

Table 4.2.: The first five provinces of highest value change in export between 2002 and 2009[52]

No	Province	US Dolars (000)
34	Istanbul	34,571,262
16	Bursa	5,600,641
6	Ankara	3,394,090
35	Izmir	3,340,010
41	Kocaeli	3,288,771

Source: TurkStat

The provinces which have the largest nominal values in exports inevitably increased their exports more than the other cities. The top five provinces which has the highest export volume is demonstrated at Table 4.2.. In this table, the increase for Istanbul over a six year period was almost the same for the initial level of total exports of Turkey.

At Table 4.3., the provinces which have the highest percentage change in exports are shown. When the highest percent change in exports are taken into account, the first five cities are those which have the smallest share in exports and they are all located in the south east region. The export value of Mus in 2009 was 94 times greater than the value in 2002. The top five cities increased their exports at least 20 times in seven years. The reason behind the increase in southeast region might be influenced by the invasion of Iraq by the USA:

[52] Detailed list of all provinces is in Appendix 4.1.2..

Table 4.3.: The first five provinces of highest percentage change in export between 2002 and 2009[53]

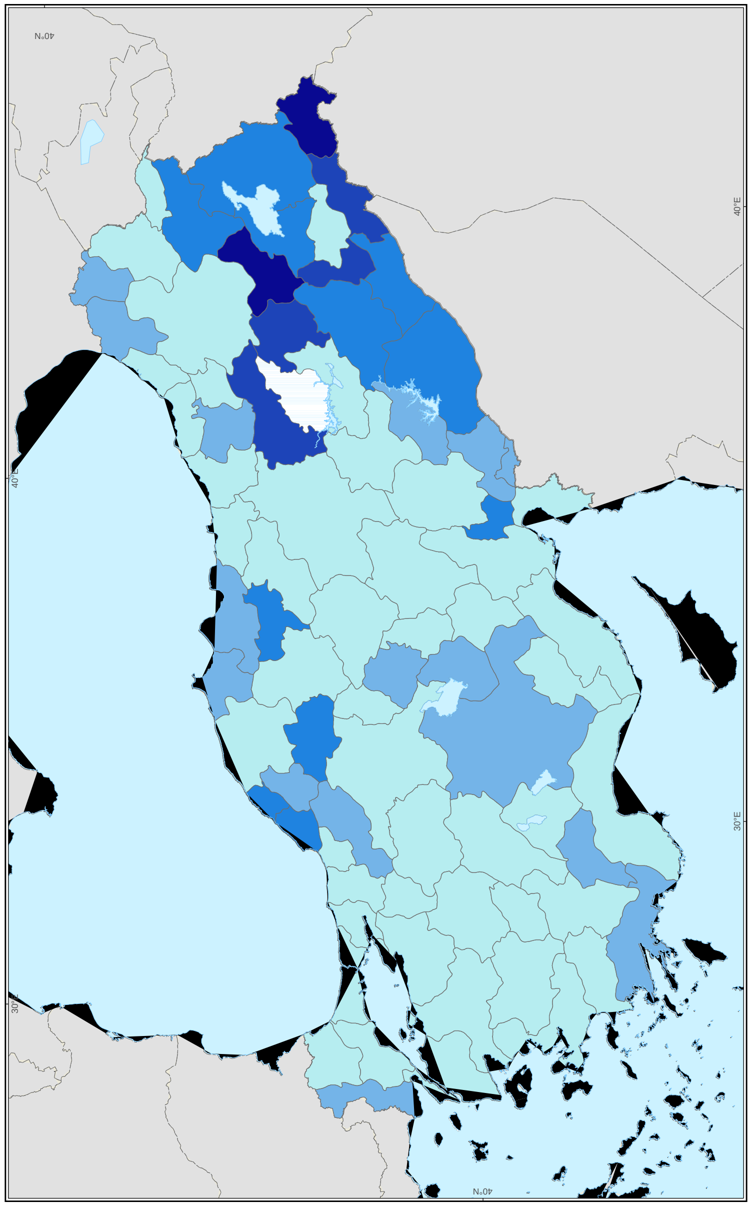
No	Province	%
49	Mus	9388.57
30	Hakkari	8128.14
12	Bingol	5178.57
73	Sirnak	2766.73
72	Batman	2597.83

Source: TurkStat

In Map 4.2., the statistical data are classified of NUTS 3 and indicates the changes in the export values of 81 cities of Turkey on the five levels between 2002 and 2009. The cities which have higher changes in exports are indicated by a darker color. On the first level, Mus and Hakkari showed the highest increase in percentages between 52% and 94%. Bingol, Sirnak, Batman and Erzincan constituted the second level with 22,5% to 52% in export rate changes. On the third level, the change rate differed from 3,5% to 9% for the following cities: Bartin, Zonguldak, Amasya, Cankiri, Osmaniye, Urfa, Diyarbakir, Mardin, Van, Agri and Bitlis. For the cities on the fourth level, the rates changed from %9 to %22,5. On this level, are Edirne, Bolu, Karabuk, Sinop, Samsun, Artvin, Ardahan, Gumushane, Konya, Aksaray, Kirsehir, Kilis, Gaziantep, Adiyaman, Mugla and Burdur. Lastly, on the fifth level, the change rates were between %-0,7 and %3.

[53] Detailed list of all provinces is in Appendix 4.1.2

Map 4.2.: Percentage Change in Export Values from 2002 to 2009



Source: TurkStat

In map 4.2., there is one main “cluster of provinces”, the provinces of the south east region. There might be more than one reason which explains this situation. One of the explanations is the easing of tensions between the minorities. As a result of some agreements, trust in the region has been established and border trade has increased. The other provinces, which are not in the south east region, are either the first or second wave[54] effect of the main centers - Istanbul, Ankara and Izmir- or border/seaside provinces. Mus is interesting in the sense that when compared to other provinces in south east; it has shown the greatest change.

Another reason which is revealed by the research of TEPAV (Dinccag and Ozlale, 2010) is the fall in the total export values in the EU market[55]. The share of the EU market is declining in total world trade in general. Because of this shrinkage in the EU market, in Turkey the government is conducting a trade policy to encourage diversity in the export market. Consequently there is a “shift in the axis” from the EU market to other markets especially in the Middle East.

Gaziantep altered its export position significantly by changing its share in total exports. Table 4.4. shows the first five provinces which have increased the share of their export in the total exports of Turkey. Kocaeli and Ankara, which are on the highest exporting provinces list, have increased their share in total. Sakarya is in the second wave of Istanbul and first wave of Kocaeli.

[54] First wave indicates the neighbours of the province; second wave means neigbours of the neighbours.

[55] In 2008-2009 period the share of EU in total world exports decrease from 48% to 46%. In this period also total world exports shrink 26% while Turkey’s share decrease27% compared to the previous year values because of the economic crisis in 2008.

Table 4.4.: The first five provinces of highest percent change in Export in 2009 ($\%X_{2009} - \%X_{2002}$)[56]

No	Province	%
27	Gaziantep	1.17
41	Kocaeli	0.94
6	Ankara	0.61
3173	Sirnak	0.54
54	Sakarya	0.50

Source: TurkStat

The increase in Sirnak and Sakarya is noteworthy. Sakarya has used its geographical advantage of being near to the hubs. Sakarya is in the first wave of Kocaeli and second wave of Istanbul. Sirnak's position can be explained by the increase in border trade.

To sum up, Istanbul is in a unique situation because more than half of the exports are carried out by this province while the share of the first five highest exporters is four fifths of the total exports. When the provinces which have the highest percentage change in export are analyzed, the provinces in the southeast region have the advantage mainly because of the "shift in the axis" in exports.

4.3. The sample

In this study, the data collected by Small and Medium Enterprises Development Organization (SMEDO) was used. The main aim of this organization is to

[56] Detailed list of all provinces is in Appendix 4.1.2

support SME's. In this study, "Field Research Survey"[57] which was collected by SMEDO to provide any assistance to the firms was used. This survey is restricted to those firms which have applied for assistance, so sample selection bias arises because the firms are not chosen randomly. The firms in the sample are those that applied for assistance from SMEDO might restrict our analysis. It is assumed that there are 250,000 SME's in Turkey according to TURKSTAT, in the SMEDO sample there are 62,137 firms which is almost one fourth of all the firms in Turkey. The coverage of the data wipes out the sample selection bias.

Since our main focus is on the exports, the position of the exports by the provinces is analyzed in detail with the help of the maps to visualize. Although no information about the export volume of the firms was available, the only eligible information to use was whether or not the firm exports.

The SMEDO data includes 62,137 firms from 24 industries in 81 provinces between 2004 and 2007. 62.87 % (39,065 firms) of it comes from the year 2004. The industries included in this study are in Appendix 4.5.. In this data only 33.42 % (20,767) of the firms are exporters while 66.58 % (41,370) of the firms are non-exporters.

Istanbul has the largest number of the firms whose location, i.e. whether the firm is in Organized Industrial Zone (OIZ), Small Industrial Zone (SIZ), etc., is specified. 28.6% of the firms are located in Istanbul. Bursa follows Istanbul by 9.1% then Ankara follows by 8.3%, Konya and Gaziantep follow by 3.9%. The largest five cities have 53.8% of the firms whose location is specified. Appendix Table 4.6. represents the distribution of firms according to provinces.

[57] The content of the data set is explained in fifth chapter in detail.

Table 4.5.: Location of the Exporters[58]

Location	Exporters	Non-Exporters	Total	Exporters Share (%)
OIZ	3407	5358	8765	39
SIZ	2355	8587	10942	22
TDZ	10	43	53	19
IZ	52	106	158	33
TP	34	87	121	28
STDC	5	68	73	07
EDC	7	42	49	14
Other	8901	19593	28494	31
Total	20471	39101	59572	34

Source: SMEDO - authors own calculations.

OIZ: Organized Industrial Zone, SIZ: Small Industrial Zone, TDZ: Technology Development Zone, IZ: Industrial Zone, TP: Technology Park/Technopark, STDC: SMEDO Technology Development Zone, EDC: Enterprise Development Center

Table 4.5. shows the number of firms according to their location. The largest share of the defined firms runs their operations in either organized industrial districts or in small scale industrial districts. 18.36 % and 14.71 % of the firms operated in OIZs and SIZs, respectively. 47.83% of the firms did not specify their location. 34 % of the firms claim that they are exporters. The number of exporters in OIZs is the only defined location which is higher than the average rate of exporters in Turkey.

[58] Detailed list of all provinces is in Appendix 4.1.4.

4.3.1. Export Behaviour by provinces

For the sake of accuracy, provinces which have less than ten observations are excluded from the analysis. For the robustness of the results, only 2004 data, which is 78 % of the sample was used. Only OIZ and SIZ have sufficient observations, thus, the analysis will focus on these two types.

Table 4.6.: The situation of the highest five exporter provinces[59]

No	Province	Number of Observation	Exporters (%)	Exporters (%) in OIZ	Exporters (%) in SIZ
34	Istanbul	10379	52.13	42.28	41.26
16	Bursa	4200	29.10	52.40	18.13
35	Izmir	1945	52.60	61.04	35.89
6	Ankara	3715	34.51	30.86	32.62
41	Kocaeli	308	50.33	72.50	27.27
	Turkey	39046	35.41	39.73	21.20

Source: SMEDO - authors own calculations.

In the macro data which was collected by TURKSTAT, the highest exporting five provinces were Istanbul, Bursa, Izmir, Ankara and Kocaeli. When we look at their positions (the share of exporters) in the sample, Istanbul, Izmir and Kocaeli have a higher proportion of exporting firms when compared to the average of Turkey as seen from Table 4.6.. On the average, in Turkey one out of three firms is exporting while in Istanbul and Izmir this proportion is one out of two. When we look at the positions of these five provinces in OIZs, except

[59] Detailed list of all provinces in the restricted (cleaned) sample is in Appendix 4.1.5.. For comparison, the detailed list of all provinces for unrestricted sample is in Appendix 4.1.4..

for Ankara, the four provinces have a higher number of exporters than the average for Turkey. The possibility of being an exporter is higher in OIZs than in the average of Turkey and also the average of the SIZs. In SIZs, the proportion of exporters is almost one out of five, which is very low. In Bursa, Izmir and Kocaeli, the proportion of exporters in OIZs is higher than the average of the provinces. On the other hand, in Ankara the average of exporters in total, OIZs and SIZs are lower than the country average. In Istanbul, Izmir and Kocaeli, the average of provinces are far higher than the average of Turkey.

When the SMEDO data is compared with macro data, being on the borders/seasides has an advantage for being an exporter. When examining the total values of exports, Ankara is on the highest exporter province list, but in terms of the number of exporters, it is far behind. This might be an indicator that, there might be several high volume exporting firms in Ankara which makes the value of the exports higher. Another reason is the larger production of technology intensive or high-technology products. But in general, the proportion of exporters is far less than the average of Turkey. This is also another indicator about the problem with the TurkStat data.

In Table 4.7, Istanbul has the highest observation rate in the sampling unit with 10379, % 52 of which are exporters. The second highest number of observations is seen in Bursa and then Ankara, Gaziantep and Izmir. Gaziantep is of particular importance as it ranks fourth in micro data and substitutes for Kocaeli which stands on the fifth level in macro data. Lastly, only Izmir and Istanbul have a position above the Turkish averages.

Table 4.7.: The provinces which have the highest observation in the sampling unit and their export share

No	Province	Number of Observation	Exporters (%)
34	Istanbul	10379	52.13
16	Bursa	4200	29.10
6	Ankara	3715	34.51
27	Gaziantep	1979	25.97
35	Izmir	1945	52.60

Source: SMEDO - authors own calculations.

In the sampling unit, when the provinces which have the highest exporting firm rates are checked, two provinces, Istanbul and Izmir, are on the top as seen at Table 4.8.. The province which has the highest proportion of exporters is Duzce. This province has exporters amounting to 57% of the 44 sampling units. This may be caused by the insufficient number of sampling units. However, as for Istanbul and Izmir, there are significant levels of observations, the situation is still interesting. In both cities, one out of two firms is an exporter. In the highest exporter rates, the first five provinces have an average of 50%. Except for Izmir, the other three provinces are the waves of Istanbul, i.e. they are neighbors of Istanbul or neighbors of the neighbors. From this list, the effects of Istanbul are obviously clear.

Table 4.8.: Highest export shares in the sample

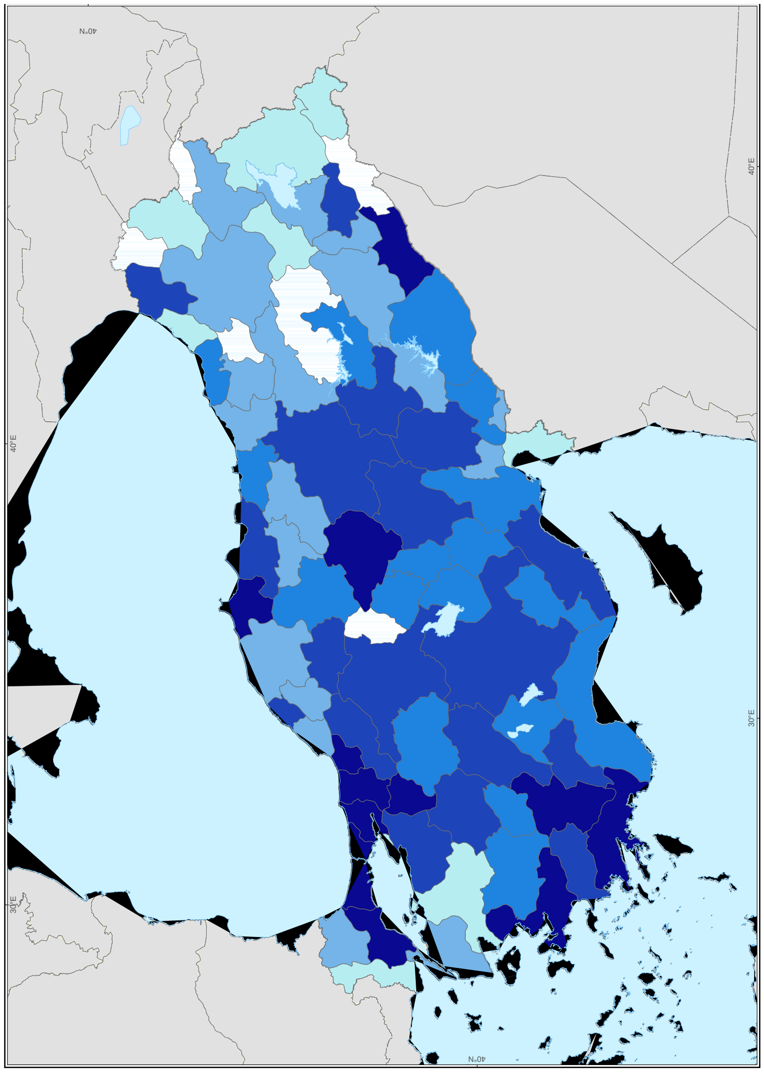
No	Province	Number of Observation	Exporters	Exporters (%)
81	Duzce	44	25	56.82
35	Izmir	1945	1023	52.60
34	Istanbul	10379	5410	52.13
54	Sakarya	119	60	50.42
41	Kocaeli	308	155	50.33
	Turkey	39046	13817	35.41

Source: SMEDO - authors own calculations.

Map 4.3. is drawn according to the proportion of the exporters in the sampling unit. The cities are listed on five levels and the cities which have more exporters are shown in a darker color. On the first level there are Istanbul, Kocaeli, Duzce, Tekirdag, Bilecik, Sinop, Izmir, Yozgat, Mardin, Mugla, Sakarya and Denizli which have 36% to 57% exporter proportions in the sampling unit. Then, on the second level are Artvin, Samsun, Bartin, Bursa, Kutahya, Afyon, Konya, Burdur, Mersin, Kayseri,

Sivas, Kahramanmaras, Malatya, Siirt, Ankara, Cankiri and Bolu which constitute 27% to 36% of the exporters. Adana, Antalya, Isparta, Manisa, Usak, Eskisehir, Karaman, Nigde, Aksaray, Nevsehir, Corum, Gaziantep, Urfa, Elazig, Ordu and Trabzon are on the third level and have 19% to 27% of the exporters. On the fourth level, there are Kirklareli, Canakkale, Zonguldak, Karabuk, Kastamonu, Amasya, Tokat, Giresun, Gumushane, Erzincan, Erzurum, Agri, Bitlis, Batman, Diyarbakir, Adiyaman, Osmaniye and Kilis with 11% to 19% of the exporters and lastly, Kars, Van, Hakkari, Hatay, Mus and Balikesir with 11% proportions of the exporters on the fifth level.

Map 4.3.: Proportion of Exporters in the sample (number of exporters (0,1)/ total number of firms)



Legend

TR_NUTS3

exp

- 0.000000 - 0.113924
- 0.113925 - 0.195652
- 0.195653 - 0.270492
- 0.270493 - 0.363636
- 0.363637 - 0.568182

Source: SMEDO - authors own calculations.

In this map, two clusters, Istanbul and Izmir, and three other provinces, Sinop, Yozgat and Mardin are easily observed. Except for Yozgat, the provinces which have the highest proportion of exporters are on the borders/seasides. Almost all of the second-level exporter provinces are either linked to the first or the second level provinces.

4.3.2. Export Behaviour in OIZ in the sample[60]

From the cluster literature, as far as we know, the firms which are geographically clustered are influenced by one another. The export behavior in Turkey and the provinces of Turkey are analyzed by maps to see whether or not they are virtually affected by each other. Due to unavailability of the data, the export behavior in OIZs in Turkey has not been analyzed yet. Our aim is to fill this gap and to map the export behavior in OIZs.

Table 4.9.: The provinces which has the highest observation number in OIZs

No	Province	Number of Observation	Exporters (%) in OIZs
6	Ankara	1941	30.86
34	Istanbul	1814	42.28
16	Bursa	292	52.40
38	Kayseri	268	47.02
35	Izmir	249	61.04
	Turkey	6068	39.73

Source: SMEDO - authors own calculations.

[60] For the situation in SIZs, check Appendix 4.7.

In the sample, only 6,068 firms specify their status as OIZs at Table 4.9.. 32% and 30% of the observations in the sample are from Ankara and Istanbul, respectively. The average proportion of exporters in OIZs is 39.73% while this proportion is 35.41% for the whole of Turkey. Except for Ankara, the other four provinces have a higher exporter proportion than the average exporter proportion in Turkey. In Izmir, this rate is 61.04%, which is very high.

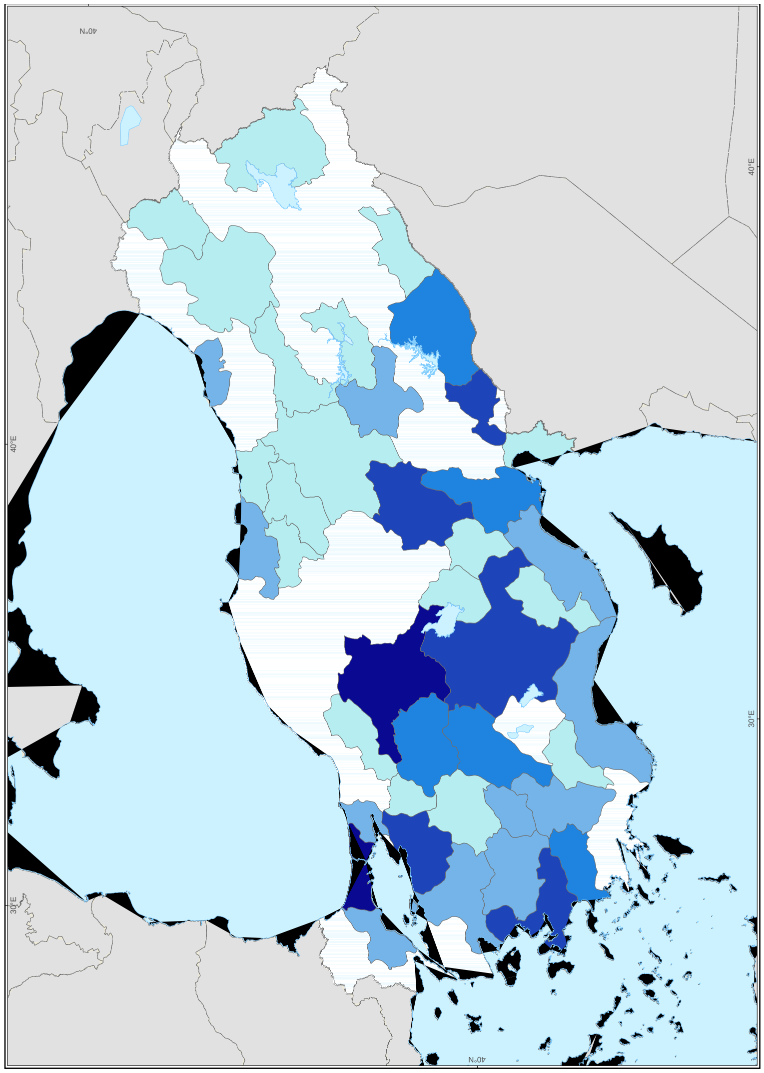
Table 4.10: The provinces which has the highest proportion of exporters in OIZs

No	Province	Number of Observation	Exporters (%) in OIZ
41	Kocaeli	40	72.50
11	Bilecik	19	63.16
35	Izmir	249	61.04
47	Mardin	11	54.55
31	Hatay	11	54.55

Source: SMEDO - authors own calculations.

The first five provinces which have the highest proportion of exporters in OIZs are Kocaeli, Bilecik, Izmir, Mardin and Hatay at Table 4.10.. The rate in these five provinces is higher than % 50. In Kocaeli, the rate of exporters is 72.5% but the problem is that there are only 40 observations. On this list, three provinces have observations between 11 and 19. This makes the shares biased.

Map 4.4.: Number of Observations in OIZs



Legend

TR_NUTS3

expfirmOSB

- 11 - 26
- 26 - 49
- 49 - 82
- 82 - 292
- 292 - 1941

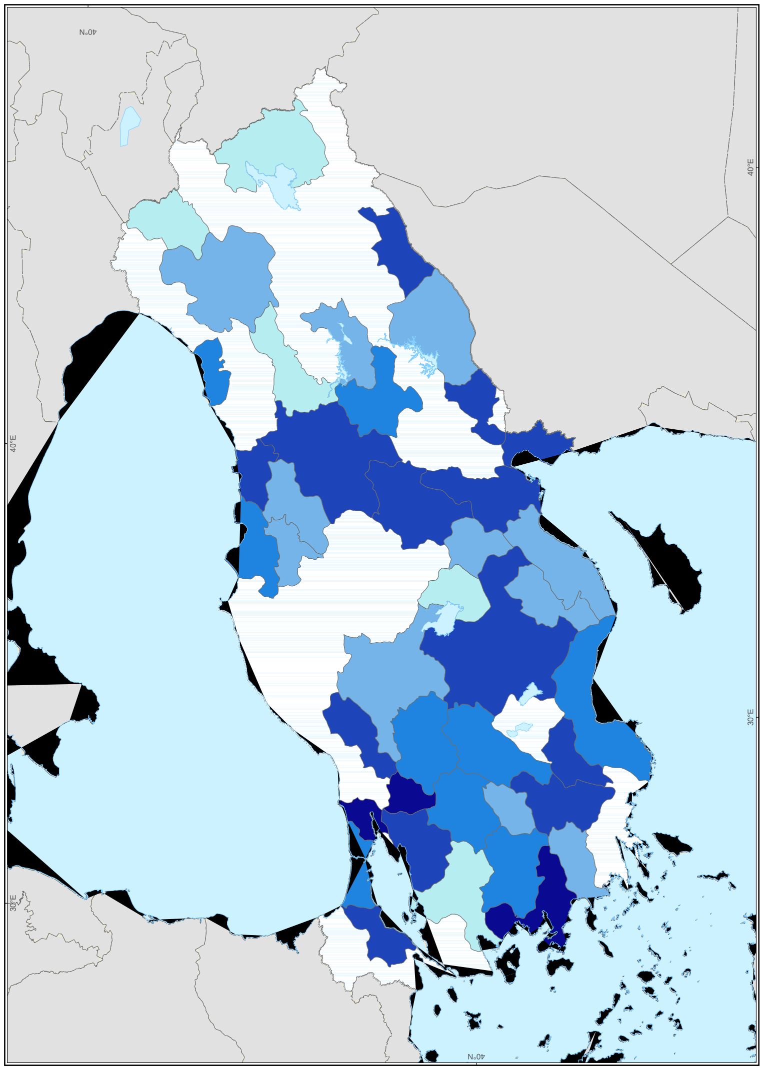
Source: SMEDO - authors own calculations.

Ankara and Istanbul have the highest observations among the sampling units in Map 4.4. and they constitute the first level. On the second level, there are İzmir, Bursa, Kayseri, Konya and Gaziantep with observation values of 82 to 292. Aydin, Eskisehir, Afyon, Adana and Urfa with 49 to 82 observation values are on the third level. As for the fourth level, there are Trabzon, Samsun, Malatya, Antalya, Mersin, Manisa, Denizli, Usak, Balikesir, Tekirdag and Kocaeli with 26 to 49 observation values and lastly, on the fifth level there are Van, Erzurum, Kars, Erzincan, Sivas, Tokat, Amasya, Karaman, Nigde, Aksaray, Burdur, Kütahya, Bilecik and Bolu which have 11 to 26 export firms in their organized industrial regions.

The first OIZs founded in large cities have more exporting firms than the others have. In addition to this, the number of the observations in these large cities is higher than for the others, especially for Istanbul and Ankara. On the second level, the cities are those that have relatively developed manufacturing industries.

Map 4.5. indicates the proportion of exporters in the OIZs. Kocaeli, Bilecik, and Izmir have the highest rate of export in the OIZs by 54,5% to 72,5%. On the second level, there are Tekirdag, Bursa, Bolu, Denizli Burdur, Konya, Adana, Kayseri, Sivas, Ordu, Hatay, Gaziantep and Mardin with 42,4% to 54,5% proportions. Istanbul, Manisa, Eskisehir, Afyon, Antalya, Malatya, Samsun, Kutahya and Trabzon have 33,3% to 42,4% proportions and constitute the third level. With the proportion of 16,7% to 33,3% the fourth level have the cities of Ankara, Amasya, Tokat, Aydin, Usak, Karaman, Mersin, Nigde, Urfa, Erzurum and Elazig. Lastly, on the fifth level, there are Van, Kars, Aksaray, Erzincan and Balikesir with 8,3% to 16,7%.

Map 4.5.: Proportion of Exporters in OIZs



Legend

TR_NUTS3

expOSB

- 0.083333 - 0.166667
- 0.166668 - 0.333333
- 0.333334 - 0.424242
- 0.424243 - 0.545455
- 0.545456 - 0.725000

Source: SMEDO - authors own calculations.

As it can be seen from the map, the cities which have the highest proportion of exporters are Izmir's or Istanbul's second or third wave cities. The four cities on the second level draw a boundary as if separating the east and the west of Turkey.

4.4. Summary

In 2002[61], there were 1,720,598 enterprises in Turkey, 14.35% of them were in the manufacturing industry which had 246,899 enterprises. 24.87% of these enterprises were in Istanbul. After Istanbul, Izmir and Ankara follow with 6.99% and 6.92%, respectively. In the manufacturing industry, employment capacity was almost 2 million (KOSGEB, 2005).

In our sample, there are 59,572 enterprises from the manufacturing industry. The sample represents almost 24.13% of all firms in Turkey, i.e. one out of four firms is included in the sample. This shows that the representative capacity of the data is very high.

In general, Turkey's export data according to WTO (2009) illustrates that Turkey ranks as 32nd in the world with share of 0,821% which amounted to $132 billion in 2008[62]. In 2008, the volume of exports constituted 25,4% of the GDP. When compared to the numbers in 2002, Turkey doubled her export rates over 7 years.

[61] The last "General Census of Industry and Business Local Units" is done at 2002 by TURKSTAT.

[62] As we use 2004 values in SMIDO sample, in 2004, Turkey ranks 34^{rt} with 0,69% share and $ 63.1 billion (WTO, 2005).

As for the export volumes of the provinces, the first five provinces with the highest export rates (namely Istanbul, Bursa, Izmir, Ankara and Kocaeli) had 78,52% export volume according to 2009 data. Only Istanbul constituted more than half of the Turkish export volume with a proportion of 54,39%. It was obvious that it was a biased situation. When the overall changes in the export volumes were examined, the first five cities with the highest export rates did not change, but their ranks changed. However, in some cities the percentage change in the export differed from the export volumes ranking table. Mus, Hakkari, Bingol, Sirnak and Batman had the highest increase in change in export percentage. Mus experienced a drastic change in export proportion when it boosted her export 93 times from 2002 to 2009. Gaziantep is also considered as a champion for increasing its share in the total export volume of Turkey by 1,17%.

SMEDO sample consists of 62,137 firms from 24 industries and 81 provinces and in this sample 33.42% (20431 out of 59572 where the firm specifies its location) of the firms define themselves as exporters. In our sampling unit, 18,36% of the firms are located in the OIZs and 39% of these firms are exporters.

As far as the provinces are concerned, the firms located in the OIZs in Bursa, Izmir and Kocaeli have more proportion of the export rate than other firms in the same cities. Whereas, the situation is vice versa in Ankara and Istanbul. Overall, the firms located on the OIZ have a higher proportion of exportation rates than the ones outside the OIZ. One of the main problems of the sample is that 52.13% of the observations come from Istanbul. Istanbul has a unique situation because 27.65% of the gross value added[63] is produced and 17.96% of the labor force[64] is in Istanbul.

The border/seaside provinces have a greater chance to export. From one perspective, as Rauch (1991) stated not only wage rates, but also the city sizes decline monotonically as we moved inland. From another perspective, on the border the distance between the two countries are shorter and also on the seaside there is a chance to use shipping routes. The location of the province greatly affects the possibility of the firm's export. Another perspective is that if a firm decides to export from the establishment, it prefers border/seaside provinces. In both senses, propensity to export and geographic location affects each other.

The main difference between two (TURKSTAT and SMEDO) samples is explained by the position of Ankara. According to total export values, Ankara stands among the champion cities; however it is far behind most provinces as far as the proportion of exporters are concerned. This is the point of this thesis. The advantage of using micro-level data is that it also covers the effects which we cannot catch with the macro data. Ankara has the advantage of being the capital city and some large firms make the export value higher but especially in SMEs, the rate of exporters are lower than the average of Turkey.

[63] Regional gross value added at current basic prices, 2008.

[64] Labor force status by non institutional population [15 age and over], 2010.

CHAPTER 5

ECONOMETRIC ESTIMATION RESULTS

5.1. Introduction

In this chapter our main aim is to test the hypothesis of spatial dependence in OIZs in Ankara and Istanbul with the spatial econometric tools. First of all, the data set which we will use will be explained briefly. Then, we clarify the variables that we are going to use for the econometric estimation. Before going into the details of the micro and the spatial econometric estimation, we will demonstrate the summary statistics of the variables. Our main econometric tool is the spatial one although we also estimated the model with the micro econometric estimation methods to show our contribution which is to show the importance and effect of neighboring units in OIZs. Finally, we conclude and compare the results in the final section.

5.2. The SMEDO Data

In the fourth chapter, we briefly explained the data set which was collected by Small and Medium Enterprises Development Organization (SMEDO) and virtualize the dependent variable, export decision, with maps. In summary, the data set consists of 62,137 firms from 24 industries[65] in 81 provinces between 2004 and 2007.

The survey called “Field Research Survey[66]” has eight parts with 14 pages and 133 questions without the sub-ones. In the first part, the questions are addressed to the administrator and the owner of the firm. The second part poses questions about the firm including the location, establishment date, product, capital, labor, number of equipments, number of computers, export volume, exporting countries and information about the bank credits used by the firm. In the third part of the questionnaire, questions are asked about “the systems and the process” such as to whether or not the firm performs technological R&D, analysis of SWOT (Strengths, Weaknesses, Opportunities, and Threats), cost accounting and inflation correction.

The fourth part is concerned with outsourced services. It is asked whether or not the firm has used any consultancy or training about marketing, export, total quality management, human resources or distribution. Questions about the performance of the firm are asked in the fifth part. It was investigated as to whether sales, exports, the number of customers, costs of products, competitiveness or paid taxes are increasing, decreasing or constant. In the sixth part of the questionnaire, questions are asked to discover whether or not there is any need to improve technology, to decrease the cost of product, to hire skilled labor, to train for administrative personnel or to improve the quality of the firm.

The seventh part of the survey consists of questions about clustering. It is requested to specify the location (either same industrial zone or same city or

[65] Detailed list of industries can be found in Appendix 4.5..

[66] Full questionnare can be found in Appendix 5.1.

different city or foreign country) from where the firm buys its machinery, inputs, and auxiliary equipment. In the last part, the firm is questioned about its membership in professional organizations.

The answers of the survey might be either binary or natural numbers. Some of the questions have answers with monetary values. The greatest difficulty of this dataset that is the responses of the questionnaire put into the computer by different individuals because of the scope of it. Each SMEDO enter the data themselves which causes the problem of no standardization of the data. Another difficulty also comes from a regulation about the monetary market. From 1 January 2005, six zeros were dropped from Turkish lira as transition to new Turkish lira. The data with monetary values are not suitable for using due to the inconsistency[67] that exists. This inconsistency might be from either too many individuals that spoil the broth or just misspelling.

Although the reliability of the survey is ambiguous, it is a unique data set on the firm level where information about the firms' location is available. To analyze the OIZs in Turkey, to our knowledge, this dataset is the available and most appropriate. For to this reason, it makes the analysis also unique and valuable.

5.2.1 Definition of variables

In chapter 3, the literature on export function is summarized briefly. Moreover, in chapter 4, the export behavior in the sample is visualized with the help of the maps. The variable of concern in this study is the export decision of the firm.

[67] For some firms, the production quantity is higher than the GDP of Turkey. For some firms, the production level is lower than the average wage for one month. Of course the latter is still possible. The cut point between the misspelled data and the normal data is not recognized explicitly.

From the firm level studies, the determinants of export function are summarized in five main headlines; characteristics of the firm, technology, characteristic of the administrator, other variables which are research specific variables and dummies.

$$X = f(Chr_{firm}, Tech, Chr_{administrator}, Other, Dummy) \qquad (5.1)$$

In export function studies on the firm, either the decision or the volume of exports is used. As we stated earlier and explained briefly, the monetary values of the variables are not accurate. Although the proportion of the exports to the total production in the sample is available, there is not much data left after the cleaning process. The variable on export decision is not only accurate to use, but also logical for analyzing the knowledge spillovers. The volume of exports of neighboring firms is not as important as the number of neighbors who performs exports. This is mainly due to the large firms around and MNEs. The larger the firm, the larger the export level is. The higher volume of exports of a neighboring firm might mislead the results. The main concern is here whether or not the neighboring firms know how to export. The dependent variable is the export decision of firms:

$$X = \begin{matrix} 1, \text{when } x_q > 0 \\ 0, \text{when } x_q = 0 \end{matrix} \qquad (5.2)$$

where X is the export decision and x_q is the volume of exports of a firm.

The most important and indispensable part of the export function is the part which defines the characteristics of the firm. Firm size has a special importance in export function; there is an abundance of literature on this relation. Firm size is generally proxied by the employment level, i.e. number of labor. There are also other proxies such as total sales or capital intensity. The positive sign of this variable indicates economies of scale (or scale advantage), i.e. big firm advantage. Another variable which is used to define the characteristics of the firm is the number of years that the firm has been in business. New firms are more risky and more market oriented than the older firms, although older firms have the advantage of having established relationships and networks to reach the necessary knowledge. Productivity, efficiency and capital-related variables are also used. In the calculation of productivity, either the total production or the value added per worker is used.

As we try to avoid using monetary values, to define the characteristics of the firm, LNAGE (logarithm of age of the firm or years in business), LNLAB (logarithm of total labor for firm size) and HSLAB (high skilled labor) is used. When the sign of the LNAGE is positive, it indicates that the older firms have an advantage for exporting and vice versa. If the coefficient of the LNAGE variable is insignificant, this basically means that newly formed firms have the same chance to export as the old firms. According to economies of scale hypothesis, it is expected that the sign of LNLAB is positive. According to the skill-based technological change hypothesis, skilled labor triggers technological change which fosters productivity. As more productive firms are expected to export more, the sign of the HSLAB variable which is university graduates over total labor is positive.

Although different proxies are used for technology, on every level of the study related to export, either macro or micro or meso level, technology is an inevitable variable in estimating the propensity or the decision of exports. In macro studies, the main proxy for technology is patents which are also used in meso or micro level studies. Product or process innovation is used in addition to the R&D expenditure in firm level studies. In the existing literature, findings are ambiguous about the relationships of the exports and the R&D expenditures. While this relation is positive for a developed country (Germany) (Wagner, 2001), it is negative for a developing country (India) (Lall and Kumar, 1981).

Three different variables are used as a proxy or technology. In the questionnaire, questions are asked about whether or not the firm has any PLC (programmable logic controller), CNC (computer numerical control) or robot. It summed up each "yes" answer to constitute the first technology proxy, the PLCNCR. The second technology proxy is TMPUM which is a binary variable. The firms were asked whether or not they had a trade mark, patent or useful model. The last variable for technology is computer usage (COMPUSE) calculated from the question of whether or not the firm uses computers in production, design and research. All the expected signs of technology proxies are positive.

At the firm level studies, the characteristics of the administrator are also used as exogenous variables in the export function especially the "familiarity with the language of the foreign market". The education level (EDUCA) and the foreign language knowledge (FORLA) of the administrator are chosen as the characteristic of the administrator. Expected signs of these two variables are positive.

In the literature, there are also variables which are research or paper specific such as government export incentive, policy factor, advertising and promotion. In this study, it is used three extra variables not specified in the main headlines, SMEDO (SMEDO incentives), ORGPROX (organizational proximity) and CLUSTER (cluster proximity). SMEDO is a binary variable which indicates whether or not the firm uses any credit or incentives from the SMEDO.

ORGPROX is constructed from how many professional institutions the firm is member of. In the questionnaire there are six questions in which the firm has to identify five firms they are in close relationship with and also the location of these firms whether or not they are in the OIZ, in the same province, a different province or outside the country. These six questions ask; i) where the firm bought it machineries and equipments, ii) where the firm bought its spare parts, iii) where they employed maintenance services, iv) where the firm bought its inputs, v) where the firm sold out it products, vi) where its competitors are. When the firm asserted that it bought any of them from OIZ, it is counted as one. The maximum for this variable is thirty. It is expected that SMEDO and ORGPOX variables are positively effecting the export decision although it is ambiguous about the CLUSTER variable due to its close relations with the OIZ made the firm embedded in OIZ or in the province but for sure in the country.

Two types of dummies are used. One is sectoral, the other is location dummies. As we focus on the export decision, the location of the firm also matters. It is a two-sided question of either the exporting firm chooses border or seaside provinces or the firm which is on the border or seaside prefers outside markets. Whatever the answer is, being on the border or on the seaside totally affects the export behavior as it is virtualized by maps in the fourth chapter. While twenty eight provinces[68] are on the seaside, only fifteen[69] of the provinces are on the border.

[68] Kirklareli(39), Edirne(22), Tekirdag(59), Canakkale(17), Istanbul(34), Kocaeli(41), Sakarya(54), Duzce(81), Zonguldak(67), Bartin(74), Kastamonu(37), Sinop(57), Samsun(55), Ordu(52), Giresun(28), Trabzon(61), Rize(53), Artvin(08), Hatay(31), Adana(01), Mersin(33), Antalya(07), Mugla(48), Aydin(09), Izmir(35), Balikesir(10), Bursa(16), Yalova(77).

[69] Kirklareli(39), Edirne(22), Artvin(08), Ardahan(75), Kars(36), Igdir(76), Agri(04), Van(65), Hakkari(30), Sirnak(73), Mardin(47), Sanliurfa(63), Gaziantep(27), Kilis(79), Hatay(31).

Table 5.1.: Summary of the definition of variables

Variable Name	**EXPLANATION**
Dependent	
EXP	Export decision
Characteristics of the Firm	
LNAGE	Logarithm of age of the firm
LNLAB	Logarithm of total labor
HSLAB	High Skilled Labor
Technology level of the Firm	
PLCNCR	To have PLC, CNC and robot
TMPUM	To have trade mark, patent and useful model
COMPUSE	Computer usage in production, design or research
Characteristics of the Administrator	
EDUCA	Education Level of Administrator
FORLA	Foreign Language Knowledge of the Administrator
Other	
SMEDO	Usage of SMEDO incentives
ORGPROX	Organizational Proximity
CLUSTER	Cluster Proximity
Location Dummies	
BDUM	Dummy for Provinces which are on the Border
SDUM	Dummy for Provinces which are on the Sea
Pavitt Sector Dummies	
DSD	Dummy for Suppliers Dominated Industries
DSI	Dummy for Scale Intensive Industries
DSS	Dummy for Specialized Suppliers Industries
DSB	Dummy for Science Based Industries

The second type of dummies used is related to the sectoral division of observations according to Pavitt taxonomy (Archibugi, 2001: Castellacci, 2008). All the industries are divided into four; suppliers-dominated (DSD), scale intensive (DSI), specialized suppliers (DSS) and science based (DSB). Detailed division of industries according Pavitt Taxonomy is in Appendix 5.2..

In Table 5.1., all the variables chosen for analysis are summarized. In the literature, one of the important headlines is foreign direct investments (FDI) and multinational enterprise (MNE) relations of the firm. In macro studies, FDI is not only important for export function, but it also is a major component in the knowledge spillovers. For micro or firm level studies percent of the foreign ownership is a suitable variable. Furthermore, relations with geographically or economically close MNE are essential in the decision-making process of the firm. Unfortunately, no information about these issues is available in the data.

5.2.2. Summary Statistics of the variables

In our study, one clean and two subsets of data[70] from these clean data are used. The main data set includes all the available firm level data in Turkey. The two subsets are restricted to OIZs for one city. The highest number of OIZ data belongs to Ankara and Istanbul which are chosen for analyzing.

[70] One of our sub-goal is to make an analysis on the sectoral level. The data on Turkey is aggreagated both ISIC level 3 and Pavitt taxonomy on the province level. Although the data and the weight matrices are formed, the technique is not enough to make the spatial analysis. In the MATLAB code for spatial tobit, bugs exist. After the bugs are corrected, the results on these two aggregated data set are not significant for any variable. The results are not trustworthy to represent here. The analysis on aggregated both on ISIC level 3 and Pavitt taxonomy is excluded in this study.

Before summarizing the statistics of the dataset, it is necessary to explain the cleaning process. In the uncleanned data set, 62,137 observations from 2004 - 2007 are present[71]. 62.87% of the 39,065 observations is from the year 2004. Only 2004 data was used for two reasons; the first reason is that there is a low probability that a firm might apply to the SMEDO incentives more than once. The second reason is to avoid the annual effects, for instance changes in the exchange rate.

In the 2004 data, 1,330 firms did not declare their industry while 6168 of them did not specify their location. Only one of the firms had a labor force larger than 249 meanwhile, 1,022 firms did not state their labor force. When the age of the firm was smaller than 0 or higher than 100, these observations were treated as misspelled. Lastly, detailed labor force information was compared with the total labor. Any inconsistent data was dropped. Finally, after this cleaning process 25,869 observations remained. Both the dependent and the independent variables were present in 24,214 observations.

First of all, the summary statistics is demonstrated for cleaned data with 24,214 observations. Then, the summary statistics of two subsets of this data belonging to Ankara (1,545 observations) and Istanbul (1,172 observations) OIZs are represented.

5.2.2.1. Summary statistics for the whole sample

The first sample of our analysis covered the whole of Turkey after the cleaning process. In Table 5.2., the summary statistics are demonstrated. 29.78% of the firms declare that they perform export. The average age of the firms is 10.93.

[71] The distribution of the data by years is available in Appendix 5.3..

Table 5.2.: Summary statistics for the cleaned sample (# of obs:24214)

Variable	Mean	Std. Dev.	Min	Max
exp	0.2978	0.4588	0	1
age	10.9361	9.9563	0	84
lnage	2.0607	0.9556	0	4.4308
lab	16.1881	22.902	1	243
lnlab	2.1496	1.1148	0	5.4931
hslabor	0.0806	0.1528	0	1
plcncr	0.2983	0.5683	0	3
tmpum	0.3275	0.4693	0	1
compuse	0.9315	1.0670	0	3
smedo	0.0647	0.2460	0	1
orgprox	1.3284	0.7816	0	8
cluster	1.3094	2.4811	0	30
educa	1.9657	0.9220	0	5
forla	0.4732	0.6271	0	5
dsd	0.5938	0.4911	0	1
dsi	0.2169	0.4121	0	1
dss	0.1281	0.3342	0	1
dsb	0.0612	0.2397	0	1

The oldest firm is 84 years old. While 56.16% of the age of the firms is less than 10, 5.08% of are newly established firms, i.e. the age of the firm is less than 1. The average firm size is 16.19 and the maximum firm size is 243. On the average, 8.06% of the total labor was made up of college graduates. 75.05% of the firms do not have any PLC or CNC or robot. Meanwhile, 21.03% of the firms have at least one of them. 32.75% of the establishments own either a trade mark, patent or useful model. 47.93% of the firms do not use computers for the purpose of production, design or research. 6.47% of the firms used incentives from SMEDO.

66.30% of the firms are a member of at least one professional organization. 57.71% of the establishments do not have any inter-connection with the OIZs. While 59.18% of administrators do not speak any foreign language, 35.41% speak only one.

The highest proportion of the firms with 59.38% is from supplier-dominated industries. The second highest one with 21.69% is from scale-intensive industries. Specialized supplier industries are only 12.81% of the total numbers of firms. Only 6.12% of the firms are from science-based industries.

The correlation between the independent and the dependent variables are in Appendix 5.4.. According to pairwise correlations, the cluster variable is negatively correlated with all the variables. This is a reasonable fact because closer relationships with a cluster either makes the firm a part of the supply chain or fosters sell out their products to the local market. The second variable which has negative correlations is the age of the firm. AGE is negatively related to high skilled labor (HSLABOR), computer usage (COMPUSE) and foreign language knowledge of the administrator (FORLA). It is also logical because as the firm is younger, it is both more willing to hire high skilled labor and use more computers in production, design or research.

T-tests are calculated to compare the significance of the difference in variables between the exporters and the non-exporters. A detailed table is in Appendix 5.5.. According to these tests, the difference between the exporters and the non-exporters is totally significant. Except for the cluster variable, all other variables (average age; average firm size; percent of high skilled employment; usage of PLC, CNC or robot; ownership of trade mark, patent or useful model; computer usage; usage of SMEDO incentives; membership in professional organizations; educational level of administrator and knowledge of foreign language) are in favor of the exporters.

The average firm size of exporters is 17.15 although it is only 6.31. for the non-exporters. Having a trade mark, patent or useful model is doubled for exporters. In fact, half of the exporters own one of them. The explanation for signs of clusters is to increase the ability to export; the firms need relations or connections outside the OIZs. Actually, cluster variables will show us the importance of a formal relationship. On the other hand, the spatial econometric analysis of an export decision on the firm level shows the importance of informal relationships and also the importance of competitiveness.

Since the main hypothesis of this study is on OIZs; to understand the dynamics of OIZs, the summary statistics for OIZs in the sample is presented in Table 5.3.. 4,457 firms declare that they produce in OIZs in the clean data. The exporters' proportion is higher in OIZ (39.35%) than in the whole sample (29.78%). The average firm size is higher in OIZ with 19.89 rather than 16.19. High skilled labor is also slightly higher in OIZs. All of the variables including the independent ones are higher than for the whole sample. The sectoral distribution is slightly different in OIZs. The proportion of specialized supplier industries is higher in OIZs than in the whole sample although supplier-dominated industries are still dominant with 43.98%.

Table 5.3.: Summary statistics for the OIZs in the sample (# of obs: 4457)

Variable	**Mean**	**Std. Dev.**	**Min**	**Max**
exp	0.3935	0.4886	0	1
age	10.2587	9.1860	0	70
lnage	2.0210	0.9310	0	4.2485
lab	19.8856	26.2721	1	150
lnlab	2.3555	1.1285	0	5.0106
hslabor	0.0929	0.1452	0	1
plcncr	0.3473	0.6052	0	3
tmpum	0.3467	0.4759	0	1
compuse	1.1707	1.1117	0	3
smedo	0.0924	0.2896	0	1
orgprox	1.3567	0.8368	0	8
cluster	2.3550	3.4654	0	27
educa	2.1647	0.9116	0	5
forla	0.5118	0.6230	0	4
dsd	0.4398	0.4964	0	1
dsi	0.2823	0.4501	0	1
dss	0.2167	0.4120	0	1
dsb	0.0612	0.2398	0	1

The correlation between the variables are presented in Appendix 5.6.. As in the whole sample, in this sample, not only is the cluster variable negatively correlated with all the variables, but also there is a negative correlation between the age and the high skilled labor. Different from the whole sample, instead of negative correlation between the age and the computer usage, there is a negative correlation between the logarithm of the total labor and the share of high skilled labor.

5.2.2.2. Summary statistics for Ankara OIZ data

In SMEDO data, the highest number of observations from OIZs belongs to Ankara. After the cleaning process, 1,545 observations remained for analyzing. In Table 5.4., the statistics for the variables are summarized. The exporters' rate is 29.64% which is approximately the same as the whole sample. The average age of the firms is 9.41 which is lower than the whole sample. The average firm size of the Ankara OIZ is 8.80 while in the whole sample it is 16.19. The rate of high skilled labor to total labor is 9.29% while 82.46% of the firms do not use any PLC, CNC or robot in Ankara OIZs. One fifth of the firms have either a trade mark, patent or useful model. In Ankara OIZ data, the firms have less of not only PLC, CNC and robot but also less trade marks, patents and useful models than the whole sample. The average of the cluster variable is stronger in OIZs. The firms in OIZs prefer to interact geographically with nearby firms.

The distribution of firms according to their sectors shows that Ankara OIZs are more specialized in scale-intensive and specialized-suppliers industries with 33.27% and 34.56%, respectively. The share of science-based industries is the same as the whole sample. In the whole sample, 59.38% of the firms operate in scale-intensive industries while this rate is only 25.70% for Ankara OIZ firms.

The correlations between the variables are given in Appendix 5.7.. As in the sample, the cluster variable is consistent and negatively related to the dependent and the independent variables. Except for the cluster variable, the only negatively correlated pair is the age and the high skilled labor. As we explained earlier they are meaningful.

Table 5.4.: Summary statistics for Ankara OIZ data (# of obs: 1545)

Variable	Mean	Std. Dev.	Min	Max
exp	0.2964	0.4568	0	1
age	9.4136	8.8952	0	53
lnage	1.9465	0.9576	0	3.9703
lab	8.7987	10.9523	1	143
lnlab	1.7384	0.8966	0	4.9629
hslabor	0.1013	0.1714	0	1
plcncr	0.2071	0.4867	0	3
tmpum	0.2013	0.4011	0	1
compuse	1.1761	1.1735	0	3
smedo	0.0602	0.2379	0	1
orgprox	1.2162	0.6222	0	5
cluster	4.3676	4.5232	0	27
educa	0.9871	1.9111	0	5
forla	0.3961	0.5677	0	3
dsd	0.2570	0.4371	0	1
dsi	0.3327	0.4713	0	1
dss	0.3456	0.4757	0	1
dsb	0.0647	0.2461	0	1

The t-test results are given in Appendix 5.8.. Except for the cluster variable, all the differences are in favor of the exporters. All the pairwise t-tests are significant which indicates that for all the variables the means of exporters are higher than for the non-exporters except cluster.

5.2.2.3. Summary statistics for Istanbul OIZ data

In SMEDO sample, Istanbul is the second highest province with OIZ data. In a cleaned sample, 1,172 firms declare that they produce in OIZs in Istanbul. The summary statistics for this data set are presented at Table 5.5..The rate of exporters is almost fifty percent higher than not only the average of Turkey, but also the Ankara OIZs. Almost half of the firms (45%) in OIZs do exporting in Istanbul. The average age of the firms is one year older than the Ankara OIZs with 10.43. Although the average firm size is 8.80 in Ankara OIZs, this rate is 18.18 for Istanbul OIZs. It is also higher than the average of Turkey which is 16.19. The rate of high skilled labor is 9.84 % which is lower than the Ankara data but higher than for the data for Turkey. In Istanbul OIZs, 71.84% of the firms do not have any PLC, CNC or robot while this rate is 82.46% for Ankara. More than one third of the firms own either a trade mark, patent or useful model nevertheless, this rate is only one fifth of the firms in Ankara. The average usage of SMEDO incentives in Istanbul is equal to Ankara and the average of Turkey. Cluster connections in Istanbul are not as close as they are in Ankara. In Istanbul, administrators of the firms not only have a higher education level, but also a higher rate of speaking a foreign language. In the sectoral distribution of Istanbul OIZs, suppliers-dominated industries declared their dominance with 57.25%. This rate is still lower than the average of Turkey but doubled those of the Ankara OIZs. The share of scale-intensive and specialized-suppliers is around 20% each. 4.78% is the rate of science-based industries. This rate is around 6% for Turkey and Ankara.

Table 5.5.: Summary statistics for Istanbul OIZ data (# of obs: 1172)

Variable	Mean	Std. Dev.	Min	Max
exp	0.4505	0.4978	0	1
age	10.4283	9.2796	0	67
lnage	2.0119	0.9447	0	4.2050
lab	18.1783	25.0489	1	150
lnlab	2.2601	1.1127	0	5.0106
hslabor	0.0984	0.1488	0	1
plcncr	0.3430	0.6032	0	3
tmpum	0.3430	0.4749	0	1
compuse	1.1724	1.0892	0	3
smedo	0.0649	0.2464	0	1
orgprox	1.4710	1.1601	0	5
cluster	1.4778	2.4506	0	22
educa	2.1835	0.9276	0	5
forla	0.5725	0.6579	0	4
dsd	0.5247	0.4996	0	1
dsi	0.2210	0.4151	0	1
dss	0.2065	0.4050	0	1
dsb	0.0478	0.2134	0	1

The correlations between the variables for Istanbul OIZs are seen in Appendix 5.9.. Different from Turkey and Ankara, in Istanbul OIZ data, the cluster variable has a positive correlation with the age of the firm, high skilled labor, SMEDO incentives variables and foreign language knowledge of the administrator. Age of the firm and high skilled labor are also negatively correlated.

The t-tests between the variables are in Appendix 5.10.. For all the variables significant differences are present between the exporters and the non-exporters. Likewise, in Ankara OIZs and Turkey data, except for the cluster variable, all the means of the variables are higher for exporter firms.

5.3. Microeconometric Estimation Results

To analyze the knowledge spillovers within certain geographical boundaries on the firm level, two methods are prominent. The first method is OLS with regional dummies. The second method is the models with spatial lag, i.e. spatial econometrics method. Both methods are discussed in chapter 3 in detail with their advantages and disadvantages. The first method is easier to apply both methodologically and empirically.

In this part, we apply the microeconometric tools for analyzing. The export decision function is estimated with a probit model for three datasets, namely for the whole sample which covers Turkey, for Ankara OIZ and for Istanbul OIZ data, separately. First, we estimate with industry and Pavitt taxonomy dummies to distinguish the sectoral diversity. Then, for the OIZ data, the sum and the mean of the neighboring firms is included to the model.

5.3.1. Estimation Results for whole sample

The export decision function is estimated for the sample which covers Turkey. In the cleaned data set, 24,124 observations are present for the dependent and the independent variables. In Table 5.6., estimation results are represented. The first regression is without any dummies. The second one includes the industrial dummies. The third regression has the Pavitt taxonomy dummies. In all regressions, the marginal effects from the probit estimation are shown.

At Table 5.6., LNAGE is the only variable that is not significant in all three regressions. In the first regression, in addition to LNAGE, HSLABOR has a negative sign and it is also insignificant. In the second regression, the cluster variable is positive and insignificant. All the other variables are significant. Except for BDUM, all the variables have a positive sign as we expected. Although in the summary statistics the CLUSTER variable has a negative correlation with the export decision, in the regression results, it has a positive sign. The only controversial sign is the sign of the BDUM variable. It is explained as being on the seaside is more effective than the being on the border. The remarkable thing is the significance of the CLUSTER variable; with the industrial differences the effect of being in a cluster can be explained. Industrial differences in the export decision capture the effect of being in a cluster. Suppliers-dominated industries are the base industry in the third regression. Both scale-intensive (SI) and science-based (SB) industries have lower export probability than the suppliers-dominated (SD) industries. On the other hand, specialized-suppliers (SS) have higher probability.

The Table 5.6. is replicated for the Pavitt sectors separately in Appendix 5.11.. LNAGE become significant for SD and SB sectors. On the other hand, HSLABOR become insignificant for both SS and SB sectors. It is noteworthy that CLUSTER is insignificant for all sectors. Moreover, except SI sector, BDUM is also insignificant.

Table 5.6.: Probit estimation results for the sample (Marginal Effects)

VARIABLES	exp	exp	exp
	(1)	(2)	(3)
lnage	6.96e-05	0.000103	-0.000127
	(0.000311)	(0.000316)	(0.000312)
lnlab	0.117***	0.112***	0.118***
	(0.00339)	(0.00352)	(0.00343)
hslabor	-0.0144	0.109***	0.0466**
	(0.0226)	(0.0241)	(0.0235)
plcncr	0.0433***	0.0291***	0.0378***
	(0.00529)	(0.00537)	(0.00534)
tmpum	0.0817***	0.0923***	0.0829***
	(0.00694)	(0.00726)	(0.00699)
compuse	0.0587***	0.0614***	0.0591***
	(0.00321)	(0.00335)	(0.00328)
smedo	0.0590***	0.0591***	0.0574***
	(0.0129)	(0.0131)	(0.0130)
orgprox	0.0728***	0.0728***	0.0735***
	(0.00403)	(0.00406)	(0.00404)
cluster	0.00398***	0.00132	0.00251**
	(0.00127)	(0.00131)	(0.00128)
educa	0.00964**	0.0114***	0.0107***
	(0.00413)	(0.00417)	(0.00414)
forla	0.0593***	0.0609***	0.0613***
	(0.00544)	(0.00547)	(0.00545)
sdum	0.0725***	0.0687***	0.0720***
	(0.00639)	(0.00653)	(0.00642)
bdum	-0.0512***	-0.0466***	-0.0456***
	(0.0106)	(0.0109)	(0.0108)
dsi			-0.0168**
			(0.00761)
dss			0.0781***
			(0.0103)
dsb			-0.116***
			(0.0104)
Industry Dummies		YES	
Observations	24,214	24,214	24,214

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The replication is also done for OIZ firms. The detailed table is in Appendix 5.12.. The results are consistent with the whole data set except the CLUSTER variable. The CLUSTER variable is insignificant for OIZ firms in the five percent significance level.

In Table 5.7., the sum and the means of the firms both in a province and a sector in a province is included into the model to understand the influence of the surrounding firms. The definition of the additional variables is:

i) CEXPSUM is the sum of exporters in the province;

ii) CEXPMEAN which is the percentage of exporters in the province is calculated by dividing the total number of exporters to the total number of firms in a province;

iii) CSEXPSUM is the sum of all the exporters in an industry in a province;

iv) CSEXPMEAN is the percentage of exporters in an industry in a province and it is calculated by dividing the total number of exporters in an industry in a province to the total number of firms in an industry in a province.

At Table 5.7., in the first four columns, the four additional variables are added to the equation sequentially. In the last one, they are all included at the same time. When Tables 5.6. and 5.7. are compared from the significance of the variables perspective, two variables, i.e. HSLABOR and SDUM turned out to be insignificant while two variables, i.e. SMEDO and EDUCA become significant in almost all variables. HSLABOR is significant only in the last two estimations in Table 5.7. although the effect of the variable is one fourth compared to Table 5.6.. The coefficient of TMPUM is higher while the marginal effect of COMPUSE is smaller in Table 5.7. than Table 5.6..

Table 5.7.: Probit estimation results for the sample with dummies (marginal effects)

Variable	exp	exp	exp	exp	exp
	(1)	(2)	(3)	(4)	(5)
lnage	4.88e-05	0.0002	0.0002	0.0005	0.0005
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
lnlab	0.120***	0.117***	0.120***	0.103***	0.103***
	(0.0034)	(0.0034)	(0.0035)	(0.0035)	(0.0035)
hslabor	0.0304	0.0284	0.0363	0.0554**	0.0606**
	(0.0236)	(0.0235)	(0.0236)	(0.0235)	(0.0236)
plcncr	0.0421***	0.0448***	0.0409***	0.0396***	0.0377***
	(0.0054)	(0.0054)	(0.0054)	(0.0053)	(0.0054)
tmpum	0.0798***	0.0788***	0.0767***	0.0725***	0.0722***
	(0.0070)	(0.0070)	(0.0070)	(0.0070)	(0.0070)
compuse	0.0491***	0.0444***	0.0535***	0.0459***	0.0491***
	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0034)
smedo	0.0702***	0.0717***	0.0672***	0.0664***	0.0638***
	(0.0132)	(0.0133)	(0.0132)	(0.0134)	(0.0134)
orgprox	0.0654***	0.0587***	0.0685***	0.0548***	0.0579***
	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)
cluster	0.00104	0.000980	0.00113	0.00128	0.00152
	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)
educa	0.0094**	0.0076*	0.0094**	0.0040	0.0044
	(0.0042)	(0.0041)	(0.0042)	(0.0042)	(0.0042)
forla	0.0594***	0.0577***	0.0584***	0.0550***	0.0554***
	(0.0055)	(0.0055)	(0.0055)	(0.0055)	(0.0055)
sdum	0.0085	0.0081	0.0271***	-0.0005	0.0077
	(0.0075)	(0.0073)	(0.0069)	(0.0070)	(0.0077)
bdum	-0.0271**	0.00968	-0.0282**	0.0221*	0.00831
	(0.0113)	(0.0123)	(0.0113)	(0.0125)	(0.0124)
dsi	-0.0160**	-0.0190**	0.0173**	-0.0158**	-0.0109
	(0.0076)	(0.0076)	(0.0081)	(0.0077)	(0.0080)
dss	0.0700***	0.0648***	0.0927***	0.0121	0.0115
	(0.0102)	(0.0101)	(0.0104)	(0.0096)	(0.0098)
dsb	-0.117***	-0.121***	-0.0680***	-0.0819***	-0.0707***
	(0.0104)	(0.0101)	(0.0123)	(0.0116)	(0.0124)
cexpsum	5.79e-05***				8.52e-06
	(3.11e-06)				(5.42e-06)
cexpmean		0.627***			-0.283***
		(0.0280)			(0.0501)
csexpsum			0.0004***		4.43e-05*
			(2.00e-05)		(2.69e-05)
csexpmean				0.777***	0.858***
				(0.0196)	(0.0279)
# of obs.	24,214	24,214	24,214	24,214	24,214

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The marginal effect of CEXPSUM is very small nevertheless it is significant. In the last estimation, when all the additional variables are included in to the equation, it becomes insignificant. It is also true for the CSEXPSUM variable. It simply means that the total number of the surrounding firms does not affect the export probability of the firm. The quantity does not have any importance but quality, namely the density (percentage) of the exporters does matter as can be seen from the significance of the CEXPMEAN and CSEXPMEAN. CSEXPMEAN has a higher marginal influence which is also significant compared to other three additional variables. CEXPMEAN has a significant minor effect when it is included alone even though it turns into negative in the last estimation. This is explained by the higher effect of CSEXPMEAN which explains and covers the effect of CEXPMEAN. The percentage of exporters in an industry in a province has an influence on the propensity of exporting of a firm. This idea is in agreement with the Marshallian externalities which are in favor of the specialization of an industry in a geographical area.

5.3.2. Estimation Results for Ankara OIZ data

As our main concern is on OIZs, the starting point is the highest number of observation of OIZs in a province, i.e. Ankara. The export decision function is estimated for Ankara OIZ data which has 1,545 observations.

In Table 5.8., the probit estimations are summarized. In the second and third columns, industry and Pavitt taxonomy dummies are included sequentially into the main model. The positive and significant variables are LNLAB, HSLABOR, COMPUSE, ORGPROX and FORLA for all three estimations.

Table 5.8.: Probit estimations for Ankara OIZ data

VARIABLES	exp	exp	exp
	(1)	(2)	(3)
lnage	0.00241*	0.00143	0.00191
	(0.00136)	(0.00139)	(0.00137)
lnlab	0.108***	0.116***	0.112***
	(0.0170)	(0.0174)	(0.0171)
hslabor	0.135*	0.170**	0.168**
	(0.0786)	(0.0807)	(0.0795)
plcncr	0.0352	0.0272	0.0285
	(0.0242)	(0.0246)	(0.0243)
tmpum	-0.0420	-0.0325	-0.0348
	(0.0298)	(0.0311)	(0.0305)
compuse	0.0637***	0.0619***	0.0618***
	(0.0118)	(0.0121)	(0.0119)
smedo	0.0611	0.0580	0.0620
	(0.0540)	(0.0550)	(0.0543)
orgprox	0.0577***	0.0578***	0.0570***
	(0.0198)	(0.0203)	(0.0199)
cluster	-0.00348	-0.00579**	-0.00437
	(0.00284)	(0.00295)	(0.00288)
educa	-0.00240	0.00482	-0.000543
	(0.0167)	(0.0169)	(0.0167)
forla	0.0960***	0.0936***	0.0947***
	(0.0241)	(0.0244)	(0.0241)
dsd			-0.109***
			(0.0278)
dsi			-0.0632**
			(0.0275)
dsb			-0.157***
			(0.0343)
Industry Dummies		YES	
Observations	1,545	1,541	1,545

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

AGE is significant only in the first estimation. CLUSTER has significant and negative sign when the industry dummies are added.

As in the whole data, the age of the firm (LNAGE) does not make any contribution to the probability of the export of a firm in OIZs. The basic explanation is that incumbent firms do not have any superiority over the newly established ones. Interestingly, both owning a plc, cnc or robot (PLCNCR), and owning a trade mark, patent or useful model (TMPUM) does not have any influence on export decision. It is expected to find a positive effect of technology. Probably significant and positive computer usage (COMPUSE) encompasses the whole technological effect. Taking SMEDO credit also does not have any influence like being in a cluster (CLUSTER) and the education of the administrator (EDUCA). The sign of the CLUSTER is also negative but insignificant. To be competitive or to have a higher possibility to export, looser relationships in OIZs are needed. EDUCA is insignificant although foreign language knowledge of the administrator (FORLA) is significant and positive. When the administrator, whatever their education level, speaks a foreign language; it will be an advantage for the firm to export.

In Ankara OIZs, the firms having the scale advantage which is proxied by the size of the firm (LNLAB) have a higher possibility to export. Nevertheless the firms with higher high skilled labor (HSLABOR) have a higher probability to export. The firms which not only have higher computer usage in production, design and research (COMPUSE), but also higher organizational relations (ORGPROX) have a higher tendency to export. Lastly, foreign language knowledge of the administrator (FORLA) has a significant effect on the decision of exporting. These are all significant variables which are consistent with the theoretical background and expectations.

In Appendix 5.13, the first regression in Table 5.8 is done for each Pavitt sector separately to analyze the sectoral diversities. Only COMPUSE and FORLA are significant for all sectors. LNLAB is only significant for three sectors, namely DSD, DSI and DSS. The results in A.5.13 is controversial, for instance HSLABOR is significant for supplier-dominated (DSD) industries instead of science-based industries (DSB).

In Table 5.9., the estimation results are summarized when the additional variables (CSEXPSUM and CSEXPMEAN) are included into the model. In the first column, the estimation result without any additional variable is presented. In the second and the third column, CSEXPSUM and CSEXPMEAN are added separately while in the last column both variables are inserted together to the model.

The positive and significant variables (LNLAB, HSLAB, COMPUSE, ORGPROX and FORLA) in Table 5.8 are still protecting their place in Table 5.9.. Pavitt taxonomy variables (DSD and DSI) turned out to be insignificant. Additional variables (CSEXPSUM and CSEXPMEAN) explain and cover the sectoral differences. Except for science-based industries, no sectoral diversification was observed when the additional variables were included to the model.

CSEXPSUM and CSEXPMEAN are positive and significant and were individually and simultaneously inserted to the model. The effect of the CSEXPSUM is infinitesimal compared to CSEXPMEAN. This circumstance is logical from the competitiveness point of view. The firms do not care how many firms engage in export; nevertheless they are mainly concerned with the percentage of firms engage in export. The increase in the share of exporters encourages and supports the firms to export.

Table 5.9.: Probit estimation results for Ankara OIZ data with dummies (marginal effects)

VARIABLES	exp	exp	exp	exp
	(1)	(3)	(4)	(5)
lnage	0.00191	0.00184	0.00152	0.00145
	(0.00137)	(0.00137)	(0.00138)	(0.00138)
lnlab	0.112***	0.112***	0.112***	0.112***
	(0.0171)	(0.0171)	(0.0171)	(0.0172)
hslabor	0.168**	0.167**	0.167**	0.167**
	(0.0795)	(0.0795)	(0.0798)	(0.0798)
plcncr	0.0285	0.0290	0.0296	0.0300
	(0.0243)	(0.0243)	(0.0243)	(0.0244)
tmpum	-0.0348	-0.0315	-0.0371	-0.0336
	(0.0305)	(0.0307)	(0.0304)	(0.0306)
compuse	0.0618***	0.0639***	0.0601***	0.0622***
	(0.0119)	(0.0119)	(0.0119)	(0.0119)
smedo	0.0620	0.0630	0.0575	0.0583
	(0.0543)	(0.0545)	(0.0542)	(0.0544)
orgprox	0.0570***	0.0584***	0.0549***	0.0563***
	(0.0199)	(0.0199)	(0.0200)	(0.0200)
cluster	-0.00437	-0.00495*	-0.00517*	-0.00574**
	(0.00288)	(0.00290)	(0.00290)	(0.00292)
educa	-0.000543	-0.000614	0.00375	0.00365
	(0.0167)	(0.0167)	(0.0167)	(0.0167)
forla	0.0947***	0.0949***	0.0904***	0.0906***
	(0.0241)	(0.0241)	(0.0241)	(0.0241)
dsd	-0.109***	-0.0503	-0.00444	0.0612
	(0.0278)	(0.0419)	(0.0416)	(0.0548)
dsi	-0.0632**	-0.0130	-0.00359	0.0481
	(0.0275)	(0.0376)	(0.0323)	(0.0419)
dsb	-0.157***	-0.103**	-0.0976**	-0.0323
	(0.0343)	(0.0508)	(0.0460)	(0.0642)
csexpsum		0.0007**		0.0007**
		(0.0003)		(0.0003)
csexpmean			0.879***	0.881***
			(0.217)	(0.218)
Observations	1,545	1,545	1,545	1,545

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5.3.3. Estimation Results for Istanbul OIZ data

The second highest number of observations for OIZs in the cleaned SMEDO data belongs to Istanbul. In the sample, 1,172 firms declared that they perform in OIZs in Istanbul. In Table 5.10., the results for Istanbul are summarized and also it is the replication of Table 5.8. which is done for Ankara OIZs.

The sign and the significance of the variables for Istanbul OIZs are similar for Ankara OIZs case. The size of the firm (LNLAB), computer usage (COMPUSE), organization proximity (ORGPROX) and foreign language knowledge of the administrator (FORLA) is positive and significant, while the cluster variable (CLUSTER) is negative and significant.

Different from Ankara OIZs, high skilled labor (HSLABOR) is not significant but cluster (CLUSTER) is significant for Istabul OIZs. The negative sign of the CLUSTER variable is explained by the phenomenon of tighter relations in the OIZs which make firms not only less competitive to engage in export, but also concentrate on the local market instead of foreign market. Closer relationships in the cluster prevent the firm to access to foreign markets. In Istanbul, having high skilled labor does not make any contribution to the probability of exporting of the firm.

In Appendix 5.14., the estimation is replicated for each Pavitt taxonomy separately. Different from Ankara OIZs, only LNLAB is significant for all four sectors. As in Ankara OIZs, the results are controversial to explain.

Table 5.10.: Probit estimations for Istanbul OIZ data (marginal effects)

VARIABLES	exp	exp	exp
	(1)	(2)	(3)
lnage	0.000838	0.000852	0.00112
	(0.00178)	(0.00183)	(0.00178)
lnlab	0.173***	0.176***	0.176***
	(0.0192)	(0.0202)	(0.0193)
hslabor	0.145	0.166	0.181
	(0.114)	(0.118)	(0.116)
plcncr	0.0243	0.0227	0.0204
	(0.0280)	(0.0289)	(0.0284)
tmpum	0.0329	0.0284	0.0350
	(0.0356)	(0.0372)	(0.0359)
compuse	0.0546***	0.0514***	0.0521***
	(0.0171)	(0.0177)	(0.0172)
smedo	0.0866	0.0741	0.0831
	(0.0677)	(0.0703)	(0.0680)
orgprox	0.0454***	0.0519***	0.0458***
	(0.0133)	(0.0136)	(0.0134)
cluster	-0.0132*	-0.0156**	-0.0138*
	(0.00710)	(0.00742)	(0.00714)
educa	-0.00191	0.00559	0.000474
	(0.0207)	(0.0216)	(0.0209)
forla	0.0636**	0.0661**	0.0683**
	(0.0273)	(0.0281)	(0.0275)
dsi			-0.0451
			(0.0402)
dss			0.0337
			(0.0421)
dsb			-0.156**
			(0.0691)
Industry Dummies		YES	
Observations	1,172	1,160	1,172

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

In Table 5.11., the estimation results are presented with additional variables (CSEXPSUM and CSEXPMEAN) for Istanbul OIZs. They are first added separately in the second and third column. In the last column, they are included into the model simultaneously.

The estimation results in Table 5.11. are consistent with Table 5.10.. The sign and the significance of the variables are the same with or without the additional variables. As in Ankara OIZs, when the additional variables are inserted simultaneously, none of the Pavitt taxonomy dummies become significant which indicates that additional variables cover the sectoral diversification.

In Istanbul OIZs, the effect of CSEXPSUM is very minor when compared to the influence of CSEXPMEAN nevertheless they are significant and positive in each estimation as in the Ankara OIZs. The higher the share of the exporters around, the higher is the possibility to export. In a competitive environment, firms are more willing to engage in export.

Table 5.11.: Probit estimation results for Istanbul OIZ data with dummies (marginal effects)

VARIABLES	exp	exp	exp	exp
	(1)	(3)	(4)	(5)
lnage	0.00112	0.00118	0.00125	0.00131
	(0.00178)	(0.00179)	(0.00179)	(0.00179)
lnlab	0.176***	0.181***	0.165***	0.169***
	(0.0193)	(0.0195)	(0.0196)	(0.0198)
hslabor	0.181	0.182	0.155	0.156
	(0.116)	(0.116)	(0.116)	(0.116)
plcncr	0.0204	0.0202	0.0216	0.0215
	(0.0284)	(0.0284)	(0.0284)	(0.0285)
tmpum	0.0350	0.0353	0.0255	0.0260
	(0.0359)	(0.0360)	(0.0362)	(0.0363)
compuse	0.0521***	0.0515***	0.0552***	0.0544***
	(0.0172)	(0.0172)	(0.0173)	(0.0173)
smedo	0.0831	0.0848	0.0581	0.0600
	(0.0680)	(0.0680)	(0.0690)	(0.0691)
orgprox	0.0458***	0.0458***	0.0474***	0.0475***
	(0.0134)	(0.0134)	(0.0135)	(0.0135)
cluster	-0.0138*	-0.0145**	-0.0146**	-0.0152**
	(0.00714)	(0.00718)	(0.00713)	(0.00716)
educa	0.000474	-0.00155	0.00173	-0.000229
	(0.0209)	(0.0209)	(0.0210)	(0.0210)
forla	0.0683**	0.0696**	0.0615**	0.0628**
	(0.0275)	(0.0276)	(0.0277)	(0.0278)
dsi	-0.0451	-0.0100	-0.0493	-0.0171
	(0.0402)	(0.0447)	(0.0404)	(0.0449)
dss	0.0337	0.0299	-0.00326	-0.00637
	(0.0421)	(0.0421)	(0.0428)	(0.0428)
dsb	-0.156**	-0.104	-0.133*	-0.0854
	(0.0691)	(0.0786)	(0.0720)	(0.0807)
csexpsum		0.00140*		0.00129*
		(0.000737)		(0.000747)
csexpmean			0.666***	0.650***
			(0.159)	(0.158)
Observations	1,172	1,172	1,172	1,172

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5.4. Spatial Econometric Estimation Results

Spatial econometric method is explained in detail in Chapter 3 in the method section. The main difference between the standard and spatial econometrics is the realization of spatial dependence in spatial econometrics. In spatial econometrics, contiguity (weight) matrices are used to take into account the spatial dependence. In spatial analysis, the basic assumption is that the spatial unit is affected from the neighboring units. In this study, our spatial unit is a firm in an OIZ of a province. The main hypothesis is to analyze whether the OIZs are influenced from neighboring OIZs. As a sub-hypothesis, the industrial dynamics (intra-industry) in a province is also tested.

In our analysis, two contiguity (weight) matrices (w_1 and w_2) are used. While the first weighting matrix (w_1) used to show the intra-OIZ neighborhood, the second one (w_2) is for the intra-industry neighborhood. When the firms are in the same OIZ in a province, they treated as neighbors in intra-OIZ contiguity matrix. On the other hand, for intra-industry weight matrix, the firms from same industry in a province are assumed to be neighbors. Both weight matrices are row-standardized.

Moran's I and LM-error test is performed before each spatial econometric estimation to detect whether there is spatial autocorrelation in the models or not. Both tests are done by using the OLS residuals of the models. Moreover, LM-sar test is calculated to find whether spatial autocorrelation in the SAR model exists or not.

As an estimation method, Gibbs sampling which is a Bayesian technique is used in the estimation of spatial probit. It is necessary to determine the number of draws and number of omits. Le Sage (1998, 1999a, 1999b) used 1100 with first 100 omitted. Posterior inferences based on this 1000 draws for β and σ parameters[72] (Le Sage, 1998, 284-5: Le Sage, 1999a, 105-7: Le Sage, 1999b, 158). Le Sage (1998, 1999a) also advices to use a small convergence test by running the model with different draws for 300 to 500 and 1000 to 2000. When the mean and variance of the different (small and big) draws the means and the variances for the posterior estimates are approximately equal, convergence is achieved. The estimations presented here are done for different draws (300 and 1000). Convergence of all estimations is assured. Only the 1000 draw (1100 draws with first 100 omitted) estimations are presented in this study.

When the dependent variable is binary (dichotomous), the econometric model is estimated with logit or probit estimation. β coefficient[73] of the logit or probit estimation is the log odds ratio. To explain the effect of independent variables on the dependent variables marginal effects are calculated. Marginal effect in the logit or probit estimation is simply the β coefficient[74] in the standard econometric models. It is calculated for analyzing the effect of a unit change in an independent variable on the dependent variable while other independent variables are not changing. In standard logit model, it is usually calculated at the mean. Calculation of marginal effect in spatial econometrics is different

[72] Le Sage (1998, 1999a, 1999b) also estimates with Theil function which applies mixed estimation for compare the estimations. The estimates with theil function is similar but with low t-statistics due to heteroscedasticity. With Gibbs sampler, estimates less suffer from heteroscedasticity.

[73] As the standard microeconometric model is $y = x\beta + e$, where y is the dependent (endogenous) binary (dichotomous) variable, x is the vector of independent (exogenous) variables and e is the error term.

[74] As the standard econometric model is $y = x\beta + e$, where y is the dependent (endogenous) continuous variable, x is the vector of independent (exogenous) variables and e is the error term.

than standard microeconometrics. Three types of effects are computed[75]: Direct, indirect and total. Direct effect is the marginal effect from standard logit or probit regression. Indirect effect is indicating the spatial effect. Finally, total effect is the sum of direct and indirect effect (Le Sage and Pace, 2009).

Ankara and Istanbul OIZ data used for spatial analysis are cleaned from industries with single observation in the province, after the general cleaning process explained before. This elimination is because of the structure of the weighting matrix. Any spatial unit needs at least one neighbor[76] to be in the analysis.

Two provinces, i.e. Ankara and Istanbul, are chosen according to the observation number for testing the hypothesis of this study. Ankara has the highest observation number with 1545 for OIZs in SMEDO sample. Istanbul is the second province which has an observation number of 1172 for OIZs.

[75] When the i^{th} observation of the independent variable (X_{1i}) changes, it will influence not only its own region (Y_i) but also other regions (Y_j, $i \neq j$). The expected probability of the dependent variable (Y) with respect to an indepent variable (X_1) for the SAR model is $E \frac{\partial y}{\partial x_1'} = (I_n - \rho W)^{-1} I_n \beta_r$ which is an n×n matrix where n is the number of observation, X_1 is an independent variable, W is the weight matrix and β_r is the estimated coefficient from the standard probit model. The diagonal of this n×n matrix gives the direct impact while off-diagonal elements gives the indirect (spatial) effects (Le Sage and Pace, 2009, 293).

[76] Having no neighbor means, the row and the column of that firm in the weight matrix formed only from zeros. This will affect the rank of the matrix. Estimation will not be done without the full rank of the weighting matrix.

5.4.1. Estimation Results for Ankara OIZ data

As our main hypothesis is to test the null hypothesis of no spatial dependence in OIZs, the testing of hypotheses is started with the province which has the highest observation number, i.e. Ankara with 1545 observations.

The standard econometric method, in this case logit estimation, is applied for Ankara OIZ data in Chapter 5.3.. In this part, the spatial econometric estimation is done for Ankara OIZs with two different weighting matrices, w_1 and w_2 to test the hypothesis of spatial dependence in the OIZs and industry dependence. Marginal effects for direct and indirect effects are also calculated after each estimation.

Firstly, intra-OIZ relations are investigated. For this purpose, in the spatial econometric estimation, w_1 weighting matrix is used. Lastly, intra-industry relations in a province are studied. w_2 weighting matrix is used in the estimation of the model.

5.4.1.1. Intra-OIZ neighborhood

The main hypothesis of this thesis is to investigate the existence of intra-OIZ relations in a province. Ankara has the highest observation for OIZs. For intra-OIZ relations, w_1 weighting matrix is used in the spatial econometric estimation. In w_1, the firms in the same OIZs are assumed to be neighbors. If the firms are in same OIZ, it takes the value of 1, or vice versa. At Table 5.12., estimation results for Ankara for w_1 weighting matrix is shown. At the bottom of the table; LM-error, LM-sar and Moran’s I test results are presented.

Table 5.12: Bayesian spatial autoregressive probit model for Ankara OIZ data with w1 (intra-OIZ neighborhood) matrix by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0066	0.0043	0.0570
LNLAB	0.3077	0.0527	0.0000
HSLAB	0.3929	0.2475	0.0440
PLCNCR	0.1065	0.0743	0.0760
TMPUM	-0.1364	0.1025	0.0880
COMPUSE	0.2026	0.0366	0.0000
SMEDO	0.1552	0.1583	0.1630
ORGPROX	0.1662	0.0608	0.0020
CLUSTER	-0.0099	0.0091	0.1400
EDUCA	-0.0069	0.0507	0.4550
FORLA	0.2873	0.0726	0.0010
constant	-1.5704	0.1588	0.0000
rho	0.2986	0.1390	0.0270
LM-error	30.1106	17.6110*	0.0000
LM-sar	11.8468	6.6350*	0.0006
Moran's I	6.1231	0.0029	0.0000
# of obs.	1545		

*chi(1), 0.01 value

According to Moran's I and LM-error test results, the existence of spatial dependence in Ankara OIZs is proved. LM-sar test indicates the presence of

SAR model. ρ value of the spatial model is significant at 5 percent level with a value of 0.2986.

Size of the firm (LNLAB), high skilled labor (HSLAB), computer usage (COMPUSE), organizational proximity (ORGPROX) and administrator's foreign language ability (FORLA) are variables that are significant at 5%. Age of the firm (LNAGE); own a PLC, CNC or robot (PLCNCR), and own a trade mark, patent and useful model (TMPUM) are the variables that significant at %10. To use a SMEDO incentive (SMEDO), cluster proximity (CLUSTER) and education of the administrator (EDUCA) have no effect on the export decision of the firm when the spatial effects are not ignored.

The variables which are significant at 5% level are the same with the standard logit estimation of the data. TMPUM, CLUSTER and EDUCA variables which are not significant 5% level and have negative sign despite our expectations. The sign of CLUSTER variable can be explained logically although the other two cannot. As the closer the relations with the OIZ, the firm prefers to buy/sell its product in the province instead of foreign countries.

At Table 5.12.1., marginal effects of Table 5.12. is shown. For all variables almost two third of the total effect is coming from direct effect. When the spatial dependence is ignored, one third of the effect is disregarded. The indirect effect points out the spatial effect. The highest marginal effect belongs to the high skilled labor (HSLAB) variable. Second and third ones are size of the firm (LNLAB) and foreign language knowledge of the administrator (FORLA).

Table 5.12.1.: Marginal Effects of Table 5.12.

Direct	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0017	-0.0006	0.0019	0.0042	0.0047
LNLAB	0.0485	0.0575	0.0874	0.1170	0.1272
HSLAB	-0.0601	-0.0200	0.1117	0.2550	0.3040
PLCNCR	-0.0267	-0.0101	0.0302	0.0724	0.0895
TMPUM	-0.1146	-0.0949	-0.0387	0.0185	0.0373
COMPUSE	0.0275	0.0370	0.0576	0.0782	0.0851
SMEDO	-0.0824	-0.0526	0.0442	0.1310	0.1524
ORGPROX	0.0030	0.0129	0.0472	0.0824	0.0889
CLUSTER	-0.0096	-0.0081	-0.0028	0.0020	0.0035
EDUCA	-0.0390	-0.0291	-0.0020	0.0268	0.0344
FORLA	0.0277	0.0392	0.0817	0.1213	0.1347
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0009	-0.0003	0.0009	0.0029	0.0036
LNLAB	-0.0105	-0.0010	0.0403	0.0948	0.1127
HSLAB	-0.0314	-0.0122	0.0518	0.1691	0.2221
PLCNCR	-0.0143	-0.0055	0.0135	0.0437	0.0588
TMPUM	-0.0932	-0.0626	-0.0183	0.0084	0.0195
COMPUSE	-0.0055	-0.0007	0.0270	0.0664	0.0750
SMEDO	-0.0457	-0.0232	0.0198	0.0813	0.1014
ORGPROX	-0.0055	-0.0008	0.0217	0.0538	0.0662
CLUSTER	-0.0063	-0.0049	-0.0013	0.0011	0.0018
EDUCA	-0.0316	-0.0194	-0.0009	0.0152	0.0212
FORLA	-0.0085	-0.0011	0.0378	0.0969	0.1197
Total	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0025	-0.0009	0.0027	0.0064	0.0078
LNLAB	0.0661	0.0784	0.1277	0.1875	0.2205
HSLAB	-0.0975	-0.0331	0.1635	0.3767	0.4865
PLCNCR	-0.0378	-0.0157	0.0437	0.1061	0.1222
TMPUM	-0.1883	-0.1446	-0.0570	0.0266	0.0544
COMPUSE	0.0375	0.0482	0.0846	0.1314	0.1500

Table 5.12.1.: continued

SMEDO	-0.1191	-0.0694	0.0640	0.1926	0.2253
ORGPROX	0.0048	0.0166	0.0689	0.1255	0.1374
CLUSTER	-0.0145	-0.0116	-0.0041	0.0030	0.0049
EDUCA	-0.0669	-0.0461	-0.0029	0.0396	0.0500
FORLA	0.0368	0.0538	0.1195	0.1962	0.2268

At Appendix 5.15., Table 5.12. is estimated with industry dummies. Moran's I and LM-error is significant at 5% level. Both tests indicate the presence of spatial dependence. On the other hand, LM-sar test and ρ value is insignificant. It means instead of spatial autoregressive models, we might use spatial-error models. The variables which are significant at 5% level in Table 5.13. are still significant in Appendix 5.15. although the variables which are significant at 10% level - i.e. LNAGE, PLCNCR and TMPUM - become insignificant at 10%. The basic explanation is that detailed sectoral diversification explains the fact which is try to be covered by these three variables. At Appendix 5.16., Table 5.13. is estimated with Pavitt taxonomy. Specialized suppliers (SS) industries have the highest probability to export compared to other three pavitt taxonomies.

5.4.1.2. Intra-Industry neighborhood

As a sub hypothesis, one of our goals is to test the spatial dependence in within the industries in a province. In other words, we try to test for the within(intra)-industry knowledge spillovers. For Ankara, the firms from the same industry are assumed to be neighbors for testing the hypothesis. w_2 weighting matrix is used in estimation of spatial econometric model. It takes the value 1 when two firms are from the same industry according to ISIC Rev.3 classification.

Table 5.13.: Bayesian spatial autoregressive probit model for Ankara OIZ data with w2 (intra-industry neighborhood) matrix by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0075	0.0041	0.0330
LNLAB	0.3298	0.0557	0.0000
HSLAB	0.3765	0.2400	0.0590
PLCNCR	0.1116	0.0755	0.0750
TMPUM	-0.1415	0.0941	0.0790
COMPUSE	0.1925	0.0360	0.0000
SMEDO	0.1811	0.1543	0.1210
ORGPROX	0.1760	0.0623	0.0000
CLUSTER	-0.0121	0.0091	0.0850
EDUCA	-0.0061	0.0500	0.4530
FORLA	0.2947	0.0747	0.0000
constant	-1.6603	0.1628	0.0000
rho	0.2240	0.1678	0.0950
LM-error	17.2068	17.6110*	0.0000
LM-sar	49.5728	6.6350*	0.0000
Moran’s I	4.4501	0.0043	0.0000
# of obs.	1545		

*chi(1), 0.01 value

At Table 5.13., the estimation results for the intra-industry relations for Ankara are presented. According to Moran’s I and LM-error test, spatial dependence is realized in the data set. Moreover LM-sar test indicates the appropriateness of the SAR model although the ρ value estimated from the model is insignificant at 5% level but significant at 10% level. The results of the tests and the significance of the estimated ρ value is not compatible but still acceptable at 10% level.

Age of the firm (LNAGE), size of the firm (LNLAB), computer usage (COMPUSE), organizational proximity (ORGPROX) and administrator's foreign language ability (FORLA) are variables that are significant at 5%. High skilled labor (HSLAB); own a PLC, CNC or robot (PLCNCR); own a trade mark, patent of useful (TMPUM); cluster proximity (CLUSTER) and are the variables that significant at %10. To use a SMEDO incentive (SMEDO), and education of the administrator (EDUCA) have no effect on the export decision of the firm when the spatial effects are not ignored.

The variables which are significant at 5% level are the same with the standard logit estimation of the data. TMPUM, CLUSTER and EDUCA variables which are not significant 5% level have negative sign despite our expectations. The sign of CLUSTER variable can be explained logically although the other two cannot. Different from Table 5.12., at Table 5.13. LNAGE has higher significance level (from 10% to 5%) while HSLAB has lower significance (from 5% to 10%). Nevertheless, CLUSTER becomes significant at 10% level in Table 5.13. compared to Table 5.12..Thus, when intra-industrial effects considered, CLUSTER coefficient becomes significant as expected.

Table 5.13.1.: Marginal Effects of Table 5.13.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0014	-0.0003	0.0021	0.0044	0.0053
LNLAB	0.0518	0.0612	0.0946	0.1264	0.1342
HSLAB	-0.0708	-0.0257	0.1076	0.2404	0.2795
PLCNCR	-0.0250	-0.0098	0.0320	0.0748	0.0831
TMPUM	-0.1054	-0.0919	-0.0406	0.0136	0.0242
COMPUSE	0.0300	0.0348	0.0552	0.0763	0.0824
SMEDO	-0.0562	-0.0379	0.0519	0.1403	0.1596
ORGPROX	0.0034	0.0166	0.0504	0.0865	0.0973
CLUSTER	-0.0102	-0.0086	-0.0035	0.0014	0.0032
EDUCA	-0.0438	-0.0291	-0.0017	0.0271	0.0332
FORLA	0.0303	0.0431	0.0845	0.1284	0.1424
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0009	-0.0004	0.0007	0.0026	0.0033
LNLAB	-0.0268	-0.0148	0.0310	0.0923	0.1088
HSLAB	-0.0550	-0.0217	0.0357	0.1427	0.1747
PLCNCR	-0.0131	-0.0057	0.0107	0.0412	0.0530
TMPUM	-0.0778	-0.0541	-0.0135	0.0073	0.0146
COMPUSE	-0.0164	-0.0099	0.0178	0.0527	0.0601
SMEDO	-0.0286	-0.0170	0.0170	0.0787	0.1032
ORGPROX	-0.0137	-0.0080	0.0164	0.0510	0.0664
CLUSTER	-0.0072	-0.0052	-0.0011	0.0010	0.0018
EDUCA	-0.0256	-0.0147	-0.0007	0.0124	0.0203
FORLA	-0.0219	-0.0137	0.0275	0.0765	0.1026
Total	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0020	-0.0004	0.0029	0.0064	0.0076
LNLAB	0.0614	0.0722	0.1256	0.1992	0.2221
HSLAB	-0.1122	-0.0325	0.1434	0.3579	0.4229
PLCNCR	-0.0271	-0.0123	0.0427	0.1062	0.1256
TMPUM	-0.1627	-0.1341	-0.0541	0.0172	0.0413
COMPUSE	0.0355	0.0413	0.0730	0.1132	0.1240

Table 5.13.1.: continued

SMEDO	-0.0819	-0.0495	0.0689	0.1954	0.2399
ORGPROX	0.0038	0.0220	0.0669	0.1225	0.1437
CLUSTER	-0.0161	-0.0127	-0.0046	0.0017	0.0045
EDUCA	-0.0600	-0.0410	-0.0024	0.0369	0.0517
FORLA	0.0296	0.0508	0.1120	0.1819	0.2119

At Table 5.13.1. the direct, indirect and marginal effects of the estimations presented at Table 5.13. is demonstrated. For all variables one fourth of the total effects are from indirect effects, i.e. spatial effects. The spatial effects in intra-indusrty relations are lower than intra-OIZ relations. One third of the total effect is from indirect effect in intra-OIZ neighborhood. The highest marginal effects belongs to the high skilled labor (HSLAB), size of the firm (LNLAB) and foreign language knowledge of the administrator (FORLA) variables which are the same as intra-OIZ relations in Ankara.

At Appendix 5.17., the estimation results with Pavitt taxonomy dummies are presented. Moran's I is significant at 10% level. LM-error and LM-sar tests are indicating no spatial dependence in the model when estimated with pavitt taxonomies. Moreover ρ value is also insignificant. The tests results are consistent. Thus, there is no need of using spatial econometric model instead of standard econometric models.

5.4.2. Estimation Results for Istanbul OIZ data

To test our hypothesis, two provinces are chosen according to the observation numbers from the whole cleaned SMEDO sample. Istanbul is the second highest province with 1172 observation for OIZs. The standard econometric method, logit estimation, is also applied for Istanbul OIZs in Chapter 5.3.. In this part, spatial econometric estimation is applied for Istanbul OIZs. Two different weight matrices, w_1 and w_2, is used for estimation. Direct and indirect marginal effects are also calculated after each estimation.

First we focus on the intra-OIZ neighborhood. For this, w_1 weighting matrix is used in the spatial econometric estimation. Then, intra-industry relations are revealed by using the w_2 weighting matrix.

5.4.2.1. Intra-OIZ neighboorhood

As our main hypothesis of this thesis is to investigate the existence of intra-OIZ relations in a province, Istanbul has the second highest observation number with 1172 after Ankara. w_1 weighting matrix is used in the spatial econometric estimation for intra-OIZ relations for Istanbul. In w_1 weighting matrix, the firms in the same OIZs are assumed to be neighbors. When the firms are in same OIZ in Istanbul, it takes the value of 1. At Table 5.14., estimation results for Istanbul for w_1 weighting matrix is shown. LM-error, LM-sar and Moran's I test results are presented at the bottom of the table.

According to Moran's I and LM-error test at Table 5.14., the hypothesis of no spatial dependence is not rejected. The test indicates that no spatial dependence in Istanbul OIZs. Moreover, LM-sar test results show that there is no need to use spatial autocorrelation model instead of standard logit model. Nevertheless ρ value indicates that spatial dependence in the data is present at 5% significance level. The inconsistency of the test results and the lag draw attention[77,78].

[77] In the time series econometrics, this inconsistency can be explained and solved by different methods. In the time series econometrics, the lag number used in the test might be lower than the actual lag in the data. For example, there might be an autocorrelation in 12th lag but the

Table 5.14.: Bayesian spatial autoregressive probit model for Istanbul OIZ data with w1 (intra-OIZ neighborhood) matrix by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0020	0.0045	0.3320
LNLAB	0.4159	0.0481	0.0000
HSLAB	0.3396	0.2800	0.1130
PLCNCR	0.0558	0.0672	0.1940
TMPUM	0.0801	0.0876	0.1720
COMPUSE	0.1356	0.0432	0.0010
SMEDO	0.2396	0.1664	0.0730
ORGPROX	0.1079	0.0338	0.0010
CLUSTER	-0.0365	0.0181	0.0160
EDUCA	-0.0082	0.0524	0.4410
FORLA	0.1547	0.0703	0.0100
constant	-1.4963	0.1307	0.0000
rho	0.2256	0.0882	0.0110
LM-error	1.8685	17.6110*	0.1717
LM-sar	0.0420	6.6350*	0.8377
Moran's I	1.6042	0.0063	0.1087
# of obs.	1172		
* chi(1), 0.01 value			

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autocorrelation test check only till 8th lag. This may cause an inconsistency between the tests and lag results.

[78] It is notable that some revisions are necessary to make the test results and ρ value compatible. Our solution is to omit some independent variables. The estimations results for intra-industry relations are better without some independent variables (i.e. SMIDO and EDUCA). It is still needed to work on intra-OIZ relations in Istanbul. Not only to be consistent in all parts of thesis but also for to compare the results of Ankara and Istanbul easily, we prefer to stick to the same independent variables in whole set of estimations.

Size of the firm (LNLAB), computer usage (COMPUSE), organizational proximity (ORGPROX), cluster proximity (CLUSTER) and administrator's foreign language ability (FORLA) are variables that are significant at 5%. To use a SMEDO incentive (SMEDO) is the only variable which is significant at 10%. Age of the firm (LNAGE); high skilled labor (HSLAB); own a PLC, CNC or robot (PLCNCR); and own a trade mark, patent and useful model (TMPUM); and education of the administrator (EDUCA) have no effect on the export decision of the firm in Istanbul OIZ when the spatial dependence is take into account.

The variables which are significant at 5% level in spatial econometric estimations are the same with the standard logit estimation of the data. CLUSTER and EDUCA have negative sign despite our expectations. The sign of CLUSTER variable can be explained logically while EDUCA is insignificant at 5% level. Strong relations with the OIZ causes the firm closed in the province or country. With the looser relations with OIZ makes firm more prone to export.

When the results of Istanbul are compared with Ankara for the significant dependent variables, for both provinces four significant variables (LNLAB, COMPUSE, ORGPROX an FORLA) are common. Although in Ankara OIZs HSLAB is significant in addition to these four variables, in Istanbul CLUSTER variable is significant. HSLAB and CLUSTER variables show the main difference between the Ankara and Istanbul OIZs.

At Table 5.14.1., marginal effects of Table 5.14. is shown. For all variables almost one fourth of the total effect is coming from indirect effect. When the spatial dependence is ignored, one fourth of the effect is disregarded. The highest marginal effect belongs to size of the firm (LNLAB). The second

Table 5.14.1.: Marginal Effects of Table 5.14.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0031	-0.0022	0.0006	0.0034	0.0040
LNLAB	0.0960	0.1026	0.1311	0.1576	0.1655
HSLAB	-0.1153	-0.0700	0.1071	0.2750	0.3363
PLCNCR	-0.0375	-0.0232	0.0176	0.0592	0.0703
TMPUM	-0.0455	-0.0301	0.0252	0.0757	0.0939
COMPUSE	0.0071	0.0173	0.0427	0.0684	0.0742
SMEDO	-0.0540	-0.0234	0.0755	0.1795	0.2125
ORGPROX	0.0032	0.0120	0.0340	0.0549	0.0600
CLUSTER	-0.0264	-0.0231	-0.0115	-0.0012	0.0027
EDUCA	-0.0483	-0.0365	-0.0026	0.0289	0.0382
FORLA	-0.0102	0.0084	0.0488	0.0933	0.1075
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0012	-0.0008	0.0002	0.0013	0.0019
LNLAB	-0.0036	0.0045	0.0386	0.0817	0.0937
HSLAB	-0.0453	-0.0196	0.0323	0.1144	0.1576
PLCNCR	-0.0154	-0.0084	0.0052	0.0225	0.0302
TMPUM	-0.0182	-0.0099	0.0075	0.0303	0.0396
COMPUSE	-0.0010	0.0016	0.0124	0.0287	0.0381
SMEDO	-0.0178	-0.0073	0.0221	0.0692	0.0861
ORGPROX	-0.0011	0.0009	0.0100	0.0241	0.0337
CLUSTER	-0.0134	-0.0095	-0.0034	0.0000	0.0013
EDUCA	-0.0162	-0.0120	-0.0006	0.0105	0.0151
FORLA	-0.0058	0.0003	0.0144	0.0407	0.0640
Total	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0041	-0.0031	0.0008	0.0045	0.0055
LNLAB	0.1160	0.1241	0.1696	0.2203	0.2338
HSLAB	-0.1505	-0.0862	0.1394	0.3682	0.4335
PLCNCR	-0.0510	-0.0319	0.0228	0.0787	0.0956
TMPUM	-0.0631	-0.0397	0.0327	0.1025	0.1266
COMPUSE	0.0091	0.0221	0.0551	0.0905	0.1018

Table 5.14.1.: continued

SMEDO	**-0.0685**	**-0.0289**	**0.0976**	**0.2375**	**0.2835**
ORGPROX	0.0049	0.0148	0.0440	0.0731	0.0839
CLUSTER	-0.0371	-0.0307	-0.0149	-0.0016	0.0042
EDUCA	-0.0557	-0.0472	-0.0032	0.0378	0.0506
FORLA	-0.0133	0.0113	0.0632	0.1234	0.1528

highest effect belongs to high skilled labor (HSLAB) which is insignificant. From the significant variables, the second and the third highest marginal effects are foreign language knowledge of the administrator (FORLA) and computer usage (COMPUSE).

At Appendix 5.18., Table 5.14. is estimated with industry dummies. At A.5.18., Moran's I become significant at 10% level. While LM-error test indicates the absence of spatial dependence, LM-sar test result show that no spatial autocorrelation. Both test (LM-error and LM-sar) tests are still insignificant. Nevertheless ρ value is significant at 1%. The variables which are significant at 5% level in Table 5.14. are still significant in A.5.18.. SMEDO variable was significant at Table 5.14, at A.5.18. it become insignificant. Moreover, HSLAB which is insignificant at Table 5.14 turn into significant at 10%. At Appendix 5.19., Table 5.14. is estimated with Pavitt taxonomy. Moran's I, LM-error and LM-sar is insignificant although ρ value is significant as in Table 5.14.. The significant variables is still the same with Table 5.14.. Like A.5.18., not only HSLAB turn into significant at 10% but also SMEDO become insignificant. Science based (SB) industries have lower probability to export than other three Pavitt taxonomies.

5.4.2.2. Intra-Industry neigboorhood

As we stated before, our sub-goal is to test the spatial dependence in within the industries in a province. We test the hypothesis of the within (intra)-industry knowledge spillovers existence for Ankara. In this part, we are going to test for Istanbul OIZs. When the firms are from the same industry, they assumed to be neighbors for testing the hypothesis. w_2 weighting matrix is used in estimation of spatial econometric model. It takes the value 1 when two firms are from the same industry according to ISIC Rev.3 classification.

At Table 5.15., the estimation results for the intra-industry relations for Istanbul are presented. According to Moran's I and LM-error test, spatial dependence is realized in the data set. Moreover, LM-sar test indicates the appropriateness of the SAR model although the ρ value estimated from the model is insignificant 5% level The results of the tests and the significance of the estimated ρ value is not compatible[79,80].

At Table 5.15., tests results indicate to use a spatial model meanwhile estimated ρ value is insignificant. The situation at Table 5.14. is vice versa. For Istanbul, some solutions such as omitting or including new variables, detailed cleaning of

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[79] In the time series econometrics, this inconsistency between the autocorrelation test results and significance of the lag might be explained. The explanation is that this inconsistency is an indicator of existence of the autocorrelation. After adding the first lag, the model is tested again for autocorrelation problem. It is solved by including extra lags to the model.

[80] It is notable that some revisions are necessary to make the test results and ρ value compatible. One of the solutions is to estimate the model without some independent variables. The estimations results are better without some independent variables (i.e. SMIDO and EDUCA) for intra-industry relations. In Appendix 5.20., the estimation results of the model without SMIDO and EDUCA variable is represented. In Appendix 5.20., both the test results and estimated ρ value is consistent at 5% significance level. All of them indicates no spatial dependence in intra-industry relations in Istanbul. Not only to be consistent in all parts of thesis but also for to compare the results of Ankara and Istanbul easily, we prefer to stick to the same independent variables in whole set of estimations.

the data to solve this problem is possible. To be consistent throughout the thesis, we prefer to stick to the results.

Table 5.15.: Bayesian spatial autoregressive probit model for Istanbul OIZ data with w2 (intra-industry neighborhood) matrix by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0020	0.0047	0.3180
LNLAB	0.4348	0.0507	0.0000
HSLAB	0.3570	0.2893	0.1060
PLCNCR	0.0684	0.0729	0.1750
TMPUM	0.0843	0.0913	0.1720
COMPUSE	0.1382	0.0439	0.0000
SMEDO	0.1840	0.1657	0.1270
ORGPROX	0.1172	0.0333	0.0010
CLUSTER	-0.0354	0.0176	0.0190
EDUCA	-0.0053	0.0541	0.4590
FORLA	0.1577	0.0693	0.0100
constant	-1.5820	0.1358	0.0000
rho	0.1603	0.1316	0.1180
LM-error	4.6385	17.6110*	0.0313
LM-sar	4.7820	6.6350*	0.0288
Moran’s I	2.4108	0.0060	0.0159
# of obs.	**1172**		

*chi(1), 0.01 value

Size of the firm (LNLAB), computer usage (COMPUSE), organizational proximity (ORGPROX), cluster proximity (CLUSTER) and administrator's foreign language ability (FORLA) are variables that are significant at 5%. CLUSTER variable is the only variable that has a negative sign. The variables that have no influence on the decision of export of the firms is age of the firm (LNAGE); high skilled labor (HSLAB); own a PLC, CNC or robot (PLCNCR); own a trade mark, patent and useful model (TMPUM); to use a SMEDO incentive (SMEDO), and education of the administrator (EDUCA). The significant variables of the estimation in Table 5.15. are same as not only with the Table 5.14. but also with the standard logit estimation.

The direct, indirect and marginal effects of the estimations presented at Table 5.15. is demonstrated at Table 5.15.1.. For all variables one fourth of the total effects is from indirect effects, i.e. spatial effects. The spatial effects in intra-indusrty relations are lower than intra-OIZ relations. One third of the total effect is from indirect effect in intra-OIZ neighborhood. The highest marginal effects belong to size of the firm (LNLAB). Foreign language knowledge of the administrator (FORLA) and computer usage (COMPUSE) has the highest marginal effects after LNLAB.

The estimation results with Pavitt taxonomies are presented at Appendix 5.21.. Moran's I is significant at 5% level. LM-error and LM-sar tests are indicating no spatial dependence in the model when estimated with pavitt taxonomies. Moreover ρ value is also insignificant. The tests results are consistent. There is no means of using spatial econometric model instead of standard econometric models. The significant variables of the estimation presented at A.5.21. are still the same variables which are shown at Table 5.15.. Only difference is that high skilled labor (HSLAB) becomes significant at 10%.

Table 5.15.1.: Marginal Effects of Table 5.15.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0036	-0.0024	0.0006	0.0035	0.0043
LNLAB	0.0956	0.1075	0.1358	0.1641	0.1729
HSLAB	-0.1108	-0.0646	0.1116	0.2930	0.3383
PLCNCR	-0.0385	-0.0244	0.0213	0.0676	0.0787
TMPUM	-0.0567	-0.0309	0.0264	0.0845	0.0974
COMPUSE	0.0091	0.0171	0.0432	0.0686	0.0739
SMEDO	-0.0761	-0.0449	0.0575	0.1627	0.1907
ORGPROX	0.0097	0.0160	0.0366	0.0579	0.0621
CLUSTER	-0.0251	-0.0220	-0.0111	-0.0013	0.0019
EDUCA	-0.0430	-0.0352	-0.0016	0.0322	0.0397
FORLA	-0.0061	0.0059	0.0493	0.0905	0.1031
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0010	-0.0006	0.0002	0.0013	0.0020
LNLAB	-0.0300	-0.0167	0.0292	0.0861	0.1104
HSLAB	-0.0403	-0.0206	0.0248	0.1148	0.1624
PLCNCR	-0.0141	-0.0072	0.0048	0.0241	0.0319
TMPUM	-0.0187	-0.0084	0.0054	0.0282	0.0426
COMPUSE	-0.0079	-0.0049	0.0096	0.0299	0.0444
SMEDO	-0.0281	-0.0152	0.0119	0.0532	0.0741
ORGPROX	-0.0081	-0.0042	0.0080	0.0249	0.0343
CLUSTER	-0.0139	-0.0091	-0.0025	0.0013	0.0022
EDUCA	-0.0216	-0.0130	-0.0007	0.0086	0.0153
FORLA	-0.0136	-0.0057	0.0107	0.0368	0.0547
Total	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0043	-0.0027	0.0008	0.0044	0.0057
LNLAB	0.1034	0.1156	0.1650	0.2303	0.2589
HSLAB	-0.1432	-0.0801	0.1364	0.3680	0.4621
PLCNCR	-0.0487	-0.0284	0.0261	0.0843	0.1023
TMPUM	-0.0693	-0.0374	0.0317	0.1064	0.1164
COMPUSE	0.0112	0.0187	0.0527	0.0939	0.1101

Table 5.15.1.: continued

SMEDO	-0.0957	-0.0565	0.0695	0.1961	0.2431
ORGPROX	0.0103	0.0182	0.0446	0.0747	0.0884
CLUSTER	-0.0343	-0.0285	-0.0135	-0.0014	0.0019
EDUCA	-0.0617	-0.0464	-0.0023	0.0391	0.0475
FORLA	-0.0072	0.0073	0.0600	0.1209	0.1388

5.5. Conclusion

In this chapter, the hypothesis of knowledge spillovers in Ankara and Istanbul OIZs is tested by micro and spatial econometric tools. The export decision function is estimated on the firm level with SMEDO dataset. Not only micro and spatial econometrics estimations are compared but also the behavioral differences between the two provinces are also compared.

In the export decision function five set of variables are used from the SMEDO dataset. In the first set, age of the firm (LNAGE), number of total labor (LNLAB) and high skilled labor percentage (HSLAB) are used for characteristic of the firm. In the second set, three variables are proxied the technology level of the firm. To have PLC, CNC and robot (PLCNCR); to have a trade mark, patent and useful model (TMPUM); and computer usage in the production, design and research (COMPUSE) are the variables that utilized for technology proxy. Education level (EDUCA) and foreign language knowledge (FORLA) of the administrator is employed for the characteristic of the administrator. Usage of SMEDO incentives (SMEDO), organizational proximity (ORGPROX) and cluster proximity (CLUSTER) are also important in the export decision of a firm. In the last set, border (BDUM) and sea (SDUM) are used. Pavitt taxonomies are exerted for industrial differences.

The distribution of the industries by Pavitt taxonomy differ in Turkey, Turkey OIZs, Ankara OIZs and Istanbul OIZs as can be seen at Appendix Table 5.22.. In Turkey almost 60% of the firms are suppliers dominated industries. This industries share in Ankara and in Istanbul is 26% and 53%, respectively. Ankara OIZs are dominated by specialized suppliers and scale intensive industries. Supplier dominated industries are eminent in Istanbul OIZs as in Turkey. Science based industries have a very low share not only in Turkey but also in both provinces. The industry structure of two provinces is totally different. This structure may also explain the some differences.

The summary of the micro and spatial econometric estimation results for Ankara and Istanbul are presented at Appendix 5.23. and Appendix 5.24.., respectively. In Ankara and Istanbul, especially four variables, i.e. LNLAB, COMPUSE, ORGPROX and FORLA, draw attention in micro and spatial analysis due to their significance in all estimations at 1%. Size of the firm indicates the scale advantages. Higher the size, higher is the probability to export. Technology as proxied by computer usage in production, design and research has a positive effect on the export decision of the firm as expected. The membership of professional organizations increases firm's network capabilities which affect the export propensity of the firm. Moreover the foreign language ability of the administrator is easing the firms export possibility.

In micro econometric analysis, the effect of the percentage of exporters in the industry is higher than the total number of exporting firms on the probability to export of a firm in Ankara and in Istanbul. This is also a sign for the spatial effects. The firms are affected by the percentage of exporters around. To distinguish the industry and all industries effect, the estimation results for Turkey guide us. The percentage of exporter in an industry in a province is more influential than the percentage of exporters in a province. This is also an indicator for the Marshallian knowledge spillovers.

Intra-OIZ relations in Ankara are proved through the spatial econometric analysis. One third of the total effect of the variables is from spatial effects. Without the spatial dependence, the effect of the variables is underestimated. Intra-industry relations are also meaningful. One fourth of the total effect is from indirect effects. In Istanbul, for both intra-OIZ and intra-industry relations, one fourth of total effect is from spatial effects. This ratio is higher in intra-OIZ relations in Ankara with one third of the total effect. In Ankara, the firms in the OIZs are more sensitive to their neighboring firms when they decide to do export.

In Istanbul, there is inconsistency between the spatial autocorrelation test and the significance of the lag value for intra-OIZ relations and intra-industry relations. For intra-OIZs, the tests that no sign of spatial autocorrelation inspite of that the estimated spatial lag value is significant. For intra-industry relation in Istanbul, the situation is vice versa. When the insignificant variables (SMEDO and EDUCA) are omitted from the model, consistent results are obtained for at least intra-industry relations. For coherency, we prefer to use same independent variables throughout the whole study.

In spatial analysis, Ankara and Istanbul have common four variables, namely LNLAB, COMPUSE, ORGPROX and FORLA. While HSLAB is significant at 5% in intra-OIZ relations and at 10% intra-industry relations in Ankara OIZs, CLUSTER is significant at 5% in both relations with a negative sign in Istanbul OIZs. These two variables are distinguishing variables one province from the other. The share of high skilled labor is almost effective in Ankara for export decision. Firms in Ankara are sensible to the high skilled labor. This variable does not have any influence on Istanbul. Nevertheless, Istanbul firms are susceptible to relations with the cluster. Close relations with the cluster cause firm to close in the country. Istanbul firm are in need of outside OIZ relations to increase their competitiveness and sell their products to foreign countries.

In sum; size of the firm, technology, organizational proximity and foreign language ability of the administrator are the main determinants of export decision in OIZ for Ankara and Istanbul. The spatial dependence in intra-OIZ and intra-industry in Ankara are proved in our study. For Istanbul, spatial econometric results are unreliable. In Ankara, one third of the total effect in intra-OIZ relations caused by the spatial dependence to the neighboring units while one fourth of the total effect in intra-industry relations.

CHAPTER 6

CONCLUSION AND POLICY IMPLICATIONS

6.1. Introduction

In this study, Our major aim is to investigate the existence of knowledge spillovers in Ankara and Istanbul OIZs. Our main hypothesis is to reveal out intra-OIZ relations for Ankara and Istanbul. Our sub-hypothesis is to uncover the intra-industry relations in those provinces by using OIZ data. We estimate export decision function in testing our hypothesis. We use data from “Field Research Survey” which is collected by Small and Medium Enterprises Development Organization (SMEDO). Spatial econometric technique is preferred to use as an analysis tool.

6.2. Main Findings

In this study, except the introduction and conclusion chapter, there is four main chapters. The literature on knowledge spillovers and clusters are reviewed in Chapter 2. The model and the method are summarized in Chapter 3. The export behavior in Turkey by provinces is mapped in Chapter 4. Finally, the estimation results from micro and spatial econometrics are presented in Chapter 5.

In the endogenous growth theory, “knowledge” becomes important variable for the theoreticians and the politician who are seeking sustainable growth. Knowledge spillovers, which are simply “externalities” in economic theory, believed to trigger the economic growth. The firm is benefitting from other firms around which are accumulating knowledge although the economists emphasize that knowledge transfer mechanisms are not clear.

There are three main types of theories on knowledge spillovers: Marshall-Arrow-Romer (MAR), Jacobs and Porter. MAR type of externalities is in favor of specialization of an industry for to knowledge to spill, while in Jacobs type of externalities, diversification of industries in a region/province are emphasized. In MAR externalities, intra-industry relations are important than inter-industry relation which is crucial in Jacobs externalities. Porter is in line with MAR externalities with including the competition between the firms.

Cluster idea stem from the Marshall who first stresses the role of location in knowledge transfer. Porter makes the idea famous after 2000s. Porter stresses the importance of geographical agglomerations (clusters) which is for him best way to transfer knowledge between the firms. Three conditions are necessary in the definition of clusters: geographical proximity, competitive environment and network between the firms. In our study, we are questioning whether the OIZs are cluster or not. In OIZ, it is sure that they are geographically close. For competitive environment, no direct measure exists. For network between the firms, knowledge spillovers could be used to measure whether the firms are affected from each other or not.

R&D, trade and FDI is the three different mechanisms for knowledge to flow. We prefer to use export decision function to analyze whether there is knowledge spillovers in OIZs and in industries. As in the hypothesis, the spatial units are used; the best method is the spatial econometrics analysis. The difference between the spatial and standard econometrics, in the latter spatial dependence is ignored. When the spatial dependence is in the dependent variable, spatial autoregressive model (SAM) is used. If the spatial dependence is in the error term, spatial error model (SEM) is utilized.

In the export decision function four set of variables is used. The age of the firm (LNAGE), the size of firm (LNLAB) and the percentage of high skilled labor (HSLAB) are used for the characteristics of the firm. Three technology proxies is used: to have PLC, CNC and robot (PLCNCR); to have trade mark, patent and useful model (TMPUM); and computer usage in production, design or research (COMPUSE). Third set involves the characteristics of the administrator: education level of the administrator (EDUCA) and the foreign language knowledge of the administrator (FORLA). SMEDO incentives (SMEDO), organization proximity (ORGROX) and cluster proximity (CLUSTER) are under the set of other. Besides these four set of variables, dummies for the border and seaside provinces are also used with Pavitt taxonomy dummies.

The structure (distribution of industries) of OIZs is different in Ankara and Istanbul. In Istanbul supplier-dominated industries are dominant with 52.47% while the share of these industries is only 25.70% in Ankara. In Turkey, these industries' share is 59.38% in SMEDO sample. In Ankara, scale-intensive and specialized industries are more widespread.

The existence of knowledge spillovers in intra-OIZs and intra-industry for Ankara is proved through spatial econometric analysis. One third and one fourth of the total effect is from indirect (spatial effects) in intra-OIZ and intra-industry relations, respectively in Ankara. There is inconsistency between the test and estimation results for Istanbul. Our solution is to omit some of the insignificant results but to be consistent throughout the thesis, we prefer to present results with the same independent variables. For Istanbul, one fourth of the total is from spatial (indirect) effects for both intra-OIZ and intra industry relations.

In the spatial econometric analysis, four variables are significant for both Ankara and Istanbul. The significant variables are the size of the firm (LNLAB); computer usage in production, design and research; organizational proximity (ORGROX); and foreign language knowledge of the administrator. The difference between the two provinces comes from the uncommon variables. Besides these four variables, in Ankara high skilled labor (HSLAB) is significant while in Istanbul cluster proximity (CLUSTER) with a negative sign is significant.

6.3. Policy Recommendation

In this study, we analyze the efficiency of OIZ policy from knowledge spillover perspective. SMEDO survey is used with the spatial econometric method. The findings of our analysis can also be used to propose policy recommendations to improve the industrial policy towards OIZs. The insignificant variables are also as important as the significant for policy considerations.

The four variables are prominent in our study for Ankara and Istanbul OIZs for export decision function. Logarithm of total labor (LNLAB); computer usage in production, design and research (COMPUSE); organizational proximity (ORGPROX); and finally foreign language knowledge of the administrator

(FORLA) are significant for both Ankara and Istanbul OIZs in the spatial econometric estimation of the export decision function.

LNLAB variable is used for firm size which indicates the economies of scale. The bigger the firm is the higher to probability to export. Higher export probability of a firm means higher competitiveness. Policy makers can encourage firms hire more labor and increase their capacities. In SMEDO incentives for R&D, innovation and industrial application support program[81], 75% of the labor cost till 100,000 YTL of a firm is covered by SMEDO. It is still in force although it is restricted to the firm which has incentive for R&D or innovation. To say more on this subject, it should be investigated the R&D and trade relation which we will mention as a further research subject in Chapter 6.4..

COMPUSE variable is used as a technology proxy in the model. First of all, the relationship between the three technology proxies should be analyzed. We suggest this also as a further analysis to talk on this subject for policy implication. The simple policy recommendation is to finance the computer expenditures and software purchases. In SMEDO incentives for R&D, innovation and industrial application support program, 75% of the machinery, software and design expense till 150,000 YTL of a firm is covered by SMEDO. This incentive is only for the firms which has a R&D or innovation intent. It is necessary do some further analysis for a comprehensive policy recommendation.

ORGPROX is also one of the significant variables for Ankara and Istanbul OIZs. Organizational proximity variable is constructed from membership of

[81] For detailes of the program, check http://www.kosgeb.gov.tr/Pages/UI/Destekler.aspx?ref=6 (Access date: 01.07.2012)

chamber of commerce and industry of the firm. The membership of a professional organization creates an environment for firm to interact, to cooperate and to share information. This is an indicator that firms need a shared environment for relation. The professional organizations such as chamber of mechanical engineers can be encouraged for establishing in each province. Another recommendation is to organize professional domestic or foreign trips by SMEDO centers, OIZ head offices or chamber of commerce and industry of the provinces.

FORLA is the fourth common significant variable for Ankara and Istanbul OIZs. The policy recommendation of it is simple. Each OIZ can open a free or low-cost language courses for their members. It is not only to increase the probability of export of a firm but also to create a suitable condition for interaction between the firms in the OIZs. It should be investigated in which language course is better for the province. Each province probably has interconnects with certain countries. In the southeast region, probably Arabic or Persian courses will be more effective than English or German ones. In Istanbul probably English or German courses will be more efficient. To open language courses is easy policy with low cost compared to other policy options. Several OIZs might be using this policy option of language courses but it should be encouraged in all provinces.

High skilled labor (HSLAB) and cluster proximity (CLUSTER) are the distinctive variables for Ankara and Istanbul OIZs. In Ankara OIZs, high skilled labor is almost effective. The higher is the high skilled labor percentage, the higher is the probability to export in Ankara. The reason behind that in Ankara the firms are in need of high skilled labor. To have high-skilled labor in own institution gives a firm advantage to export. This can be solved by encouraging the high-skilled labor work in OIZs or by analyzing what kind of labor the firms are in need of and opening technical courses.

In Istanbul, the situation is more complex than in Ankara. Close firm relations in the OIZ causes to firm embedded in the country. For knowledge to spill, interaction between the firms in the OIZ is necessary although this interaction is obstacle of the firm to export. In further research, by analyzing which type of relation is causing the firm to enclose will be helpful for policy recommendations. We study six different relations in one variable in our study. Each of the relations should be analyzed in detail to understand the embeddedness of the firm in OIZs in Istanbul.

Insignificant variables indicate the unimportant issues in the export decision of a firm. For example, age of the firm (LNAGE) have no influence on the export decision of the firm. The hypothesis of the advantage of the incumbent or the advantage of newly established firm is rejected. In our study, three technology proxies is used: to have PLC, CNC and robot (PLCNCR); to have trade mark, patent and useful model (TMPUM); and computer usage in production, design or research (COMPUSE). Only COMPUSE is significant for Ankara and Istanbul OIZs in our study. For further research, it is necessary to understand the relation of three technology proxies.

One of the insignificant variables is the usage of SMEDO incentives (SMEDO). It does not mean that SMEDO incentives are not efficient. Most of the incentives are R&D and innovation based, not trade. To increase the competitiveness, it should be arranged some incentives for encouraging exports by SMEDO. It is also necessary to understand the relation of R&D policies and exports.

In our study, HSLAB is significant for Ankara OIZs while education level of administrator (EDUCA) have no effect on the probability of exports of a firm in Ankara and Istanbul OIZs. The education or the skill of the administrator have no importance, nevertheless the most important skill of the administrator is ability to speak a foreign language.

6.4. Further Research

In this thesis, we try to enlighten the efficiency of OIZs from the knowledge spillover perspective with the help of the spatial econometric techniques. This study is just a beginning of an analysis series of OIZ, TDZ and IZ policies in Turkey. Eight of the suggestions for further analysis are explained with its reasoning's although it is not limited to only eight. The most appropriate ones are stated here.

First of all, this study can be replicated for TDZs. The structure of the TDZs is different than the OIZs as we summarize in Chapter 2. The knowledge spillover mechanism between the firms in TDZs is probably different than the OIZs and it is interesting for policy implications. After the TDZ analysis, the findings of the TDZs and OIZs can be compared to understand which better instrument for the industrial policy is.

Secondly, in this thesis, we only focus on the two provinces, i.e. Ankara and Istanbul. In SMEDO sample, the five provinces have more than 200 observations for OIZs. The provinces are Bursa (292 observation), Gaziantep (225), Izmir (249 observation), Kayseri (268 observation) and Konya (204 observation). Each of these provinces has an important role in the manufacturing industry of Turkey. Findings of each city can be compared and this comparison is also very useful guide in the construction of industrial policy in Turkey.

Thirdly, this study can be replicated for the Pavitt taxonomies. The data for OIZs can be aggregated for Pavitt taxonomies in each province. Actually, we also tried this analysis although the spatial tobit results was not suitable for presenting here due to the bugs in the MATLAB code. After the revision of the MATLAB code for spatial probit, existence of MAR and Jacobs knowledge spillovers can be tested for whole Turkey.

Fourthly, our hypothesis is on intra-OIZ relations, it could be extended to inter-OIZ relations. In an OIZ, the knowledge transfer mechanism can be tested within the same industry firms or from different industries. For this analysis, the contiguity matrix should be constructed from the distances between the firms.

As a fifth suggestion for further research, in our study, we use the export decision function. In the SMEDO sample, there is also information about the export rates of firms, although this information is restrictly available for all firms, i.e. one third of the firms are doing export in our whole and provincial samples. When the export rate is used, two third of data will be not be used.

As a sixth suggestion for further analysis, in our study, the computer usage in research, design and production (COMPUSE) is significant instead of other technology variables (TMPUM and PLCNCR). As a developing country, it is logical to have COMPUSE significant instead of TMPUM. If we had done this analysis for a developed country, we could probably have found the TMPUM variable significant. Owning a trade mark, patent or useful model is constricted in developing countries. This point needs further investigation.

As a seventh suggestion for further analysis which compatible with the sixth suggestion can be on trademarks, patent and useful models. Instead of using an export function, the study can be replicated for a technology model by exploiting the SMEDO sample. The comparison can be done through which channel of knowledge has a better transfer mechanism. As we stated in Chapter 2, knowledge spills through three channels: R&D, trade and FDI. With the extended analysis, we can in favor of one channel over the other.

As a seventh suggestion, in our study, we found foreign language ability of the administrator has a positive effect on export decision of the firm. Actually, in every province probably one language has an advantage over the others. As a policy tool, to open language courses is suggested. English classes will not a sufficient in south east region where to speak Arabic or Persian gives an advantage. In a policy recommendation, to state which language course to open is more easily applied.

As an eight suggestion for further analysis can be on the firms relation with the cluster. In our study, it is found that higher interactions with cluster cause the firm to embedded in the cluster in Istanbul. In an extended analysis, we can find which relation induces the embeddedness of the firm. In the SMEDO sample, seven different types of relations are exposed. We can detect which relationship with the OIZ causes the embeddedness of the firms. Embeddedness to the province or region causes firm less competitive. To increase competitiveness in Istanbul OIZs, the reason of it will be helpful for policy makers to overcome the problem.

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APPENDICES

A.2.1. The states of OIZs In Turkey

Stage of OIZ (OSB’nin Aşaması)

A: Choice of location (Yer Seçimi)

B: Expropriation (Kamulaştırma)

C: Planning (Planlama)

D: Infrastructure construction (Altyapı Inşaat)

E: Operating (Işletme)

Table A.2.1.: The states of OIZs in Turkey

PROVINCES	NAME OF OIZs	STAGE OF OIZ					GROSS OIZ DOMAIN (Hectare)
		A	B	C	D	E	
Adana	Adana Haci Sabanci					X	1,225.00
	Kozan					X	163.00
Adiyaman	Adiyaman					X	210.00
	Adiyaman Besni					X	124.13
	Adiyaman Golbasi					X	110.00
	Adiyaman Kahta		X				155.00
Afyonkarahisar	Afyonkarahisar					X	468.20
	Bolvadin				X		125.00
	Dinar			X			380.00
	Emirdag				X		104.00
	Iscehisar Mermer					X	150.00

	Dazkirıi Dokuma ve Konfeksiyon				X		17.00
	Suhut			X			180.00
	Sandikli				X		50.00
	AfyonkarahisarMerkez Il .	X					50.00
Agri	Agri				X		100.00
Aksaray	Aksaray					X	663.00
Amasya	Amasya					X	79.50
	Amasya Merzifon					X	111.80
	AmasyaSuluova				X		74.80
	Suluova Besi				X		90.00
Ankara	Ostim					X	472.00
	Ankara Ivedik					X	477.00
	Polatli					X	375.00
	Ankara Sanayi Odası I					X	954.00
	Aso 2. ve 3.				X		1,047.00
	Anadolu		X				410.00
	Baskent					X	1,045.00
	Sereflikochisar		X				141.00
	Cubuk Hayvancilik Ihtisas		X				255.00
	Beypazarı			X			300.00
	PolatliTicaret Odasi	X					50.00
	Ankara Dokuncul Er Ihtisas	X					240.00
Antalya	Antalya					X	662.00
	Kumluca Gida Ihtisas		X				21.00
Ardahan	Ardahan			X			150.00
Aydın	Aydın					X	110.00
	Astim					X	530.00
	Ortaklar					X	112.00
	Soke				X		185.00
	Nazilli				X		126.00
	Buharkent	X					95.00
	Cine				X		230.00
Balıkesir	Bandırma					X	150.00
	Balıkesir					X	550.00

	BalıkesirII.					X	135.00
	GonenDeri				X		150.00
	Zeytin ve Zeytin Urunleri Isleme Ihtisas	X					50.00
Bartin	BartinMerkez I.					X	74.80
Batman	Batman Ili					X	100.00
Bayburt	Bayburt					X	218.00
Bilecik	Bilecik I.					X	110.00
	Bilecik II.					X	194.00
	Bozuyuk					X	550.00
	Osmaneli				X		97.00
	Pazaryeri					X	145.00
	Sogut		X				140.00
Bingol	Bingol				X		76.00
Bitlis	Bitlis				X		57.00
Bolu	Bolu					X	147.00
	Gerede					X	100.00
	GeredeDeri				X		130.00
	Yenicaga	X					118.02
Burdur	Burdur					X	85.00
	BurdurBucak					X	85.00
	BurdurII.		X				96.00
Bursa	Nilufer					X	232.00
	Inegol					X	300.00
	BursaTicaret veSanayiOdasi					X	679.00
	GusabGursu					X	101.00
	Demirtas					X	475.00
	Mustafa Kemal Pasa					X	220.00
	MkpMermerciler					X	67.00
	Kestel					X	73.43
	Bursa Deri				X		173.30
	Yenisehir					X	173.58
	Hasanaga(Hosab)					X	111.00
	Inegol Mobilya Agac Isleri Ihtisas		X				410.00
	TosabBursa Tekstil Boyahaneleri		X				191.00
Canakkale	Biga					X	85.00

	Canakkale					X	100.00
Cankırı	Cankırı-Korgun					X	73.00
	Kursunlu Cavundur	X					50.00
	Sabanozu- (Cankırı)					X	57.00
	Cerkes		X				116.00
Corum	Corum					X	437.00
	CorumSungurlu				X		484.00
Denizli	Denizli					X	400.00
	DenizliCardak OzdemirSabanci					X	322.50
	DenizliDeri				X		63.00
	DenizliMermerIhtisas			X			160.00
	Saraykoy TarımaDayaliIhtisas		X				53.00
	DenizliTavas	X					230.00
Diyarbakir	Diyarnakir					X	532.00
	Diyarbakir TarımaDayalıIhtisas(Tdi) BesiSut	X					180.00
Duzce	Duzce					X	173.00
	Duzce II					X	81.00
Edirne	Edirne					X	107.00
	Kesan		X				150.00
Elazig	Elazig					X	312.00
	ElazigHayvanUrunleri					X	18.50
Erzincan	Erzincan					X	373.00
Erzurum	Erzurum I.					X	115.00
	Erzurum II.		X				260.00
	Oltu			X			180.00
Eskisehir	EskisehirSanayiOdasiI Osb					X	2,912.00
	Sivrihisar		X				600.00
	Beylikova Besi			X			143.00
Gaziantep	Gaziantep					X	2,370.00
	Gaziantep Besi					X	450.00
	Nizip				X		99.00
Giresun	Giresun					X	70.00
Gumushane	Gumushane					X	76.00
Hakkari	Hakkari			X			38.00

Hatay	Antakya					X	150.00
	IskendurunII	X					100.00
	Hatay Erzin	X					100.00
	HatayPayas					X	53.00
	Iskenderun					X	114.00
Igdir	Igdir				X		200.00
Isparta	Isparta Deri				X		63.00
	Isparta Yalvac	X					200.00
	IspartaSuleymanDemirle					X	252.00
Istanbul	Ikitelli					X	700.00
	TuzlaMermerciler					X	72.00
	Istanbul Deri					X	741.25
	IstanbulBoya ve Vernik					X	52.00
	IstanbulTuzlaKimyaSanayicileri					X	74.22
	IstanbulDudullu					X	265.00
	IstanbulTuzla					X	60.00
	Beylikduzu					X	160.00
Izmir	IzmirAtatürk					X	700.00
	Tire					X	410.00
	Izmir Buca(Ege Giyim)					X	50.00
	Itob					X	250.00
	Izmir Aliaga					X	922.00
	Odemis			X			93.00
	IzmirBergama			X			179.00
	IzmirPancar Osb				X		95.00
	Kinik	X					85.00
	Menemen (Plastik)		X				92.00
	Torbalı	X					65.00
	IzmirKemelpasaOsb					X	1,030.00
	Izmir(Baysb) Bagyurdu		X				146.00
K.Maras	Kahramanmaras					X	300.00
	Elbistan		X				130.00
	Turkoglu		X				126.00
Karabuk	Karabuk					X	100.00
Karaman	Karaman					X	561.00
Kars	Kars					X	200.00

	Kars Besi	X					188.00
Kastamonu	Kastamonu					X	126.99
	Tosya	X					200.00
Kayseri	Kayseri					X	2,200.00
	Kayseri Incesu					X	610.00
	Kayseri Mimar Sinan					X	604.00
Kiriklale	Kirikkale I.					X	150.00
	Keskin				X		153.00
Kirklareli	Kirklareli					X	367.00
	Asbey Insaat Aslan Ozel	X					67.00
Kirsehir	Kirsehir					X	200.00
	KirsehirMucur	X					50.00
	KirsehirKaman				X		280.00
Kilis	Kilis					X	90.00
Kocaeli	Gebze					X	528.83
	Kocaeli-Gebze Taysad					X	257.50
	Kocaeli-Gebze Plastikciler					X	169.90
	Kocaeli-Gebze Guzeller					X	134.00
	Kocaeli- Gebzevi. (Imes)				X		300.00
	Kocaeli-Gebze IV (Istanbul Makineve ImalatSanayicileri				X		510.00
	Kocaeliebze V. (Kimya)		X				244.00
	Kocaeli-GebzeDilovasi					X	900.00
	Kocaeli-GebzeArslanbey					X	142.00
	Kocaeli-Gebze Asimkıdar					X	206.00
	Kocaeli-Gebze Komurculer			X			78.00
	KocaeliAlıkahya					X	160.00
	KandıraGıdaIhtisas		X				198.00
Konya	KonyaBirinci					X	134.00
	KonyaEregli					X	100.00
	Beysehir					X	100.00
	Konya					X	1,600.00
	Aksehir				X		125.00

	Seydisehir				X		150.00
	KonyaKarapinar		X				200.00
	Konya Kulu		X				400.00
	Cumra				X		50.00
Kutahya	Kutahya					X	215.00
	Kutahya Merkez2.		X				320.00
	Gediz					X	103.00
	Simav			X			130.00
	Tavsanli				X		116.00
Malatya	Malatya II.					X	500.00
	MalatyaMerkez I.					X	300.00
	MalatyaDarende	X					180.00
Manisa	Manisa					X	959.00
	ManisaTurgutlu I.					X	162.00
	Akhisar					X	292.00
	Salihli					X	115.00
	Kula Deri			X			203.00
Mardin	Mardin					X	300.00
Mersin	Mersin-Tarsus					X	558.00
	Silifke				X		92.00
Mugla	Milas			X			120.00
Mus	Mus					X	90.00
Nevsehir	NevsehirAcıgol			X			160.00
Nıgde	Nıgde					X	406.15
	Nigde Bor Karma					X	292.00
Ordu	Ordu Farsa					X	50.00
	Ordu					X	60.00
	Unye	X					40.00
Osmaniye	Osmaniye					X	380.00
	Kadirli					X	120.00
Rize	Rize			X			55.00
	RizeArdesen		X				56.00
Sakarya	Sakarya III.					X	254.00
	Sakarya I.					X	162.00
	Sakarya II.					X	350.00
	Sakarya Karasu	X					43.00
	Ferizli		X				69.00

	Kaynarca	X					89.00
Samsun	SamsunMerkez					X	160.00
	SamsunKavak					X	104.00
	SamsunBafra					X	228.00
	SamsunHavza	X					100.00
	SamsunGida	X					50.00
Siirt	Siirt					X	70.00
Sinop	Sinop					X	100.00
	Boyabat		X				72.00
Sivas	SivasMerkez I.					X	396.00
	SivasMerkez II.		X				850.00
	SivasGemerek				X		110.00
	Sarkisla				X		78.80
Sanliurfa	Sanliurfa					X	459.00
	Sanliurfa II.				X		1,170.00
	SanliurfaTarima DayaliIktisas	X					50.00
	SanliurfaViransehir					X	182.50
Sirnak	Sirnak				X		84.00
	Cizre			X			100.00
Tekirdag	Cerkezkoy					X	1,247.00
	Corlu Deri					X	130.00
	Hayrabolu					X	100.00
	Malkara				X		105.60
Tokat	TokatMerkez					X	500.00
	Erbaa					X	130.00
	Zile				X		110.00
	Niksar				X		210.00
	Turhal					X	59.42
Trabzon	Trabzon Arsin					X	100.00
	Trabzon Besikduzu				X		72.00
	Vakfikebir(Trabzon)			X			83.00
	TrabzonSinik(Akcaabat)		X				83.00
Tunceli	Tunceli				X		106.00
Usak	Usak Deri(KarmaA)					X	264.00
	Usak					X	680.00
	UsakKarahalli					X	67.00

Van	Van					X	127.00
Yalova	YalovaCicekcilik		X				139.00
	YalovaBilisim		X				34.50
Yozgat	Yozgat Kale Seramik Ozel					X	56.20
	Yozgat					X	150.00
Zonguldak	Zomguldak Caycuma					X	125.00
	ZonguldakAlapli			X			81.50
	Zonguldak Eregli					X	200.00
	COMPENDIUM	A	B	C	D	E	68,780.92
	STAGE OF OIZ (Number)	25	30	19	41	148	263
	OIZ DOMAIN (Hectare)	2,670.02	6,157.50	2,837.60	7,658.50	49,481.40	
		10%	11%	7%	16%	56%	

Source: www.osbuk.org.tr

A.2.2. The rank order of provinces by their square meter of OIZs per person

Rank	Province	Population In 2009	Total number of OIZs	Total square of OIZs	Sqmtr of OIZ per person
1	Bilecik	202,061	6	12,360,000	61.17
2	Eskisehir	755,427	3	37,230,000	49.28
3	Usak	335,860	3	10,130,000	30.16
4	Bayburt	74,710	1	2,180,000	29.18
5	Kayseri	1,205,872	3	34,130,000	28.30
6	Kocaeli	1,522,408	13	38,362,100	25.20
7	Karaman	231,872	1	5,610,000	24.19
8	Afyonkarahisar	701,326	9	16,698,600	23.81
9	Kirsehir	223,102	3	5,300,000	23.76
10	Sivas	633,347	4	14,340,000	22.64
11	Nigde	339,921	2	6,980,000	20.53
12	Tekirdag	783,310	4	15,596,000	19.91
13	Bolu	271,545	4	4,950,000	18.23
14	Gaziantep	1,653,670	3	29,190,000	17.65
15	Aksaray	376,907	1	6,630,000	17.59
16	Erzincan	213,288	1	3,730,000	17.49
17	Corum	540,704	2	9,210,000	17.03
18	Tokat	624,439	5	10,087,200	16.15
19	Cankiri	185,019	4	2,960,000	16.00
20	Kutahya	571,804	5	8,840,000	15.46
21	Konya	1,992,675	9	28,894,000	14.50
22	Aydin	979,155	7	13,679,000	13.97
23	Denizli	926,362	6	12,385,000	13.37
24	Malatya	736,884	3	9,800,000	13.30
25	Ankara	4,650,802	12	61,350,000	13.19
26	Kirklareli	333,179	2	4,340,000	13.03
27	Manisa	1,331,957	5	17,311,600	13.00
28	Kars	306,536	2	3,940,000	12.85
29	Tunceli	83,061	1	1,060,000	12.76
30	Bursa	2,550,645	13	32,060,100	12.57
31	Isparta	420,796	3	5,150,000	12.24
32	Sanlıurfa	1,613,737	4	18,615,000	11.54
33	Izmir	3,868,308	13	43,860,000	11.34
34	Sakarya	861,570	6	9,660,000	11.21
35	Amasya	324,268	4	3,561,000	10.98

A.2.2.: continued

36	Igdir	183,486	1	2,000,000	10.90
37	Kirikkale	280,834	2	3,030,000	10.79
38	Osmaniye	471,804	2	5,000,000	10.60
39	Burdur	251,550	3	2,660,000	10.57
40	Adiyaman	588,475	4	5,991,300	10.18
41	BalikesIr	1,140,085	5	10,462,000	9.18
42	Sinop	201,134	2	1,720,000	8.55
43	Yalova	202,531	2	1,730,000	8.54
44	Adana	2,062,226	2	17,610,000	8.54
45	Duzce	335,156	2	2,540,000	7.58
46	Kilis	122,104	1	900,000	7.37
47	Erzurum	774,207	3	5,550,000	7.17
48	Zonguldak	619,812	3	4,060,000	6.55
49	Edirne	395,463	2	2,570,000	6.50
50	Elazıg	550,667	2	3,305,000	6.00
51	Gumushane	130,976	1	760,000	5.80
52	Nevsehir	284,025	1	1,600,000	5.63
53	Kahramanmaras	1,037,491	3	5,560,000	5.36
54	Kastamonu	359,823	2	1,899,900	5.28
55	Samsun	1,250,076	5	6,420,000	5.14
56	Ardahan	108,169	1	514,000	4.75
57	Diyarbakir	1,515,011	2	7,120,000	4.70
58	Karabuk	218,564	1	1,000,000	4.58
59	Mersin	1,640,888	2	7,500,000	4.57
60	Trabzon	765,127	4	3,363,400	4.40
61	Sirnak	430,424	2	1,840,000	4.27
62	Yozgat	487,365	2	2,062,000	4.23
63	Hatay	1,448,418	5	6,110,000	4.22
64	Mardin	737,852	1	3,000,000	4.07
65	Bartin	188,449	1	748,000	3.97
66	Canakkale	477,735	2	1,850,000	3.87
67	Antalya	1,919,729	2	6,830,000	3.56
68	Rize	319,569	2	1,060,000	3.32
69	Bingol	255,745	1	720,000	2.82
70	Siirt	303,622	1	700,000	2.31
71	Batman	497,998	1	1,130,000	2.27
72	Mus	404,484	1	900,000	2.23
73	Ordu	723,507	3	1,500,000	2.07
74	Agri	537,665	1	1,000,000	1.86

A.2.2.: continued

75	Bitlis	328,489	1	570,000	1.74
76	Giresun	421,860	1	700,000	1.66
77	Istanbul	12,915,158	8	21,292,600	1.65
78	Mugla	802,381	1	1,200,000	1.50
79	HakkarIi	256,761	1	380,000	1.48
80	Van	1,022,310	1	1,270,000	1.24
81	Artvin	165,580			0.00
SUM:		**72,561,312**	**263**	**699,907,800**	**9.65**

Source: www.osbuk.org.tr

A.4.1. Detailed Statistics of Export behavior both for Turkey and the sample by provinces

A.4.1.1. Exports in 2002 and 2008 by province

cno	province	exp2002	expshr2002	exp2009	expshr2009
1	Adana	461040	1.2790	1134975	1.1115
2	Adıyaman	8097	0.0225	58091	0.0569
3	Afyon	55184	0.1531	208609	0.2043
4	Ağrı	3153	0.0087	44336	0.0434
5	Amasya	1312	0.0036	21629	0.0212
6	Ankara	1515106	4.2030	4909196	4.8078
7	Antalya	165989	0.4605	654391	0.6409
8	Artvin	8286	0.0230	54955	0.0538
9	Aydın	156508	0.4342	421766	0.4131
10	Balıkesir	90166	0.2501	364675	0.3571
11	Bilecik	12985	0.0360	32687	0.0320
12	Bingöl	28	0.0001	1478	0.0014
13	Bitlis	235	0.0007	3001	0.0029
14	Bolu	7866	0.0218	45740	0.0448
15	Burdur	15575	0.0432	161553	0.1582
16	Bursa	3456516	9.5886	9057157	8.8700
17	Çanakkale	52616	0.1460	85955	0.0842
18	Çankırı	1179	0.0033	18303	0.0179
19	Çorum	26300	0.0730	98989	0.0969
20	Denizli	680541	1.8879	1587336	1.5545
21	Diyarbakır	6811	0.0189	115848	0.1135
22	Edirne	15643	0.0434	93267	0.0913
23	Elazığ	24328	0.0675	30061	0.0294
24	Erzincan	364	0.0010	9747	0.0095
25	Erzurum	7070	0.0196	24255	0.0238
26	Eskişehir	151065	0.4191	557754	0.5462
27	Gaziantep	619536	1.7186	2952488	2.8915
28	Giresun	64659	0.1794	101741	0.0996
29	Gümüşhane	23	0.0001	112	0.0001
30	Hakkari	4850	0.0135	399065	0.3908
31	Hatay	349548	0.9697	1416898	1.3876

A.4.1.1.: continued

32	Isparta	57576	0.1597	74618	0.0731
33	İçel	319972	0.8876	1047815	1.0262
34	İstanbul	20970063	58.1723	55541325	54.3937
35	İzmir	2777767	7.7057	6117777	5.9914
36	Kars	807	0.0022	236	0.0002
37	Kastamonu	20199	0.0560	82918	0.0812
38	Kayseri	351569	0.9753	963223	0.9433
39	Kırklareli	32344	0.0897	68639	0.0672
40	Kırşehir	15217	0.0422	111609	0.1093
41	Kocaeli	1268868	3.5199	4557639	4.4635
42	Konya	129959	0.3605	734944	0.7198
43	Kütahya	42622	0.1182	101758	0.0997
44	Malatya	71618	0.1987	221160	0.2166
45	Manisa	311945	0.8654	911996	0.8932
46	Kahramanmaraş	110305	0.3060	430773	0.4219
47	Mardin	23405	0.0649	549798	0.5384
48	Muğla	39624	0.1099	193557	0.1896
49	Muş	70	0.0002	6642	0.0065
50	Nevşehir	7540	0.0209	20688	0.0203
51	Niğde	19363	0.0537	36351	0.0356
52	Ordu	110499	0.3065	205150	0.2009
53	Rize	89385	0.2480	259529	0.2542
54	Sakarya	428029	1.1874	1722184	1.6866
55	Samsun	37715	0.1046	304213	0.2979
56	Siirt	360	0.0010	921	0.0009
57	Sinop	3729	0.0103	20128	0.0197
58	Sivas	8463	0.0235	37391	0.0366
59	Tekirdağ	298731	0.8287	483255	0.4733
60	Tokat	5747	0.0159	21719	0.0213
61	Trabzon	234075	0.6493	815701	0.7988
62	Tunceli		0.0000	19	0.0000
63	Şanlıurfa	6967	0.0193	128431	0.1258
64	Uşak	47284	0.1312	96701	0.0947
65	Van	1427	0.0040	17341	0.0170
66	Yozgat	6157	0.0171	9362	0.0092

A.4.1.1: continued

67	Zonguldak	31899	0.0885	438425	0.4294
68	Aksaray	9949	0.0276	56538	0.0554
69	Bayburt	178	0.0005	177	0.0002
70	Karaman	36099	0.1001	145700	0.1427
71	Kırıkkale	1323	0.0037	6005	0.0059
72	Batman	600	0.0017	16187	0.0159
73	Şırnak	21172	0.0587	606945	0.5944
74	Bartın	739	0.0021	14659	0.0144
75	Ardahan	218	0.0006	1882	0.0018
76	Iğdır	21505	0.0597	79637	0.0780
77	Yalova	16251	0.0451	33577	0.0329
78	Karabük	9757	0.0271	58062	0.0569
79	Kilis	2486	0.0069	16456	0.0161
80	Osmaniye	698	0.0019	9754	0.0096
81	Düzce	83325	0.2311	64319	0.0630
	Turkey	36048179		102109892	

Source: TURKSTAT

A.4.1.2. Changes in Exports between 2002 and 2009 by province

cno	province	chexp29 (#)	expch29 (%)	expshch29
1	Adana	673935	1.4618	-0.1674
2	Adıyaman	49994	6.1744	0.0344
3	Afyon	153425	2.7802	0.0512
4	Ağrı	41183	13.0615	0.0347
5	Amasya	20317	15.4855	0.0175
6	Ankara	3394090	2.2402	0.6048
7	Antalya	488402	2.9424	0.1804
8	Artvin	46669	5.6323	0.0308
9	Aydın	265258	1.6949	-0.0211
10	Balıkesir	274509	3.0445	0.1070
11	Bilecik	19702	1.5173	-0.0040
12	Bingöl	1450	51.7857	0.0014
13	Bitlis	2766	11.7702	0.0023
14	Bolu	37874	4.8149	0.0230
15	Burdur	145978	9.3726	0.1150
16	Bursa	5600641	1.6203	-0.7186
17	Çanakkale	33339	0.6336	-0.0618
18	Çankırı	17124	14.5242	0.0147
19	Çorum	72689	2.7638	0.0240
20	Denizli	906795	1.3325	-0.3333
21	Diyarbakır	109037	16.0090	0.0946
22	Edirne	77624	4.9622	0.0479
23	Elazığ	5733	0.2357	-0.0380
24	Erzincan	9383	25.7775	0.0085
25	Erzurum	17185	2.4307	0.0041
26	Eskişehir	406689	2.6921	0.1272
27	Gaziantep	2332952	3.7656	1.1728
28	Giresun	37082	0.5735	-0.0797
29	Gümüşhane	89	3.8696	0.0000
30	Hakkari	394215	81.2814	0.3774
31	Hatay	1067350	3.0535	0.4180
32	Isparta	17042	0.2960	-0.0866
33	İçel	727843	2.2747	0.1385

A.4.1.2.: continued

34	İstanbul	34571262	1.6486	-3.7786
35	İzmir	3340010	1.2024	-1.7143
36	Kars	-571	-0.7076	-0.0020
37	Kastamonu	62719	3.1051	0.0252
38	Kayseri	611654	1.7398	-0.0320
39	Kırklareli	36295	1.1222	-0.0225
40	Kırşehir	96392	6.3345	0.0671
41	Kocaeli	3288771	2.5919	0.9435
42	Konya	604985	4.6552	0.3592
43	Kütahya	59136	1.3875	-0.0186
44	Malatya	149542	2.0881	0.0179
45	Manisa	600051	1.9236	0.0278
46	Kahramanmaraş	320468	2.9053	0.1159
47	Mardin	526393	22.4906	0.4735
48	Muğla	153933	3.8848	0.0796
49	Muş	6572	93.8857	0.0063
50	Nevşehir	13148	1.7438	-0.0007
51	Niğde	16988	0.8773	-0.0181
52	Ordu	94651	0.8566	-0.1056
53	Rize	170144	1.9035	0.0062
54	Sakarya	1294155	3.0235	0.4992
55	Samsun	266498	7.0661	0.1933
56	Siirt	561	1.5583	-0.0001
57	Sinop	16399	4.3977	0.0094
58	Sivas	28928	3.4182	0.0131
59	Tekirdağ	184524	0.6177	-0.3554
60	Tokat	15972	2.7792	0.0053
61	Trabzon	581626	2.4848	0.1495
62	Tunceli	19	0.0000	0.0000
63	Şanlıurfa	121464	17.4342	0.1065
64	Uşak	49417	1.0451	-0.0365
65	Van	15914	11.1521	0.0130
66	Yozgat	3205	0.5205	-0.0079
67	Zonguldak	406526	12.7442	0.3409
68	Aksaray	46589	4.6828	0.0278

A.4.1.2.: continued

69	Bayburt	-1	-0.0056	-0.0003
70	Karaman	109601	3.0361	0.0425
71	Kırıkkale	4682	3.5389	0.0022
72	Batman	15587	25.9783	0.0142
73	Şırnak	585773	27.6673	0.5357
74	Bartın	13920	18.8363	0.0123
75	Ardahan	1664	7.6330	0.0012
76	Iğdır	58132	2.7032	0.0183
77	Yalova	17326	1.0661	-0.0122
78	Karabük	48305	4.9508	0.0298
79	Kilis	13970	5.6195	0.0092
80	Osmaniye	9056	12.9742	0.0076
81	Düzce	-19006	-0.2281	-0.1682

Source: TURKSTAT

A.4.1.3. Export Behaviour in the unrestricted sample

cno	province	observation	exporters	expmean	shareexp
1	Adana	1581	390	24.6679	1.9052
2	Adıyaman	156	22	14.1026	0.1075
3	Afyon	440	136	30.9091	0.6644
4	Ağrı	22	3	13.6364	0.0147
5	Amasya	204	32	15.6863	0.1563
6	Ankara	4963	1566	31.5535	7.6502
7	Antalya	898	173	19.265	0.8451
8	Artvin	33	5	15.1515	0.0244
9	Aydın	633	188	29.6998	0.9184
10	Balıkesir	1230	144	11.7073	0.7035
11	Bilecik	117	45	38.4615	0.2198
12	Bingöl	22	1	4.5455	0.0049
13	Bitlis	46	6	13.0435	0.0293
14	Bolu	147	40	27.2109	0.1954
15	Burdur	210	57	27.1429	0.2785
16	Bursa	5419	1671	30.836	8.1632
17	Çanakkale	337	41	12.1662	0.2003
18	Çankırı	64	16	25	0.0782
19	Çorum	397	84	21.1587	0.4104
20	Denizli	1212	432	35.6436	2.1104
21	Diyarbakır	313	47	15.016	0.2296
22	Edirne	101	11	10.8911	0.0537
23	Elazığ	274	48	17.5183	0.2345
24	Erzincan	96	12	12.5	0.0586
25	Erzurum	190	22	11.579	0.1075
26	Eskişehir	805	171	21.2422	0.8354
27	Gaziantep	2324	621	26.7212	3.0337
28	Giresun	129	22	17.0543	0.1075
29	Gümüşhane	54	7	12.963	0.0342
30	Hakkari	20	1	5	0.0049
31	Hatay	934	135	14.454	0.6595
32	Isparta	317	52	16.4038	0.254

A.4.1.3: continued

33	İçel	1147	390	34.0017	1.9052
34	İstanbul	17022	8602	50.5346	42.0225
35	İzmir	3643	1579	43.3434	7.7137
36	Kars	25	1	4	0.0049
37	Kastamonu	103	8	7.767	0.0391
38	Kayseri	1590	574	36.1006	2.8041
39	Kırklareli	96	20	20.8333	0.0977
40	Kırşehir	123	27	21.9512	0.1319
41	Kocaeli	803	361	44.9564	1.7636
42	Konya	2322	695	29.9311	3.3952
43	Kütahya	324	65	20.0617	0.3175
44	Malatya	459	107	23.3116	0.5227
45	Manisa	875	212	24.2286	1.0357
46	Kahramanmaraş	478	134	28.0335	0.6546
47	Mardin	67	30	44.7761	0.1466
48	Muğla	197	65	32.9949	0.3175
49	Muş	31	0	0	0
50	Nevşehir	265	41	15.4717	0.2003
51	Niğde	168	22	13.0952	0.1075
52	Ordu	270	55	20.3704	0.2687
53	Rize	228	18	7.8947	0.0879
54	Sakarya	386	163	42.228	0.7963
55	Samsun	647	188	29.0572	0.9184
56	Siirt	29	8	27.5862	0.0391
57	Sinop	99	19	19.1919	0.0928
58	Sivas	208	45	21.6346	0.2198
59	Tekirdağ	495	168	33.9394	0.8207
60	Tokat	354	48	13.5593	0.2345
61	Trabzon	490	117	23.8776	0.5716
62	Tunceli	25	0	0	0
63	Şanlıurfa	313	49	15.655	0.2394
64	Uşak	538	115	21.3755	0.5618
65	Van	283	17	6.0071	0.083

A.4.1.3.: continued

66	Yozgat	195	28	14.359	0.1368
67	Zonguldak	224	26	11.6071	0.127
68	Aksaray	232	38	16.3793	0.1856
69	Bayburt	15	3	20	0.0147
70	Karaman	148	38	25.6757	0.1856
71	Kırıkkale	58	13	22.4138	0.0635
72	Batman	66	11	16.6667	0.0537
73	Şırnak	14	1	7.1429	0.0049
74	Bartın	98	23	23.4694	0.1124
75	Ardahan	11	1	9.0909	0.0049
76	Iğdır	15	12	80	0.0586
77	Yalova	291	52	17.8694	0.254
78	Karabük	118	16	13.5593	0.0782
79	Kilis	25	5	20	0.0244
80	Osmaniye	186	25	13.4409	0.1221
81	Düzce	81	34	41.9753	0.1661
	Turkey	62137	20470	33.4213	

Source: SMEDO - authors own calculations.

A.4.1.4. Export Behavior in the restricted sample

cno	province	observation	exporters	expmean	shareexp
1	Adana	1006	264	26.2425	1.9107
2	Adıyaman	78	11	14.1026	0.0796
3	Afyon	290	92	31.7241	0.6658
4	Ağrı	11	2	18.1818	0.0145
5	Amasya	159	26	16.3522	0.1882
6	Ankara	3715	1282	34.5088	9.2784
7	Antalya	552	121	21.9203	0.8757
8	Artvin	12	4	33.3333	0.0289
9	Aydın	478	139	29.0795	1.0060
10	Balıkesir	1086	105	9.6685	0.7599
11	Bilecik	89	41	46.0674	0.2967
12	Bingöl	0	0	0.0000	0.0000
13	Bitlis	44	6	13.6364	0.0434
14	Bolu	100	28	28.0000	0.2026
15	Burdur	113	41	36.2832	0.2967
16	Bursa	4200	1222	29.0952	8.8442
17	Çanakkale	284	36	12.6761	0.2605
18	Çankırı	33	12	36.3636	0.0868
19	Çorum	320	71	22.1875	0.5139
20	Denizli	780	326	41.7949	2.3594
21	Diyarbakır	235	29	12.3404	0.2099
22	Edirne	79	9	11.3924	0.0651
23	Elazığ	150	36	24.0000	0.2605
24	Erzincan	52	9	17.3077	0.0651
25	Erzurum	111	17	15.3153	0.1230
26	Eskişehir	582	138	23.7113	0.9988
27	Gaziantep	1979	514	25.9727	3.7201
28	Giresun	90	15	16.6667	0.1086
29	Gümüşhane	19	3	15.7895	0.0217
30	Hakkari	17	1	5.8824	0.0072
31	Hatay	804	82	10.1990	0.5935
32	Isparta	122	33	27.0492	0.2388
33	İçel	925	325	35.1351	2.3522
34	İstanbul	10379	5410	52.1245	39.1547

A.4.1.4.: continued

35	İzmir	1945	1023	52.5964	7.4039
36	Kars	17	1	5.8824	0.0072
37	Kastamonu	24	4	16.6667	0.0289
38	Kayseri	1122	385	34.3137	2.7864
39	Kırklareli	33	6	18.1818	0.0434
40	Kırşehir	95	20	21.0526	0.1447
41	Kocaeli	308	155	50.3247	1.1218
42	Konya	1517	453	29.8616	3.2786
43	Kütahya	199	59	29.6482	0.4270
44	Malatya	223	71	31.8386	0.5139
45	Manisa	650	160	24.6154	1.1580
46	Kahramanmaraş	298	106	35.5705	0.7672
47	Mardin	34	17	50.0000	0.1230
48	Muğla	63	31	49.2064	0.2244
49	Muş	25	0	0.0000	0.0000
50	Nevşehir	146	31	21.2329	0.2244
51	Niğde	73	15	20.5480	0.1086
52	Ordu	221	47	21.2670	0.3402
53	Rize	143	10	6.9930	0.0724
54	Sakarya	119	60	50.4202	0.4342
55	Samsun	456	147	32.2368	1.0639
56	Siirt	14	4	28.5714	0.0289
57	Sinop	32	14	43.7500	0.1013
58	Sivas	122	35	28.6885	0.2533
59	Tekirdağ	265	118	44.5283	0.8540
60	Tokat	190	33	17.3684	0.2388
61	Trabzon	319	79	24.7649	0.5718
62	Tunceli	0	0	0.0000	0.0000
63	Şanlıurfa	178	40	22.4719	0.2895
64	Uşak	248	52	20.9677	0.3763
65	Van	191	12	6.2827	0.0868
66	Yozgat	27	11	40.7407	0.0796
67	Zonguldak	73	13	17.8082	0.0941
68	Aksaray	129	27	20.9302	0.1954

A.4.1.4.: continued

69	Bayburt	0	0	0.0000	0.0000
70	Karaman	106	25	23.5849	0.1809
71	Kırıkkale	0	0	0.0000	0.0000
72	Batman	41	7	17.0732	0.0507
73	Şırnak	0	0	0.0000	0.0000
74	Bartın	47	17	36.1702	0.1230
75	Ardahan	0	0	0.0000	0.0000
76	Iğdır	0	0	0.0000	0.0000
77	Yalova	217	22	10.1383	0.1592
78	Karabük	46	9	19.5652	0.0651
79	Kilis	12	2	16.6667	0.0145
80	Osmaniye	110	21	19.0909	0.1520
81	Düzce	44	25	56.8182	0.1809
		39016	13817		

Source: SMEDO - authors own calculations.

A.4.1.5. Exporters Behaviour in OIZs and SIZs

cno	province	obsOIZ	expOIZ	obsSIZ	expSIZ
1	Adana	53	52.8302	168	17.8571
2	Adıyaman	0	0.0000	0	0.0000
3	Afyon	82	37.8049	17	23.5294
4	Ağrı	0	0.0000	0	0.0000
5	Amasya	19	21.0526	53	3.7736
6	Ankara	1941	30.8604	279	32.6165
7	Antalya	38	42.1053	87	10.3448
8	Artvin	0	0.0000	0	0.0000
9	Aydın	62	27.4194	95	11.5790
10	Balıkesir	39	10.2564	366	5.4645
11	Bilecik	19	63.1579	17	35.2941
12	Bingöl	0	0.0000	0	0.0000
13	Bitlis	0	0.0000	30	10.0000
14	Bolu	24	45.8333	21	19.0476
15	Burdur	12	50.0000	16	6.2500
16	Bursa	292	52.3973	502	18.1275
17	Çanakkale	0	0.0000	149	8.7248
18	Çankırı	0	0.0000	0	0.0000
19	Çorum	0	0.0000	63	14.2857
20	Denizli	39	46.1539	123	24.3902
21	Diyarbakır	0	0.0000	45	2.2222
22	Edirne	0	0.0000	0	0.0000
23	Elazığ	19	26.3158	0	0.0000
24	Erzincan	12	16.6667	13	23.0769
25	Erzurum	26	23.0769	20	10.0000
26	Eskişehir	68	41.1765	311	10.2894
27	Gaziantep	225	48.4444	241	24.4813
28	Giresun	0	0.0000	16	6.2500
29	Gümüşhane	0	0.0000	0	0.0000
30	Hakkari	0	0.0000	0	0.0000
31	Hatay	11	54.5455	346	8.6705
32	Isparta	0	0.0000	31	6.4516
33	İçel	29	31.0345	125	22.4000
34	İstanbul	1814	42.2823	1590	41.2579

A.4.1.5.: continued

35	İzmir	249	61.0442	418	35.8852
36	Kars	11	9.0909	0	0.0000
37	Kastamonu	0	0.0000	0	0.0000
38	Kayseri	268	47.0149	260	12.3077
39	Kırklareli	0	0.0000	0	0.0000
40	Kırşehir	0	0.0000	35	11.4286
41	Kocaeli	40	72.5000	44	27.2727
42	Konya	204	50.9804	773	12.9366
43	Kütahya	17	35.2941	39	20.5128
44	Malatya	49	34.6939	66	6.0606
45	Manisa	33	42.4242	262	9.9237
46	Kahramanmaraş	0	0.0000	96	19.7917
47	Mardin	11	54.5455	0	0.0000
48	Muğla	0	0.0000	0	0.0000
49	Muş	0	0.0000	0	0.0000
50	Nevşehir	0	0.0000	45	17.7778
51	Niğde	21	28.5714	22	4.5455
52	Ordu	22	45.4546	63	3.1746
53	Rize	0	0.0000	0	0.0000
54	Sakarya	0	0.0000	11	54.5455
55	Samsun	36	38.8889	114	17.5439
56	Siirt	0	0.0000	0	0.0000
57	Sinop	0	0.0000	0	0.0000
58	Sivas	22	45.4546	38	13.1579
59	Tekirdağ	44	52.2727	22	22.7273
60	Tokat	24	33.3333	42	9.5238
61	Trabzon	37	40.5405	28	14.2857
62	Tunceli	0	0.0000	0	0.0000
63	Şanlıurfa	57	26.3158	10	20.0000
64	Uşak	40	30.0000	57	10.5263
65	Van	12	8.3333	89	2.2472
66	Yozgat	0	0.0000	0	0.0000
67	Zonguldak	0	0.0000	0	0.0000
68	Aksaray	25	16.0000	27	14.8148

A.4.1.5.: continued

69	Bayburt	0	0.0000	0	0.0000
70	Karaman	22	31.8182	46	6.5217
71	Kırıkkale	0	0.0000	0	0.0000
72	Batman	0	0.0000	0	0.0000
73	Şırnak	0	0.0000	0	0.0000
74	Bartın	0	0.0000	0	0.0000
75	Ardahan	0	0.0000	0	0.0000
76	Iğdır	0	0.0000	0	0.0000
77	Yalova	0	0.0000	46	2.1739
78	Karabük	0	0.0000	0	0.0000
79	Kilis	0	0.0000	0	0.0000
80	Osmaniye	0	0.0000	20	10.0000
81	Düzce	0	0.0000	0	0.0000
		6068		7397	

Source: SMEDO - authors own calculations.

A.4.2. Information about the TurkStat data

General information about geographical coverage, the items and the source of the export data which avaliable online on website of TurkStat.

A.4.2.1.Geographical coverage

Geographical coverage is based on customs boundaries. Statistical territory is corresponding to the custom territories. In terms of foreign trade statistics, customs warehouses, free zones and duty-free shops in Turkey are considered as beyond the customs frontier. Foreign trade with third countries from these areas are excluded from statistics.

A.4.2.2. The following items are excluded;

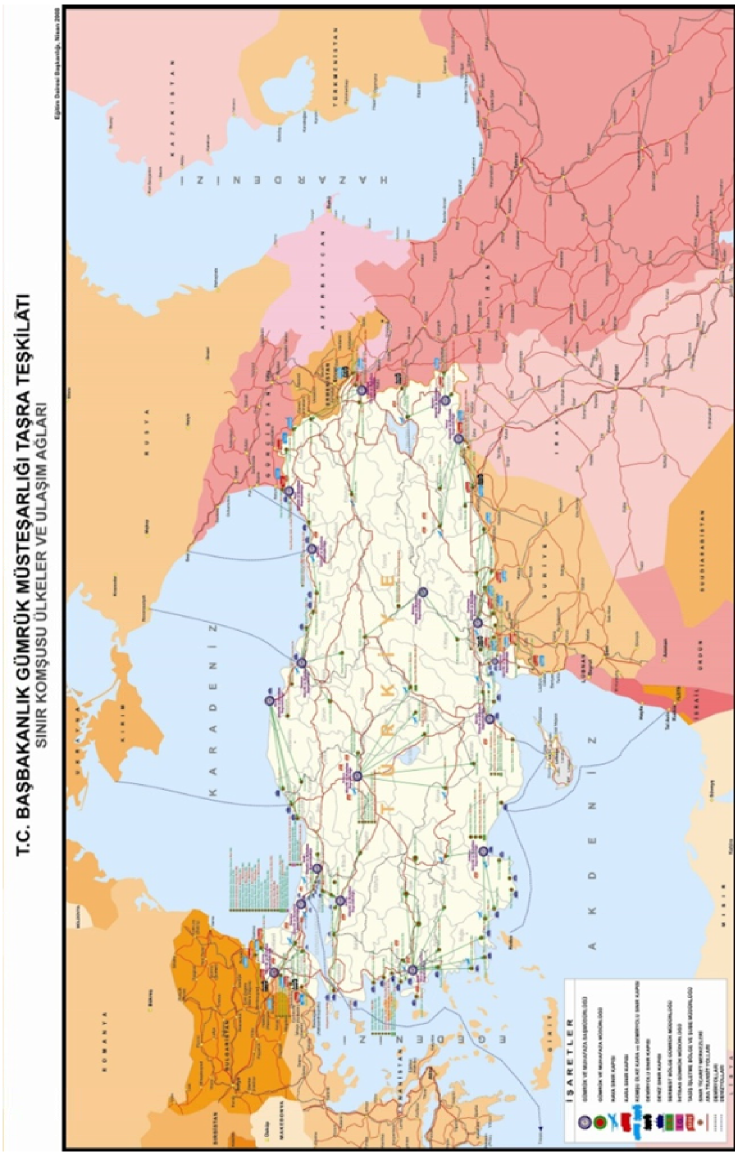
a) Transit trade
b) Shuttle trade
c) Border and coastal trade
d) Temporary import and export
e) Commodities not crossed border
f) Transactions under $100
g) Monetary gold, Means of payment which are legal tender, Securities

A.4.2.3. Sources

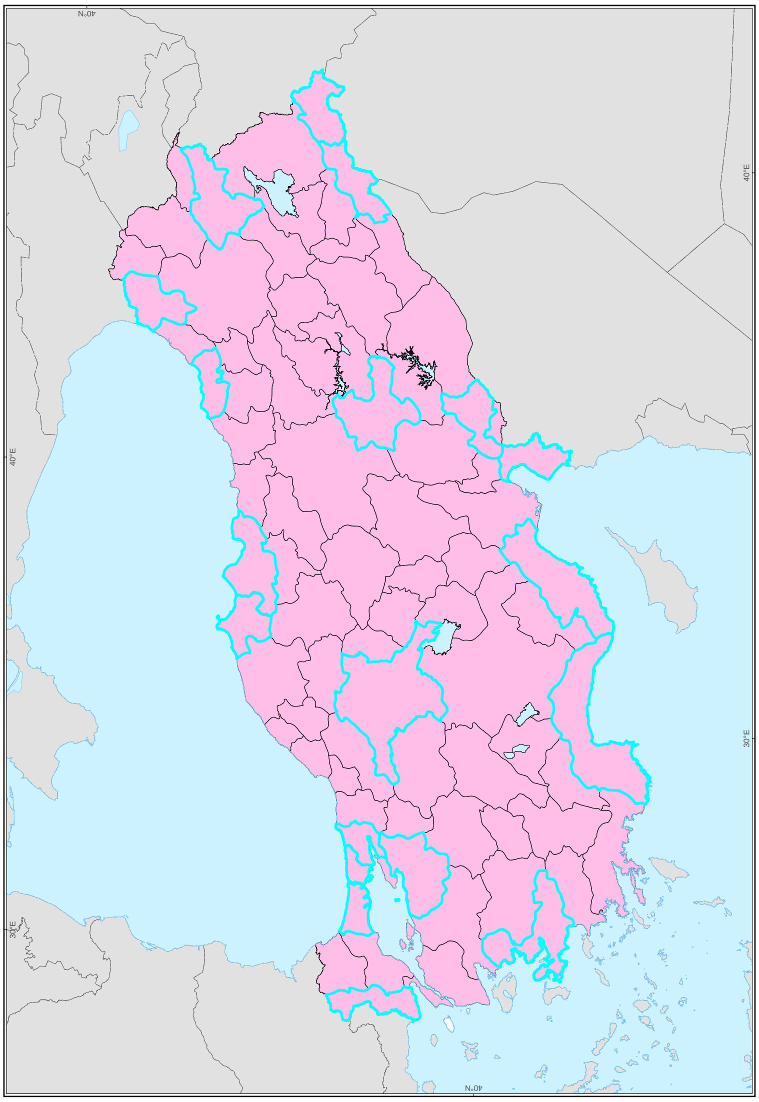
Main data source is the customs declarations compiled by Undersecretariat of Customs. In addition, data related to crude petroleum, natural gas and electricity are compiled from companies.

A.4.3. Map of Head of Customs and Custody Offices in Turkey

A.4.3.1.

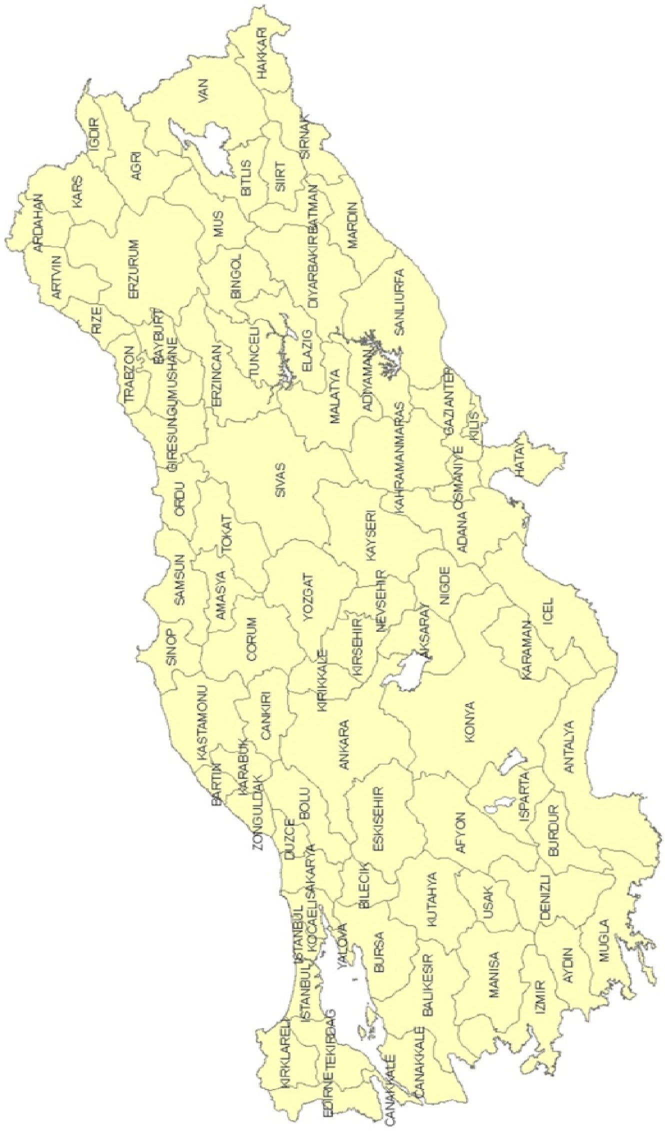


A.4.3.2.



The provinces which have a blue border have a Customs and Custody Office.

A.4.4. Map of provinces with their names



A.4.5. List of Related Codes For Industries Based On ISIC Rev.3 Classification Of The United Nations Statistics Division

15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metalic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office, accounting and computing machinery
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling
72	Computer and related activities

Source: http://unstats.un.org/unsd/cr/registry/regest.asp?Cİ=2, Access date: 12.08.2008

A.4.6. Distribution of observation in OIZs by provinces

no	Province	Number of observation
1	Adana	53
2	Adıyaman	9
3	Afyon	82
4	Ağrı	
5	Amasya	19
6	Ankara	1941
7	Antalya	38
8	Artvin	
9	Aydın	62
10	Balıkesir	39
11	Bilecik	19
12	Bingöl	
13	Bitlis	
14	Bolu	24
15	Burdur	12
16	Bursa	292
17	Çanakkale	9
18	Çankırı	6
19	Çorum	9
20	Denizli	39
21	Diyarbakır	8
22	Edirne	
23	Elazığ	19
24	Erzincan	12
25	Erzurum	26
26	Eskişehir	68
27	Gaziantep	225
28	Giresun	7
29	Gümüşhane	
30	Hakkari	
31	Hatay	11
32	Isparta	7

A.4.6.: continued

33	İçel	29
34	İstanbul	1814
35	İzmir	249
36	Kars	11
37	Kastamonu	
38	Kayseri	268
39	Kırklareli	2
40	Kırşehir	9
41	Kocaeli	40
42	Konya	204
43	Kütahya	17
44	Malatya	49
45	Manisa	33
46	Kahramanmaraş	3
47	Mardin	11
48	Muğla	
49	Muş	
50	Nevşehir	3
51	Niğde	21
52	Ordu	22
53	Rize	
54	Sakarya	4
55	Samsun	36
56	Siirt	
57	Sinop	2
58	Sivas	22
59	Tekirdağ	44
60	Tokat	24
61	Trabzon	37
62	Tunceli	
63	Şanlıurfa	57
64	Uşak	40
65	Van	12

A.4.6.: continued

66	Yozgat	2
67	Zonguldak	5
68	Aksaray	25
69	Bayburt	
70	Karaman	22
71	Kırıkkale	1
72	Batman	3
73	Şırnak	1
74	Bartın	5
75	Ardahan	
76	Iğdır	
77	Yalova	3
78	Karabük	2
79	Kilis	3
80	Osmaniye	2
81	Düzce	1
	Total	6174

Source: SMEDO - authors own calculations.

A.4.7. The situation in SIZs

A4.7.1.: The provinces which has the highest observation number in SIZs

No	**Province**	**Number of Observation**	**Exporters (%) in KSB**
34	İstanbul	1590	41.26
42	Konya	773	12.94
16	Bursa	502	18.13
35	İzmir	418	35.89
10	Balikesir	366	5.47
	Turkey	7397	21.20

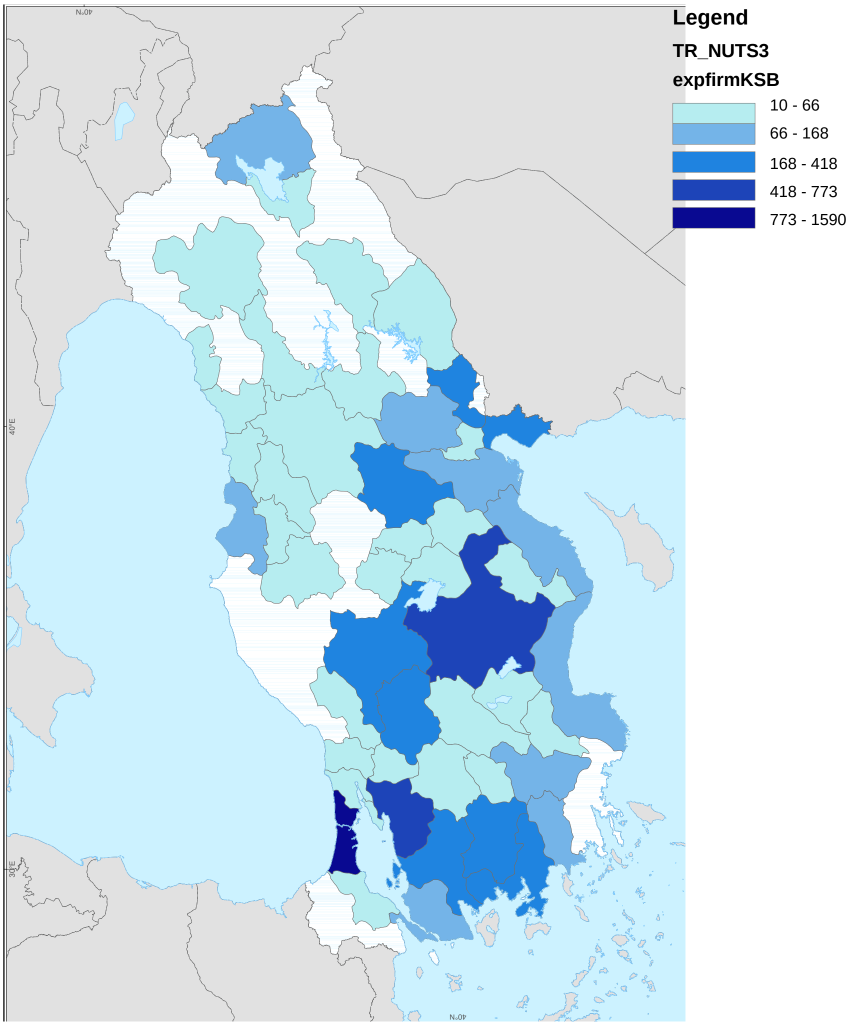
Source: SMEDO - authors own calculations.

A.4.7.2.: The provinces which has the highest proportion of exporters in SIZs

No	**Province**	**Number of Observation**	**Exporters (%) in KSB**
54	Sakarya	11	54.55
34	İstanbul	1590	41.26
35	İzmir	418	35.89
11	Bilecik	17	35.29
6	Ankara	279	32.62

Source: SMEDO - authors own calculations.

A.4.7.3.: Number of Observation in SIZs



Source: SMEDO - authors own calculations.

1. level: Tekirdag, Kocaeli, Bilecik, Bolu, Kutahya, Usak, Isparta, Burdur, Afyon, Aksaray, Kirsehir, Nevsehir, Nigde, Karaman, Osmaniye, Urfa, Diyarbakir, Malatya, Sivas, Tokat, Amasya, Corum, Ordu, Giresun, Trabzon, Erzincan, Erzurum, Bitlis,

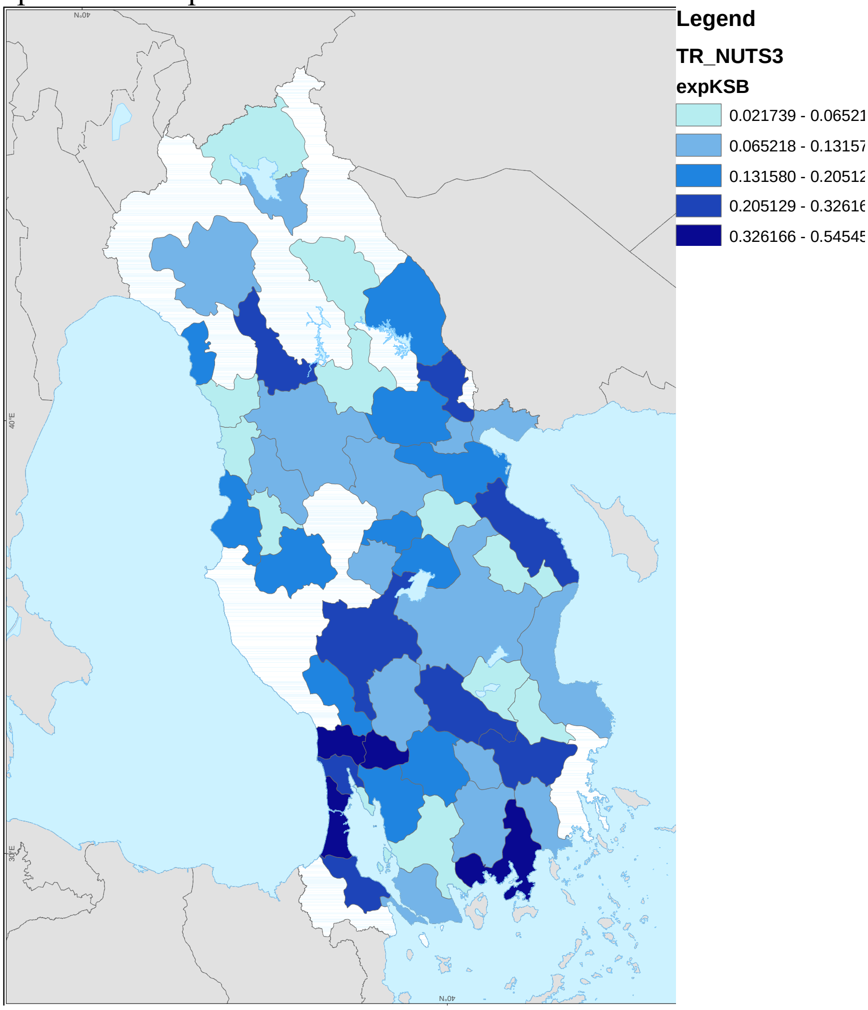
2. level: Canakkale, Aydin, Denizli, Antalya, Mersin, Adana, Maras, Samsun, Van

3. level: Balikesir, İzmir, Manisa, Eskisehir, Ankara, Kayseri, Hatay, Antep

4. level: Konya, Bursa

5. level: İstanbul

A.4.7.4.: Proportion of Exporters in SIZs



Source: SMEDO - authors own calculations.

1. level: Van, Diyarbakir, Malatya, Amasya, Ordu, Giresun, Balikesir, Burdur, Isparta, Karaman

2. level: Canakkale, Aydin, Manisa, Usak, Antalya, Konya, Kirsehir, Kayseri, Osmaniye, Hatay, Sivas, Tokat, Bitlis, Erzurum

3. level: Bursa, Kutahya, Bolu, Samsun, Corum, Adana, Marasi Urfa, Trabzon, Aksaray, Nevsehir,

4. level: Erzincan, Antep, Mersin, Denizli, Afyon, Ankara, Antep

5. level: Istanbul, Izmir, Bilecik, Sakarya,

A.5.1. “Field Research Survey” of SMEDO

KOSGEB

SAHA ARAŞTIRMASI ANKETİ

İşbirliği Yapılan Meslek Kuruluşunun Kısa Adı:

Anketin yapıldığı il: **Tarih:**

1.İŞLETME TEPE YÖNETİCİSİNE İLİŞKİN BİLGİLER (Görüşülen Kişi)

Adı – Soyadı:

1.1 İşletmedeki Konumu:□ Sahip □ Ortak □ Profesyonel Yönetici □ Diğer

1.2 Öğrenim Durumu :□ İlk-Orta □ Lise □ Üniversite(Lisans) □ Yüksek Lisans □ Doktora

1.3 Yaşı : ____________________

1.4 Yabancı Dil: □ Bilmiyor □ İngilizce □ Almanca □ Fransızca □ Arapça □ Rusça □ Diğer _____________

1.5. İşletme Sahibinin Öğrenim Durumu (Yukarıdaki ile Aynı Kişi İse Doldurulmayacak):

1.5.1 □ İlk-Orta □ Lise □ Üniversite (Lisans) □ Yüksek Lisans □ Doktora

1.5.2 Yabancı Dil: □ Bilmiyor □ İngilizce □ Almanca □ Fransızca □ Arapça □ Rusça □ Diğer ______________

2.İŞLETME HAKKINDA GENEL BİLGİLER

2.1 İşletmenin Kayıtlı Unvanı: ___________________________________

2.2 İşletmenin Adresi: ____

2.3 İşletmenin

a) Telefonu :( ) ____________ d) web adresi :www.

b) Faks : ( ) _____________ e) Vergi Dairesi: ________

c) e-posta : f) Vergi Numarası: ___________

2.4 İşletmenin Yeri: □ OSB □ KSS □ Teknopark □ Serbest Bölge □ Diğer

2.5 İşletmenin Kuruluş Yılı: _________________________________

2.6 Hukuki Statü : □A.Ş. □ Kolektif □ Komandit

□ Ltd. Şti. □Şahıs İşletmesi □ Diğer _____

2.7 Ortak Sayısı : ...... Adet

2.8 İşletmenin Kuruluş Şekli:

□ Yeni Kuruluş □ Aileden devralma

□ Üçüncü Şahıstan Devralma □ Çalışanlar Olarak Devralma

□ Diğer _______________

2.9 İşletmenin Faaliyet Konusu (Sektörü):___________________

Sektör kodlaması (NACE) : [ ] , [ ] , [ ]

2.10 İşletmenin Üretimi: □ Ürün □ Hizmet □ Ticaret (Alıp-Satma)

(Firmanın **ürün** ya da **hizmet** ürettiği, eğer hizmet üretiyorsa **hangi kategoride hizmet** olduğu belirlenecek.)

	Ürünler	Ürün Kodu(gtip no)	Yıllık Üretim Kapasitesi	Hizmetler
1.	____________	_____________	_____________	______________
2.	____________	_____________	_____________	______________
3.	____________	_____________	_____________	______________
4.	____________	_____________	_____________	______________
5.	____________	_____________	_____________	______________

2.11 İşletmenin Ürünü:

(Ürünlerin **tüketiciye** yönelik olduğu mu yoksa bir başka sanayi kuruluşuna satılan **sanayi girdisi** mi olduğuna göre işaretlenecek.)

□ Tüketim Malı □ Sanayi Girdisi

2.12 İşletmenin Varsa Bağlı Bulunduğu Holding veya Grup:___________________________

(Tamamen **bağımsız** bir işletme olup olmadığını tespit etmek için bu soru soruluyor.)

2.13 Sermayesi :

(Halen mali tablolarda görünen **yatırılmış toplam sermaye** ve **yılı** belirtilecek.)

2.13.1 Kuruluş Sermayesi : ____________________ TL

2.13.2 İşletme Sermayesi : ____________________ TL

(Firmanın işletme sermayesi **halen kullandığı miktar** olarak anlaşılmalıdır.)

a) 50 Milyar < □

b) 51 - 150 Milyar □

c) 151 – 300 Milyar □

d) 301 Milyar > □

2.14 Çalışanların Sayısı :

(Burada amaç **direkt üretimde** çalışanlarla **üretim dışında** çalışanları ayırmak. O nedenle sadece imalatta çalışanların sayısı dikkate alınacak, diğerlerinin tümü büro çalışanı olarak gösterilecek.)

a) Büro Çalışanı (Beyaz yaka) ....

b) Üretimde Çalışan (Mavi yaka) ....

Toplam:_____________

2.15 Çalışanların Öğrenim Durumu: Kişi sayısı

a) Üniversite ——

b) Yüksekokul(İki Yıllık) ——

c) Teknik ve Endüstri Meslek Lisesi ——

d) Lise ——

e) Çıraklık Okulu ——

f) İlköğretim ——

g) Okur Yazar Değil ——

2.16 Makine Parkı ve Cihazları Sıralayınız:

(Burada CNC ve robot örnek olarak verilmiştir. Eğer özellik arz eden **ileri teknoloji** cihazlar kullanılıyorsa, bunlar kısaca kaydedilecektir.)

	Var	Adet
a) Programlanabilir Kontrolcü (PLC)	□	_____
b) CNC	□	_____
c) Robot	□	_____

2.17 İşletmenin Üretim, Satış, Büro vb. İşlerde **Aylık** Kullandığı Ortalama Yakıt Miktarı :

(Yanıtlarken dikkat edilecek husus, sarf edilen miktarın **aylık bazda** olmasıdır. Buraya herhangi bir ortalama ayın değeri girilebileceği gibi, bir yıllık tüketimin 12'ye bölünmüş miktarı da kullanılabilir.)

□ Motorin (ton) : □ Fuel Oil (ton): □ LPG (m^3): □ Doğalgaz (m^3): □ Benzin (ton):

2.18 İşletmenin Aylık Kullandığı Elektrik Miktarı

(kw-saat):________________

(Burada da maksat ortalama **bir aylık** elektrik tüketiminin miktarını belirlemektir.)

2.19 Kurulu Gücü (kw) : ______________________________

2.20 Bugün İtibariyle Makina Parkı Değeri : _____________________milyar TL.

(Makina parkının değeri olarak bugünkü **rayiç değeri** alınabilir.)

2.21 Normalde Kaç Vardiya Çalışıldığı : 1 □ 2 □ 3 □ (sadece biri işaretlenecek)

2.22 Vardiya İtibariyle Yıllık Üretim Kapasitesi : ___________ (Miktar)

2.23 Ortalama Kapasite Kullanım Oranı (Son Bir Yıl %'si) : __________

(Kaç vardiya itibari ile kapasite belirlenmişse bu vardiya sayısına göre kapasite kullanım oranı belirlenecektir. Örneğin, tek vardiyaya göre yıllık üretim kapasitesi 1000 ton ise kapasite kullanımı da tek vardiyaya göre hesaplanacaktır. Mesela 750 ton üretim yapılmışsa ortalama kapasite kullanım oranı % 75 olacaktır.)

2.24 Üretim Yer Alanı :

Toplam Alan .... m^2 Kapalı Alan .... m^2

(Burada 'kapalı alan' tanımına sadece imalatın yapıldığı yer değil, bürolar, depolar ve diğer **kapalı tüm hacimler** dahil edilecektir.)

2.24.1 Üretim Yeri Mülkiyeti:

□ Kira □ İşletmenin Kendi Mülkü □ Diğer

2.24.2 Kira ise; _______________TL/Aylık

2.25 Bilişim Alt Yapısı :

(Halen aktif olarak kullanılan bilgisayar adedi not edilecek. 'Network' ile kastedilen bilgisayarların birbirleri ile bağlantılı olup olmadığı. **Satış** anlamında e-ticaret yapılıyorsa internet üzerinde mallarını satıyor anlamına gelmektedir. **Tedarik** anlamında e-ticaret ise temin ettiği ürünler internet üzerinden alıp almadığı ile ilgili. Web tanıtım sayfası varsa not edilecek. İhtiyaç hissedilirse "bir görebilir miyim" diye sorulacak ve tanıtım sayfasına bakılacak.)

a) Bilgisayar adedi	________
	Var
b) İnternet Bağlantısı	□
c) Network (Yerel Ağ)	□

d) E-ticaret (satış) □

e) E-ticaret (Tedarik) □

f) Web Tanıtım Sayfası □

2.26 İşletmenizde Bilgisayarı Hangi Amaçla Kullanıyorsunuz? (Birden Fazla Seçenek İşaretlenebilir)

(Üretim sürecinde kullanım varsa bunun mahiyeti sorulacak ve gerçekten üretimde kullanıp kullanmadığı anlaşılacak. İnternetten bilgi araştırması yaptığını söylüyorsa son zamanlarda **ne tür bir araştırma yaptığı sorularak** doğru yanıt elde edilecek.)

□ Üretim sürecinde □ Muhasebede □ Tasarımda

□ İnternetten bilgi araştırması □ Diğer

2.27 Yıllık Satış Tutarı:

(Satış miktarları belirtildiğinde **miktarı ifade eden birim** mutlaka buraya kaydedilecek. Rakamların tam bir yılı (12 ay) tanımlaması çok önemli.):

2002 .... TL Satış miktarı : ________

2003 .... TL Satış miktarı : ________

Tahmini Miktar : 2004 ………. TL Satış Miktarı : ________

2.28 Firma İhracat Yapıyor mu ?

□ Evet (Evet ise en yoğun hangi kanalı kullanıyorsunuz? 2.28.1)

□ Hayır(2.30 dan devam edin)

2.28.1 İhracat Şekli:

(Müşteriye doğrudan satış ile kastedilen ürünü kullanan firmaya satıştır. **Komisyoncu** firma, belli bir yüzde karşılığı ürüne müşteri bulan firmadır. **Toptancı** ise işin ticaretini yapan yani ürünleri alıp bunlara yurtdışında müşteri bulan firmalardır.)

a) Komisyoncu / Mümessil firma ile □

b) Dolaylı İhracat (Aracı Firma İle) □

c) Müşteriye Doğrudan Satış □

2.28.2 İhracatı (Sadece en yoğun olan seçenek işaretlenecek)

a) Kendi Markası ile □

b) Müşterinin İstediği Marka ile □

2.28.3 İhracatın Satışlara Oranı (Yıllık) ___________ %

2.29 Ürünlerini İhraç Ettiği Ülkeler :

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________

2.30 İhracat Yapmama Nedenleriniz Nelerdir?

(İşaretlenecek şıklar kendi aralarında önem sırasına göre yandaki paranteze 1,2 ya da 3 diye işaret edilecektir.)

<u>Önem sırası</u>

a) İç pazarlarda tatmin olma ( )

b) Kaynak yetersizliği (sermaye, teknoloji, malzeme vb.) ( )

c) Aracı işletme bulmadaki zorluk ( )

d) Dış pazarları tanımama ve bilgi eksikliği ( )

e) Talep edilen kalite ve miktarda mamul sunamama ( )

f) Uygun fiyatta mamul sunamama ( )

g) Yabancı dil yetersizliği ( )

h) Diğer …………………………………………………

2.31 Ürün ve Hizmetleri İç Pazarda

2.31.1 a) Kendi Markası ile Satıyor □

b) Müşterinin İstediği Etiketle Satıyor □

(Eğer tüketiciyi kendisi bulup müşteriye satıyorsa **kendisi satıyor** anlamına gelmektedir. Bu ürünleri alıp pazarlayan şirkete satıyorsa **toptancıya satıyor** kutusu işaretlenecek. Belli bir prim ya da komisyon karşılığı müşteri bulan bir firma aracılığıyla satıyorsa **komisyoncu** ile satılıyor anlamına geliyor. **Perakende** kanal ise doğrudan tüketiciye hitap eden mağaza ya da dükkanlar anlamına geliyor. Zaman zaman açılan ihalelere teklif verip o şekilde satıyorsa **ihale usulü** satıyor anlamına gelir.)

2.31.2. a) Kendisi Satıyor □

b) Toptancıya Satıyor □

c) Komisyoncu ile Satılıyor □

d) Perakende Kanala Satıyor □

e) İhale Usülü Satıyor □

f) Diğer (______) □

2.32 İşletmenin Sahip Olduğu Belge Ve Sertifikalar:

(Belgenin ne olduğu yanlışlığa mahal vermeyecek şekilde not edilecek.)

□ ISO 9000 □ ISO 14000 □ HACCP □ TSE

□ CE İŞARETİ □ ISO 16949 □ DİĞER ....

2.33 Tescilli Marka ve Patentiniz veya Faydalı Modeliniz var mı?

(Birden fazla marka tescil edilmiş olabilir. Her biri not edilecek. Marka adıyla firma adı karıştırılmamalı.)

□ Evet : □ Hayır □ Çalışmalar sürüyor

2.33.1Evet ise ; a) Tescilli Marka Sayısı __________

b) Patent Sayısı __________

c) Faydalı Model Sayısı __________

2.34 KOBİ Teşvik Belgeniz Var mı? □ **Evet** □ **Hayır**

2.35 Kredi Kullanıyor musunuz? □ **Evet** □ **Hayır**

2.35.1 Kullanılan Kredi Türü:

□ İşletme Kredisi □ Yatırım Kredisi □ İhracat Kredisi

2.36 Kredi Ve Teminat Mektubu Alırken Verilen Teminat Türü:

□ İpotek □ Kefillik □ KGF A.Ş. □ İmza Karşılığı □ Belge Karşılığı

2.36.1 Kredi ve Teminat İçin Aşağıdakilerden Hangisini Kullanıyorsunuz?

□ Banka □ Özel Finans Kurumu □ Faktoring □ Diğer _____________

2.36.2 Kredi Limitlerinizin Toplamı: ______________________ TL

2.36.3 Yıllık Ortalama Kullanılan Kredi Miktarı:___________________ TL

2.37 İşletmenin KOSGEB İle İletişimi	Evet	Hayır
a) KOSGEB'i Daha Önceden Duydum	□	□
b) KOSGEB Tarafından İşletme Analizi Yapıldı	□	□
c) KOSGEB'den Daha Önce Destek Aldım	□	□
d) KOSGEB'le Çalışmaktan Memnunum	□	□

2.38 Yeni Yatırım Düşünüyor Musunuz? Evet □ Hayır □

2.38.1 Evet İse, Ne Miktarda: __________________________ TL

(Yeni yatırım düşünüyorsa bunun hangi amaçla, örneğin **kapasite artırımı**, kalite ya da **teknoloji** geliştirme veya **ürün geliştirme** alanlarından hangisi ile ilgili olduğu not edilecek.)

2.38.2 Hangi Amaçla;

□ Üretim □ Pazarlama □ Bilgi İşlem □ Yeni Sektör

□ Tasarım □ Ar-Ge

2.39 İşletmenizde Laboratuar Var mı? □ Evet □ Hayır

2.39.1 Evet ise; Bu laboratuarlarda Hangi Ürünleri Test Edebiliyorsunuz?

□ Metal □ Kauçuk-Plastik □Tekstil □ Gıda □ Boya □ Diğer

2.39.2 Hayır ise; Dış Laboratuarlarda Test Yaptırıyor musunuz?

□ Evet □ Hayır

2.39.2.1 Evet ise; Dış laboratuarlarda Hangi Aşamada Test Yaptırıyorsunuz?

□ Hammadde □ Yarı mamul □ Mamul

3. SİSTEMLER VE SÜREÇLER

(Bu bölümde işletmede uygulanan sistemler ve süreçler sorgulanmaktadır. Verilerin sağlıklı olmasını temin amacı ile yanıtlarda tereddüt gösterilen konularda firmadan **bununla ilgili belge, doküman** ya da **örnek göstermesi** istenilebilir. Örneğin ‘Sistemli Pazar Araştırılması’ sorusuna “Yapılıyor” yanıtı veriliyorsa, bu husus kısaca sorgulanabilir. Örneğin **yılda kaç kere** yapıldığı gibi. Ya da “bir örnek görebilir miyim?” diyerek sorunun doğru anlaşılıp anlaşılmadığı ya da firmanın gerçeği belirtip belirtmediği anlaşılmış olur. Keza yeni ürün geliştirme çabası içindeyse bunun **hangi amaçla yürütülmekte** olduğu, ya **da ne gibi ürünler** geliştirildiği sorgulanabilir.)

İşletmenizde Aşağıdaki Süreçlerden Hangileri Uygulanıyor?

	Yapılıyor	**Yapılmıyor**
3.1 Sistemli Pazar Araştırması	□	□
3.2 Yeni Ürün Geliştirme Çabası	□	□
3.3 Yurtiçi Fuarlara Katılım	□	□
3.4 Yurtdışı Fuarlara Katılım	□	□
3.5 Güçlü ve Zayıf Yönleri Analizi (SWOT)	□	□

(Swot analizi oldukça sofistike bir tekniktir. Eğer firma “Yapılıyor” demişse, bir örneği istenebilir.)

3.6 Bilgisayarlı Üretim ve Satış Planlaması	□	□

(Bilgisayarlı üretim ve satış planlaması' yapılıyorsa hangi yazılımı kullandığı ya da kendisinin geliştirip geliştirmediği sorulabilir.)

3.7 Kritik Personelin Yedeklenmesi □ □

3.8 Yıllık Plan ve Bütçeleme □ □

(**Yıllık plan ve bütçeleme yapıyorsa bunun özelliği kısaca sorulabilir.)**

3.9 Aylık Bütçe kontrol □ □

3.10 Çalışanların Kayıtlı Performans Yönetimi □ □

(Performans yönetimi yapan firma genellikle çok azdır. Eğer yapıldığı söyleniyorsa bununla ilgili bir örnek vermesi istenebilir.)

3.11 Ürün bazında Maliyet – Kar Analizi □ □

3.12 İstatistiksel Kalite Kontrolü □ □

(**İstatiksel kalite kontrolü uyguluyorsa, hangi yöntemi kullandığı sorulabilir.)**

3.13 İstatistiksel Proses Kontrolü □ □

(**Hangi prosese uygulandığı sorulabilir.)**

3.14 Atık Kontrolü □ □

(Hangi atıkları kontrol ettiği sorulabilir.)

3.15 Eğitim ve Geliştirme Uygulamaları □ □

(Eğitim yapıyorsa bunun kaynağı ve konuları sorulabilir.)

3.16 Müşteri Talep Tahmin Tabloları □ □

(Talep tahmini yapıyorsa bunun ne kadarlık bir süreyi kapsadığı sorulabilir ya da tabloya bir göz atılabilir.)

3.17 Başabaş Noktası Analizi □ □

(Başabaş noktasını hesaplamışsa bunun miktarı sorulabilir.)

3.18 Teknoloji Araştırma – Geliştirme □ □

(Ar-Ge yapıyorsa hangi teknolojiyi geliştirdiği ya da araştırdığı sorulabilir.)

3.19 Malzeme İhtiyaç Planlaması (MRP) □ □

(MRP uygulaması yapıyorsa hangi paket programı kullandığı sorulabilir.)

3.20 Periyodik Müşteri Memnuniyeti ölçümü □ □

(Müşteri memnuniyeti ölçülüyorsa hangi sıklıkta ve ne kapsamda olduğu sorulabilir.)

3.21 Çalışanların Periyodik Memnuniyet Ölçümü □ □

(Çalışan memnuniyeti ölçülüyorsa ne sıklıkta ve kimleri kapsadığı sorulabilir.)

3.22 Maliyet Muhasebesi □ □

(Eğer uygulanıyorsa, ürün bazında maliyet kar analizinde aynı yanıtı vermesi gerektiği kontrol edilebilir.)

3.23 Enflasyon Düzeltmesi □ □

(Enflasyon düzeltmesi uygulanıyorsa bunu bilanço bazında mı, gelir tablosu bazında mı, ya da her ikisinde mi uyguladığı sorulabilir.)

4. DIŞARDAN ALINAN HİZMETLER

Dışardan alınan hizmetleri **iki ana kategoride** değerlendirmek söz konusu. Eğer danışmanlık sağlamışsa bu danışmanlık çalışmasını **hangi kuruluştan** aldığı ve **mahiyeti** sorulur. Ayrıca, bu danışmanlık hizmeti ile bir sistem geliştirip geliştirmediği sorgulanabilir. Aynı şey eğitim için de söz konusudur. Özellikle Kosgeb hizmetlerinden yararlanmışsa bunların **tek tek not edilmesi** gerekmektedir. Burada ayrıca dikkat edilmesi gereken bir husus bu hizmetleri son **oniki aylık** dönem içinde alıp almadığıdır. Çok gerilerde kalmış olan hizmetler dikkate alınmayacaktır.

Cevapların sağlıklı olması için ifadelerde kesinlik önem aranmalıdır. Muğlak ya da net olmayan ifadelerle belirtilen danışmanlık ya da eğitim çalışmaları **alınmamış** şeklinde not edilecektir.

Geçen Yıl İçinde Şirketin Dışardan Temin Ettiği Danışmanlık ve Eğitim Hizmetleri:

1)________________________

2)________________________

3)________________________

4)________________________

5)________________________

6)________________________

7)________________________

8)________________________

9)________________________

10)_______________________

(Anketör Önce Hangi Hizmetleri Aldığını Öğrenecek, Kutuları Sonradan İşaretleyecek)

	Danışmanlık Hizmeti Aldık	Eğitim Hizmeti Aldık	Almadık
4.1. Pazarlama, Tanıtım	□	□	□
4.2. Satış, Dağıtım	□	□	□
4.3. Yönetim ve Organizasyon	□	□	□
4.4. İnsan Kaynakları	□	□	□
4.5. Toplam Kalite Yönetimi	□	□	□
4.6. Üretim Planlama ve Kontrol	□	□	□
4.7. Dış Ticaret, İhracat	□	□	□
4.8. Bilgisayar Sistemleri	□	□	□
4.9. Planlı Bakım	□	□	□
4.10. Finans Yönetimi	□	□	□
4.11. Yönetici Geliştirme Eğitimi Ve Temel Beceri Eğitimi	□	□	□

5. İŞLETME PERFORMANSI

Anketin en önemli bölümlerinden bir tanesi şirket performansının değerlendirilmesi ya da gidişatı ile ilgilidir. Bu sorulara pek çok kişi "ne artıyor, ne de azalıyor" şeklinde yanıt verme eğilimine girebilir. Ama amacımız olabildiğince performanstaki değişimi irdelemek olduğundan, soru yöneltilen kişinin bu konuda bir miktar düşünerek **gerçeği en fazla yansıtan** şekilde yanıtlaması sağlanmalıdır. Eğer firma ilgilisi ısrarla ne artıyor ne de azalıyor şeklinde yanıtlıyorsa, iki kutudan **hiçbiri** işaretlenmeyecektir. Anlaşılmayan ya da tereddüt gösterilen konuda ilave açıklamalar verilerek konunun tam manası ile anlaşılması sağlanacaktır. Anketörün başarısı olabildiğince işaretlenmemiş kutu bırakılmaması ile ilgili de görülebilir.

İşletmenin Son İki Yılda Elde Ettiği Sonuçlara Göre Yapılan Değerlendirmelerde:

	Artıyor	**Durağan**	**Azalıyor**
5.1.Satışlar	□	□	□
5.2.Ürün İadeleri	□	□	□
5.3.Fire, Kayıplar	□	□	□
5.4.Makine Parkı	□	□	□

5.5.Müşteri Memnuniyeti	□	□	□
5.6.Sevkıyat Teminlerine Uyum	□	□	□
5.7.Ürün Çeşitliliği	□	□	□
5.8.Müşteri Sayısı	□	□	□
5.9.Üretim Miktarı	□	□	□
5.10. İhracat	□	□	□
5.11. Ürün Fiyatları	□	□	□
5.12. İşletme Sermayesi	□	□	□
5.13. Hammadde Stoklar	□	□	□
5.14. Yarı mamul Stoklar	□	□	□
5.15. Mamul Stoklar	□	□	□
5.16. Toplam Borç Miktarı	□	□	□
5.17. Üretim Verimliliği	□	□	□
5.18. Personel Etkin Kullanımı	□	□	□
5.19. Satış Yapılan Ülke Sayısı	□	□	□
5.20. Kapasite Kullanım Oranı	□	□	□
5.21. Ürün Maliyetleri	□	□	□
5.22. Rekabet Gücü	□	□	□
5.23. Ödenen Vergiler	□	□	□
5.24. Karlılık	□	□	□
5.25 Ödenen Kar Payları	□	□	□

6. İŞLETMENİN GELECEĞE DÖNÜK İHTİYAÇLARI

Hiç şüphe yok ki her işletmenin hemen hemen her alanda çeşitli ihtiyaçları vardır. Bu soruları sormadan önce **işletme yöneticisinin bir süre düşünmesi** ve anketten bağımsız olarak listelemesi istenecektir. Bu listelemeye yardımcı olmak üzere anketör daha geniş düşünmesini ve muhtemel tüm ihtiyaçlarını saptamasını isteyecektir. Geleceğe dönük ihtiyaçlar işletme yetkilisi tarafından belirtildikten sonra anketör kendi yorumuna göre bu maddedeki hususları kendisi dolduracaktır.

1)________________________

2)________________________

3)________________________

4)________________________

5)________________________

6)________________________

7)________________________

8)________________________

9)________________________

10)_______________________

	İhtiyaç Var
6.1.Yatırım İçin Ek Finans	□
6.2.İlave İşletme Sermayesi	□
6.3.Kalitenin İyileştirilmesi	□
6.4.Dış Pazara Açılma	□
6.5.İç Pazarda Büyüme	□
6.6. Markalaşma	□
6.7. Yeni Bir Alana Girme	□
6.8. İşletmenin Yeniden Yapılanması	□
6.9. Nitelikli İlave Yönetici	□
6.10. Nitelikli Uzman Personel	□
6.11. Yeni Ürün Geliştirme	□
6.12. Maliyet Düşürme	□
6.13. Teknoloji İyileştirme	□
6.14. Yurtiçi Ortaklık	□
6.15. Yurtdışı Ortaklık	□
6.16. Yeni Dağıtım Kanalı Oluşturma	□
6.17. Elektronik Ticarete Geçiş	□
6.18. Bilgi Sisteminde Yeni Teknoloji	□
6.19. Yönetim Danışmanlığı	□
6.20. Çalışanların İşbaşı Eğitimi	□
6.21. Yönetici Eğitimi	□
6.22. Otomasyon	□
6.23. Planlı Bakım Sistemi	□
6.24. Temel Beceri Eğitimi	□

7. Kümelenme Soruları

Soruların Cevaplanmasında Dikkat Edilecek Hususlar:
a. Lütfen bir soruyu cevaplarken en fazla ilişkiniz olan kurum/işletme (en fazla ilişkiniz olan 1. olmak üzere) en azına doğru sıralayarak belirtiniz. ("En fazla ilişki" konusunda en fazla ciro yaptığınız firma gibi düşünebilirsiniz)   b. Sorulara cevap verirken **son iki senelik dönemi gözönünde bulundurunuz**

(İşletme ismi yazmaya gerek yok)

7.1. Kullandığınız Makina ve Ekipmanı Satın Aldığınız İşletmeler ?

Aynı Sanayi Bölgesinde / Aynı Şehirde / Farklı Şehirde / Yurt Dışında

1.	□	□	□	□
2.	□	□	□	□
3.	□	□	□	□
4.	□	□	□	□
5.	□	□	□	□

7.2. Yedek Parçalarınızı Satın Aldığınız İşletmeler?

Aynı Sanayi Bölgesinde / Aynı Şehirde / Farklı Şehirde / Yurt Dışında

1.	□	□	□	□
2.	□	□	□	□
3.	□	□	□	□
4.	□	□	□	□
5.	□	□	□	□

7.3. Bakım Hizmeti Aldığınız İşletmeler?

Aynı Sanayi Bölgesinde / Aynı Şehirde / Farklı Şehirde / Yurt Dışında

1.	□	□	□	□
2.	□	□	□	□
3.	□	□	□	□
4.	□	□	□	□
5.	□	□	□	□

7.4. Kullandığınız Hammadde/Yarımamullerinizi Satın Aldığınız İşletmeler?

Aynı Sanayi Bölgesinde / Aynı Şehirde / Farklı Şehirde / Yurt Dışında

1.	□	□	□	□
2.	□	□	□	□
3.	□	□	□	□
4.	□	□	□	□
5.	□	□	□	□

7.5. Ürünlerinizi Sattığınız İşletmeler?

Aynı Sanayi Bölgesinde / Aynı Şehirde / Farklı Şehirde / Yurt Dışında

1.	□	□	□	□
2.	□	□	□	□
3.	□	□	□	□
4.	□	□	□	□
5.	□	□	□	□

7.6. İşletmenizin Rakipleri Olan İşletmeler?

Aynı Sanayi Bölgesinde / Aynı Şehirde / Farklı Şehirde / Yurt Dışında

1.	□	□	□	□
2.	□	□	□	□
3.	□	□	□	□
4.	□	□	□	□
5.	□	□	□	□

8. İşletmenizin Üyesi Bulunduğu Meslek Kuruluşları

1. Sanayi Odası	□
2. Ticaret Odası	□
3. Sanayi ve Ticaret Odası	□
4. Esnaf ve Sanatkarlar Odası	□
5. Diğer	□

A.5.2: Pavitt Taxonomy

SUPPLIERS DOMINATED (SD)	
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
28	Manufacture of fabricated metal products, except machinery and equipment
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling
SCALE INTENSIVE (SI)	
21	Manufacture of paper and paper products
23	Manufacture of coke, refined petroleum products and nuclear fuel
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metalic mineral products
27	Manufacture of basic metals
34	Manufacture of motor vehicles, trailers and semi-trailers
SPECIALIZED SUPPLIERS (SS)	
22	Publishing, printing and reproduction of recorded media
29	Manufacture of machinery and equipment n.e.c.
31	Manufacture of electrical machinery and apparatus n.e.c.
35	Manufacture of other transport equipment

A.5.2.: continued

SCIENCE BASED (SB)	
24	Manufacture of chemicals and chemical products
30	Manufacture of office, accounting and computing machinery
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
72	Computer and related activities

A.5.3.: The distribution of the data by years

Year	Observation Number	Frequency
2004	39,065	62.87
2005	10,807	17.39
2006	5,561	8.95
2007	6,704	10.79

A5.4.: Correlation betweeen the variables for the sample (# of obs.: 24214)

	exp	**lnage**	**lnlab**	**hslabor**	**plcncr**	**tmpum**
exp	1.0000					
lnage	0.0474	1.0000				
lnlab	0.4119	0.0814	1.0000			
hslabor	0.0825	-0.0463	0.0219	1.0000		
plcncr	0.1650	0.0275	0.2300	0.0133	1.0000	
tmpum	0.2436	0.1277	0.3466	0.0839	0.1020	1.0000
compuse	0.3337	-0.0082	0.4077	0.2916	0.1836	0.2265
smedo	0.1191	0.0294	0.1880	0.0197	0.0924	0.1172
orgprox	0.2869	0.1031	0.3165	0.0859	0.0822	0.2122
cluster	-0.0494	-0.0193	-0.1292	-0.0487	-0.0261	-0.1032
educa	0.2385	0.0086	0.3455	0.3976	0.0985	0.1839
forla	0.2149	-0.0007	0.2025	0.2724	0.0673	0.1210

A.5.4. - continued: Correlation betweeen the variables for the sample

	compuse	**smedo**	**orgprox**	**cluster**	**educa**	**forla**
compu	1.0000					
smedo	0.1289	1.0000				
orgpro	0.2725	0.0690	1.0000			
cluster	-0.0396	-0.0339	-0.0605	1.0000		
educa	0.3788	0.0948	0.1872	-0.0810	1.0000	
forla	0.2854	0.0474	0.1580	-0.0645	0.4907	1.0000

A.5.5.: T-Tests for the sample

	Mean of Exporters (1)	**Mean of Non – Exporters (0)**	**Difference (m(0)-m(1))**	**p-value**
age	11.6778	10.6420	-1.0356	0.0000
lnlab	2.8422	1.8426	-0.9996	0.0000
hslabor	0.0990	0.0716	-0.0274	0.0000
plcncr	0.4415	0.2365	-0.2049	0.0000
tmpum	0.5010	0.2513	-0.2497	0.0000
compuse	1.4659	0.6893	-0.7766	0.0000
smedo	0.1093	0.0453	-0.0640	0.0000
orgprox	1.6676	1.1791	-0.4885	0.0000
cluster	1.1311	1.4027	0.2716	0.0000
educa	2.2975	1.8175	-0.4800	0.0000
forla	0.6771	0.3828	-0.2943	0.0000
# obs.	7210	17004		

A.5.6.: Correlation betweeen the variables for OIZs in the sample (# of obs.: 4457)

	exp	**lnage**	**lnlab**	**hslabor**	**plcncr**	**tmpum**
exp	1.0000					
lnage	0.0865	1.0000				
lnlab	0.3902	0.1320	1.0000			
hslabor	0.0906	-0.0097	-0.0375	1.0000		
plcncr	0.2002	0.0807	0.3276	0. 0481	1.0000	
tmpum	0.2123	0.1522	0.3493	0.0718	0.1296	1.0000
compuse	0.3043	0.0322	0.3604	0.2197	0.2354	0.2249
smedo	0.1108	0.0344	0.2079	0.0323	0.1317	0.1191
orgprox	0.2224	0.1100	0.2524	0.0542	0.1058	0.1988
cluster	-0.1134	-0.0540	-0.2341	-0.0148	-0.1027	-0.1622
educa	0.2001	0.0475	0.3161	0.3577	0.1302	0.1844
forla	0.2030	0.0358	0.2155	0.2439	0.1046	0.1501

A.5.6. - continued: Correlation betweeen the variables for OIZs in the sample

	compuse	**smedo**	**orgprox**	**cluster**	**educa**	**forla**
compu	1.0000					
smedo	0.1370	1.0000				
orgpro	0.2013	0.0519	1.0000			
cluster	-0.0461	-0.0642	-0.0886	1.0000		
educa	0.3046	0.1106	0.1289	-0.1151	1.0000	
forla	0.2503	0.0835	0.1404	-0.0934	0.4988	1.0000

A.5.7.: Correlation betweeen the variables for Ankara OIZ data (# of obs.: 1545)

	exp	**lnage**	**lnlab**	**hslabor**	**plcncr**	**tmpum**
exp	1.0000					
lnage	0.1035	1.0000				
lnlab	0.3374	0.1718	1.0000			
hslabor	0.1340	-0.0247	0.0473	1.0000		
plcncr	0.1752	0.0816	0.2775	0.0852	1.0000	
tmpum	0.1407	0.1373	0.3468	0.1276	0.1413	1.0000
compuse	0.0459	0.4677	0.2600	0.2321	0.2742	0.3224
smedo	0.1515	0.1116	0.2934	0.0358	0.1607	0.2394
orgprox	0.1823	0.1474	0.2710	0.0657	0.1707	0.1681
cluster	-0.0838	-0.0800	-0.1001	-0.0635	-0.0567	-0.0879
educa	0.2100	0.0627	0.2958	0.4513	0.1404	0.2358
forla	0.2437	0.0394	0.2258	0.3220	0.1318	0.1815

A.5.7. - continued: Correlation betweeen the variables for Ankara OIZ data

	compuse	**smedo**	**orgprox**	**cluster**	**educa**	**forla**
compu	1.0000					
smedo	0.1801	1.0000				
orgpro	0.1643	0.0958	1.0000			
cluster	-0.0829	-0.0567	-0.1028	1.0000		
educa	0.3819	0.1141	0.0986	-0.0935	1.0000	
forla	0.3230	0.1159	0.1058	-0.0936	0.5183	1.0000

A.5.8.: T-Tests for Ankara OIZ data

	Mean of Exporters (1)	**Mean of Non – Exporters (0)**	**Difference (m(0)-m(1))**	**p-value**
age	10.8319	8.8160	-2.0159	0.0000
lnlab	2.2042	1.5421	-0.6622	0.0000
hslabor	0.1366	0.0864	-0.0503	0.0000
plcncr	0.3384	0.1518	-0.1866	0.0000
tmpum	0.2882	0.1647	-0.1235	0.0000
compuse	1.7598	0.9301	-0.8297	0.0000
smedo	0.1157	0.0368	-0.0789	0.0000
orgprox	1.3908	1.1426	-0.2482	0.0000
cluster	3.7838	4.6136	0.8298	0.0010
educa	2.2817	1.8629	-0.4187	0.0000
forla	0.6092	0.3064	-0.3028	0.0000
# obs.	458	1087		

A.5.9.: Correlation betweeen the variables for Istanbul OIZ data (# of obs.: 1172)

	exp	**lnage**	**lnlab**	**hslabor**	**plcncr**	**tmpum**
exp	1.0000					
lnage	0.0828	1.0000				
lnlab	0.4502	0.1539	1.0000			
hslabor	0.0738	-0.0013	0.0103	1.0000		
plcncr	0.1618	0.0773	0.3104	0.0231	1.0000	
tmpum	0.2055	0.1034	0.3267	0.0503	0.0421	1.0000
compuse	0.3276	0.0523	0.4860	0.1804	0.2193	0.2307
smedo	0.1307	0.0181	0.1721	0.0704	0.1088	0.0944
orgprox	0.2741	0.1217	0.3471	0.0337	0.0850	0.2242
cluster	-0.0842	0.0597	-0.0955	0.0063	-0.0128	-0.0896
educa	0.1982	0.0362	0.3106	0.3428	0.0721	0.1381
forla	0.1974	0.0239	0.2310	0.2002	0.0599	0.1444

A.5.9. - continued: Correlation betweeen the variables for Istanbul OIZ data

	compuse	**smedo**	**orgprox**	**cluster**	**educa**	**forla**
compu	1.0000					
smedo	0.1397	1.0000				
orgpro	0.2865	0.1171	1.0000			
cluster	-0.0302	0.0066	-0.0273	1.0000		
educa	0.3203	0.1273	0.1442	-0.0296	1.0000	
forla	0.2423	0.0974	0.1432	0.0193	0.4631	1.0000

A.5.10.: T-Tests for Istanbul OIZ data

	Mean of Exporters (1)	**Mean of Non – Exporters (0)**	**Difference (m(0)-m(1))**	**p-value**
age	11.2765	9.7329	-1.5436	0.0046
lnlab	2.8132	1.8067	-1.0064	0.0000
hslabor	0.1105	0.0885	-0.0221	0.0115
plcncr	0.4508	0.2547	-0.1961	0.0000
tmpum	0.4508	0.2547	-0.1961	0.0000
compuse	1.5663	0.8494	-0.7169	0.0000
smedo	0.1004	0.0357	-0.0647	0.0000
orgprox	1.8220	1.1832	-0.6387	0.0000
cluster	1.2500	1.6646	0.4146	0.0039
educa	2.3864	2.0171	-0.3693	0.0000
forla	0.7159	0.4550	-0.2609	0.0000
# obs.	528	644		

A.5.11.: Probit estimation results for the sample for pavitt sectors (marginal effects)

VARIABLES	exp	exp	exp	exp
	(1)	(2)	(3)	(4)
	DSD	DSI	DSS	DSB
lnage	-0.000671*	-0.000249	0.00122	0.00252*
	(0.000393)	(0.000675)	(0.000945)	(0.00134)
lnlab	0.108***	0.116***	0.153***	0.135***
	(0.00418)	(0.00739)	(0.0126)	(0.0144)
hslabor	0.125***	0.134**	0.0472	-0.0614
	(0.0337)	(0.0575)	(0.0698)	(0.0508)
plcncr	0.0300***	0.0415***	0.0581***	0.0579**
	(0.00702)	(0.0102)	(0.0157)	(0.0287)
tmpum	0.0853***	0.0574***	0.0601***	0.0960***
	(0.00884)	(0.0153)	(0.0215)	(0.0257)
compuse	0.0680***	0.0512***	0.0610***	0.0233*
	(0.00438)	(0.00655)	(0.00956)	(0.0123)
smedo	0.0565***	0.0474*	0.0351	0.148**
	(0.0170)	(0.0246)	(0.0399)	(0.0593)
orgprox	0.0804***	0.0548***	0.0874***	0.0544***
	(0.00532)	(0.00763)	(0.0134)	(0.0157)
cluster	0.00187	0.00137	0.00149	0.00882
	(0.00166)	(0.00297)	(0.00324)	(0.00585)
educa	0.0130**	0.00728	-0.00265	0.0119
	(0.00526)	(0.00863)	(0.0132)	(0.0165)
forla	0.0644***	0.0488***	0.0603***	0.0520***
	(0.00684)	(0.0118)	(0.0177)	(0.0198)
sdum	0.0948***	0.0409***	0.0394*	0.0237
	(0.00811)	(0.0134)	(0.0203)	(0.0265)
bdum	-0.0176	-0.110***	-0.00828	-0.0726
	(0.0129)	(0.0224)	(0.0551)	(0.0483)
Observations	14,412	5,238	3,115	1,449

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.5.12.: Probit Estimation results for the data for OSB's only (marginal effects)

VARIABLES	exp	exp	exp
	(1)	(2)	(3)
lnage	0.00123	0.00101	0.00104
	(0.000872)	(0.000885)	(0.000877)
lnlab	0.135***	0.140***	0.141***
	(0.00900)	(0.00943)	(0.00914)
hslabor	0.196***	0.239***	0.233***
	(0.0595)	(0.0607)	(0.0603)
plcncr	0.0408***	0.0277**	0.0331**
	(0.0135)	(0.0137)	(0.0136)
tmpum	0.0457***	0.0647***	0.0544***
	(0.0176)	(0.0183)	(0.0178)
compuse	0.0684***	0.0639***	0.0652***
	(0.00783)	(0.00807)	(0.00793)
smedo	0.0269	0.0280	0.0251
	(0.0274)	(0.0277)	(0.0275)
orgprox	0.0565***	0.0558***	0.0550***
	(0.00919)	(0.00933)	(0.00923)
cluster	-0.00208	-0.00443*	-0.00346
	(0.00257)	(0.00265)	(0.00261)
educa	-0.00646	4.15e-05	-0.00461
	(0.0107)	(0.0109)	(0.0107)
forla	0.0630***	0.0651***	0.0649***
	(0.0145)	(0.0147)	(0.0146)
sdum	0.0593***	0.0600***	0.0680***
	(0.0169)	(0.0177)	(0.0172)
bdum	-0.0932***	-0.0580	-0.0691**
	(0.0329)	(0.0365)	(0.0346)
dsi			0.0233
			(0.0196)
dss			0.106***
			(0.0224)
dsb			-0.121***
			(0.0305)
Industry Dummies		YES	
Observations	4,457	4,457	4,457

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.5.13.: Probit estimation results for Ankara OIZ data for pavitt sectors (marginal effects)

VARIABLES	exp	exp	exp	exp
	(1)	(2)	(3)	(4)
	DSD	DSI	DSS	DSB
lnage	-0.000105	0.00401*	0.000514	0.00639
	(0.00227)	(0.00229)	(0.00266)	(0.00660)
lnlab	0.0672**	0.146***	0.122***	0.109
	(0.0298)	(0.0290)	(0.0324)	(0.0679)
hslabor	0.326**	0.0359	0.144	-0.0864
	(0.131)	(0.166)	(0.165)	(0.198)
plcncr	0.0732	0.0293	-0.00206	-0.0219
	(0.0462)	(0.0386)	(0.0459)	(0.109)
tmpum	-0.0324	0.0408	-0.0855	-0.0792
	(0.0575)	(0.0632)	(0.0539)	(0.0845)
compuse	0.0442**	0.0610***	0.0615***	0.128***
	(0.0212)	(0.0202)	(0.0221)	(0.0451)
smedo	0.0354	-0.0434	0.196*	0.304
	(0.0932)	(0.0815)	(0.105)	(0.233)
orgprox	0.0308	0.0467	0.102***	0.0905
	(0.0353)	(0.0340)	(0.0388)	(0.0615)
cluster	-0.00722	0.00373	-0.00960*	0.000221
	(0.00532)	(0.00529)	(0.00514)	(0.00840)
educa	-0.00369	0.00452	0.0174	-0.0959*
	(0.0301)	(0.0293)	(0.0306)	(0.0555)
forla	0.0836*	0.0753*	0.0876**	0.252***
	(0.0472)	(0.0420)	(0.0435)	(0.0812)
Observations	397	514	534	100

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.5.14: Probit estimation results for Istanbul OIZ data for pavitt sectors (marginal effects)

VARIABLES	exp	exp	exp	exp
	(1)	(2)	(3)	(4)
	DSD	DSI	DSS	DSB
lnage	-0.00106	0.00529	0.00243	0.0131
	(0.00248)	(0.00400)	(0.00421)	(0.00996)
lnlab	0.146***	0.155***	0.231***	0.274***
	(0.0254)	(0.0421)	(0.0521)	(0.106)
hslabor	-0.0188	0.568**	0.533*	0.115
	(0.162)	(0.259)	(0.282)	(0.632)
plcncr	0.0617	-0.0182	0.00566	-0.110
	(0.0411)	(0.0525)	(0.0714)	(0.253)
tmpum	0.0994**	-0.0284	0.000438	-0.274
	(0.0493)	(0.0779)	(0.0892)	(0.182)
compuse	0.0655***	0.0468	0.00118	0.178*
	(0.0247)	(0.0354)	(0.0403)	(0.102)
smedo	0.0830	0.0747	0.0611	0.388
	(0.104)	(0.136)	(0.148)	(0.317)
orgprox	0.130***	0.00740	0.103**	0.160
	(0.0280)	(0.0183)	(0.0484)	(0.123)
cluster	-0.00326	-0.0361**	-0.00875	-0.0394
	(0.0103)	(0.0174)	(0.0141)	(0.0490)
educa	0.0291	-0.0786*	-0.0275	0.203
	(0.0295)	(0.0448)	(0.0474)	(0.133)
forla	0.0378	0.106*	0.0906	-0.0958
	(0.0380)	(0.0566)	(0.0694)	(0.160)
Observations	615	259	242	56

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.5.15.: Bayesian spatial autoregressive probit model for Ankara OIZ data with w1 (intra-OIZ neighborhood) matrix and industry dummies[1] by Gibbs sampling method

Variable	Coefficient	Std Deviation	p-level
LNAGE	0.0040	0.0044	0.1900
LNLAB	0.3451	0.0504	0.0000
HSLAB	0.5029	0.2388	0.0200
PLCNCR	0.0852	0.0707	0.1230
TMPUM	-0.1017	0.0978	0.1440
COMPUSE	0.1946	0.0372	0.0000
SMEDO	0.1621	0.1516	0.1430
ORGPROX	0.1723	0.0643	0.0050
CLUSTER	-0.0172	0.0087	0.0250
EDUCA	0.0175	0.0547	0.3910
FORLA	0.2904	0.0759	0.0000
DS15	-0.6125	0.2697	0.0100
DS17	-0.6792	0.3307	0.0130
DS18	-35.2882	24.5099	0.0000
DS20	-0.2977	0.4037	0.2370
DS21	-0.8033	0.2473	0.0000
DS22	-0.3459	0.3170	0.1470
DS24	-0.9119	0.2164	0.0000
DS25	-0.3850	0.1435	0.0060
DS26	-0.1240	0.2048	0.2830
DS27	-0.2336	0.1150	0.0210

[1] 29 th industry is chosen as a base industry due to the highest number of observation (413) it has.

A.5.15.: continued

DS28	-0.3206	0.1314	0.0070
DS30	-9.0739	5.2267	0.0130
DS31	-0.3067	0.1584	0.0220
DS33	-0.2875	0.2605	0.1400
DS34	0.3626	0.2952	0.1020
DS35	0.3601	0.5310	0.2550
DS36	-0.4269	0.1392	0.0010
DS37	-0.3237	0.8205	0.3640
DS72	-0.3472	0.7934	0.3180
constant	-1.5013	0.1727	0.0000
rho	0.1160	0.1255	0.1700
LM-error	4.6890	17.6110*	0.0304
LM-sar	0.0216	6.6350*	0.8832
Moran’s I	2.6634	0.0029	0.0077
# of obs.	1545		

*chi(1), 0.01 value

A.5.15.1.Marginal Effects of A.5.15.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0020	-0.0013	0.0011	0.0035	0.0041
LNLAB	0.0561	0.0670	0.0949	0.1208	0.1267
HSLAB	-0.0426	0.0065	0.1385	0.2710	0.3036
PLCNCR	-0.0251	-0.0157	0.0235	0.0614	0.0719
TMPUM	-0.1043	-0.0861	-0.0281	0.0241	0.0348
COMPUSE	0.0282	0.0333	0.0536	0.0746	0.0826
SMEDO	-0.0730	-0.0405	0.0448	0.1223	0.1449
ORGPROX	-0.0001	0.0125	0.0474	0.0811	0.0914
CLUSTER	-0.0110	-0.0097	-0.0047	-0.0001	0.0018
EDUCA	-0.0353	-0.0235	0.0048	0.0352	0.0463
FORLA	0.0265	0.0389	0.0799	0.1217	0.1361
DS15	-0.3670	-0.3133	-0.1685	-0.0269	0.0145
DS17	-0.4241	-0.3753	-0.1872	-0.0141	0.0285
DS18	-24.9569	-23.4648	-9.7328	-1.3117	-0.7167
DS20	-0.3723	-0.3181	-0.0819	0.1257	0.1924
DS21	-0.4059	-0.3574	-0.2210	-0.0947	-0.0663
DS22	-0.3001	-0.2640	-0.0948	0.0672	0.1051
DS24	-0.4052	-0.3639	-0.2507	-0.1388	-0.1064
DS25	-0.2085	-0.1833	-0.1060	-0.0306	0.0009
DS26	-0.1747	-0.1454	-0.0341	0.0723	0.1057
DS27	-0.1520	-0.1269	-0.0644	-0.0018	0.0208
DS28	-0.1881	-0.1598	-0.0882	-0.0159	0.0039
DS30	-5.8193	-5.4410	-2.4975	-0.1646	0.2679
DS31	-0.2093	-0.1738	-0.0844	-0.0052	0.0292
DS33	-0.2586	-0.2197	-0.0791	0.0605	0.0947
DS34	-0.1176	-0.0524	0.0996	0.2622	0.3013
DS35	-0.2995	-0.1809	0.0988	0.3775	0.4793
DS36	-0.2113	-0.1973	-0.1174	-0.0426	-0.0198
DS37	-0.7205	-0.5562	-0.0888	0.3387	0.4191
DS72	-0.7986	-0.5758	-0.0961	0.3362	0.4796
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0007	-0.0003	0.0001	0.0010	0.0015
LNLAB	-0.0190	-0.0112	0.0141	0.0522	0.0738
HSLAB	-0.0381	-0.0162	0.0210	0.0893	0.1189

A.5.15.1.: continued

PLCNCR	-0.0085	-0.0047	0.0033	0.0195	0.0286
TMPUM	-0.0427	-0.0235	-0.0041	0.0072	0.0131
COMPUSE	-0.0126	-0.0057	0.0079	0.0301	0.0413
SMEDO	-0.0236	-0.0114	0.0059	0.0345	0.0531
ORGPROX	-0.0135	-0.0053	0.0068	0.0266	0.0373
CLUSTER	-0.0044	-0.0030	-0.0007	0.0006	0.0009
EDUCA	-0.0143	-0.0059	0.0005	0.0078	0.0144
FORLA	-0.0200	-0.0087	0.0118	0.0473	0.0653
DS15	-0.1665	-0.1193	-0.0259	0.0188	0.0477
DS17	-0.1911	-0.1211	-0.0269	0.0224	0.0483
DS18	-5.2483	-3.8319	-1.0353	1.3195	2.0183
DS20	-0.1530	-0.0983	-0.0142	0.0225	0.0470
DS21	-0.1967	-0.1326	-0.0322	0.0235	0.0462
DS22	-0.1261	-0.0816	-0.0138	0.0188	0.0478
DS24	-0.2150	-0.1467	-0.0377	0.0256	0.0592
DS25	-0.0950	-0.0659	-0.0155	0.0131	0.0221
DS26	-0.0686	-0.0424	-0.0054	0.0138	0.0362
DS27	-0.0711	-0.0477	-0.0100	0.0075	0.0161
DS28	-0.0795	-0.0547	-0.0130	0.0101	0.0171
DS30	-2.5415	-1.7933	-0.3570	0.2744	0.4129
DS31	-0.0775	-0.0514	-0.0121	0.0107	0.0199
DS33	-0.0893	-0.0639	-0.0113	0.0163	0.0325
DS34	-0.0305	-0.0176	0.0142	0.0729	0.0978
DS35	-0.0688	-0.0386	0.0154	0.1042	0.1745
DS36	-0.0906	-0.0733	-0.0172	0.0123	0.0263
DS37	-0.2826	-0.1639	-0.0166	0.0652	0.1201
DS72	-0.2814	-0.1220	-0.0133	0.0697	0.1300
Total	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0023	-0.0015	0.0013	0.0039	0.0049
LNLAB	0.0585	0.0718	0.1090	0.1525	0.1712
HSLAB	-0.0484	0.0073	0.1595	0.3223	0.3904
PLCNCR	-0.0337	-0.0186	0.0267	0.0723	0.0841
TMPUM	-0.1241	-0.0954	-0.0322	0.0281	0.0416
COMPUSE	0.0319	0.0362	0.0615	0.0935	0.1104
SMEDO	-0.0900	-0.0508	0.0507	0.1426	0.1721

A.5.15.1.: continued

ORGPROX	-0.0002	0.0144	0.0542	0.0965	0.1066
CLUSTER	-0.0131	-0.0111	-0.0054	-0.0001	0.0018
EDUCA	-0.0394	-0.0296	0.0053	0.0407	0.0502
FORLA	0.0299	0.0437	0.0917	0.1496	0.1728
DS15	-0.4773	-0.3838	-0.1944	-0.0275	0.0134
DS17	-0.5199	-0.4338	-0.2141	-0.0155	0.0351
DS18	-26.9185	-24.9798	-10.7681	-1.7637	-0.8959
DS20	-0.4330	-0.3650	-0.0961	0.1448	0.2188
DS21	-0.5286	-0.4412	-0.2532	-0.1075	-0.0786
DS22	-0.3489	-0.3080	-0.1087	0.0751	0.1427
DS24	-0.5192	-0.4618	-0.2884	-0.1469	-0.1130
DS25	-0.2704	-0.2203	-0.1215	-0.0344	0.0007
DS26	-0.2215	-0.1734	-0.0395	0.0801	0.1217
DS27	-0.1905	-0.1574	-0.0743	-0.0017	0.0217
DS28	-0.2206	-0.1934	-0.1012	-0.0196	0.0052
DS30	-7.0144	-6.2940	-2.8545	-0.1849	0.2729
DS31	-0.2453	-0.2019	-0.0965	-0.0056	0.0314
DS33	-0.3042	-0.2550	-0.0904	0.0713	0.1213
DS34	-0.1187	-0.0600	0.1138	0.3021	0.3684
DS35	-0.3185	-0.2139	0.1141	0.4486	0.5760
DS36	-0.2752	-0.2354	-0.1346	-0.0480	-0.0202
DS37	-0.8147	-0.6795	-0.1054	0.3854	0.4861
DS72	-0.8324	-0.6401	-0.1094	0.3664	0.5419

A.5.16: Bayesian spatial autoregressive probit model for Ankara OIZ data with w1 (intra-OIZ neighborhood) matrix and pavitt sector dummies[2] by Gibbs sampling method

Variable	Coefficient	Std Deviation	p-level
LNAGE	0.0044	0.0043	0.1530
LNLAB	0.3229	0.0515	0.0000
HSLAB	0.4810	0.2564	0.0320
PLCNCR	0.0794	0.0706	0.1340
TMPUM	-0.1126	0.0954	0.1250
COMPUSE	0.1957	0.0387	0.0000
SMEDO	0.1625	0.1495	0.1410
ORGPROX	0.1649	0.0615	0.0020
CLUSTER	-0.0129	0.0084	0.0640
EDUCA	0.0007	0.0501	0.4940
FORLA	0.2866	0.0687	0.0000
DSD	-0.3519	0.0947	0.0000
DSI	-0.2154	0.0880	0.0030
DSB	-0.5824	0.1695	0.0000
constant	-1.4050	0.1744	0.0000
rho	0.2616	0.1416	0.0390
LM-error	10.5883	17.6110*	0.0011
LM-sar	1.4477	6.6350*	0.2289
Moran’s I	3.7903	0.0029	0.0002
# of obs.	1545		

*chi(1), 0.01 value

[2] DSS is chosen as a base industry due to the highest number of observation (534) it has.

A.5.16.1.Marginal Effects of A.5.16.

Direct	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0019	-0.0012	0.0012	0.0035	0.0041
LNLAB	0.0504	0.0629	0.0910	0.1218	0.1349
HSLAB	-0.0738	-0.0087	0.1353	0.2733	0.3075
PLCNCR	-0.0309	-0.0187	0.0224	0.0606	0.0680
TMPUM	-0.1063	-0.0856	-0.0317	0.0200	0.0381
COMPUSE	0.0272	0.0330	0.0551	0.0771	0.0850
SMEDO	-0.0609	-0.0372	0.0456	0.1303	0.1540
ORGPROX	0.0034	0.0114	0.0464	0.0793	0.0938
CLUSTER	-0.0098	-0.0084	-0.0036	0.0009	0.0019
EDUCA	-0.0373	-0.0285	0.0001	0.0272	0.0334
FORLA	0.0272	0.0414	0.0807	0.1200	0.1300
DSD	-0.1779	-0.1525	-0.0989	-0.0470	-0.0306
DSI	-0.1218	-0.1090	-0.0606	-0.0133	-0.0018
DSB	-0.2955	-0.2609	-0.1638	-0.0679	-0.0426

Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0013	-0.0006	0.0004	0.0020	0.0025
LNLAB	-0.0138	-0.0037	0.0347	0.0865	0.1029
HSLAB	-0.0346	-0.0123	0.0521	0.1702	0.2315
PLCNCR	-0.0124	-0.0066	0.0086	0.0340	0.0534
TMPUM	-0.0705	-0.0480	-0.0122	0.0110	0.0197
COMPUSE	-0.0088	-0.0020	0.0216	0.0561	0.0726
SMEDO	-0.0251	-0.0159	0.0170	0.0734	0.0923
ORGPROX	-0.0097	-0.0020	0.0176	0.0489	0.0641
CLUSTER	-0.0071	-0.0054	-0.0014	0.0005	0.0010
EDUCA	-0.0272	-0.0147	0.0000	0.0141	0.0211
FORLA	-0.0146	-0.0026	0.0310	0.0790	0.1061
DSD	-0.1333	-0.1043	-0.0384	0.0032	0.0111
DSI	-0.0939	-0.0705	-0.0241	0.0020	0.0095
DSB	-0.2221	-0.1677	-0.0640	0.0052	0.0202

A.5.16.1.: continued

Total	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0032	-0.0017	0.0017	0.0051	0.0060
LNLAB	0.0731	0.0821	0.1257	0.1847	0.2151
HSLAB	-0.0963	-0.0138	0.1875	0.4002	0.4884
PLCNCR	-0.0385	-0.0245	0.0310	0.0868	0.1124
TMPUM	-0.1586	-0.1208	-0.0439	0.0304	0.0531
COMPUSE	0.0340	0.0418	0.0766	0.1187	0.1410
SMEDO	-0.0845	-0.0495	0.0627	0.1802	0.2151
ORGPROX	0.0054	0.0160	0.0640	0.1166	0.1384
CLUSTER	-0.0151	-0.0123	-0.0051	0.0013	0.0026
EDUCA	-0.0624	-0.0397	0.0002	0.0389	0.0516
FORLA	0.0374	0.0519	0.1118	0.1806	0.2126
DSD	-0.2697	-0.2322	-0.1374	-0.0637	-0.0374
DSI	-0.1995	-0.1660	-0.0847	-0.0156	-0.0024
DSB	-0.4657	-0.3902	-0.2278	-0.0877	-0.0552

A.5.17.: Bayesian spatial autoregressive probit model for Ankara OIZ data with w2 (intra-industry neighborhood) matrix and pavitt sector dummies[3] by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0056	0.0042	0.1000
LNLAB	0.3447	0.0551	0.0000
HSLAB	0.4967	0.2435	0.0220
PLCNCR	0.0899	0.0765	0.1220
TMPUM	-0.1148	0.0924	0.1130
COMPUSE	0.1885	0.0366	0.0000
SMEDO	0.1797	0.1507	0.1100
ORGPROX	0.1747	0.0593	0.0020
CLUSTER	-0.0136	0.0092	0.0600
EDUCA	-0.0002	0.0504	0.4970
FORLA	0.2969	0.0724	0.0000
DSD	-0.4837	0.1270	0.0000
DSI	-0.2632	0.1105	0.0040
DSB	-0.6946	0.2044	0.0000
constant	-1.7428	0.1666	0.0000
rho	-0.2871	0.2524	0.1320
LM-error	1.2764	17.6110*	0.2586
LM-sar	1.4102	6.6350	0.2350
Moran's I	1.9024	0.0040	0.0571
# of obs.	1545		

*chi(1), 0.01 value

[3] DSS is chosen as a base industry due to the highest number of observation (534) it has.

A.5.17.1.Marginal Effects of A.5.17.

Direct	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0013	-0.0008	0.0016	0.0039	0.0044
LNLAB	0.0560	0.0671	0.0976	0.1288	0.1397
HSLAB	-0.0423	0.0005	0.1407	0.2741	0.3168
PLCNCR	-0.0274	-0.0168	0.0255	0.0704	0.0820
TMPUM	-0.1029	-0.0857	-0.0326	0.0213	0.0408
COMPUSE	0.0271	0.0332	0.0534	0.0733	0.0765
SMEDO	-0.0585	-0.0362	0.0509	0.1331	0.1596
ORGPROX	0.0034	0.0166	0.0496	0.0852	0.0949
CLUSTER	-0.0116	-0.0091	-0.0038	0.0011	0.0027
EDUCA	-0.0419	-0.0278	0.0000	0.0269	0.0364
FORLA	0.0341	0.0431	0.0841	0.1242	0.1350
DSD	-0.2319	-0.2083	-0.1369	-0.0679	-0.0543
DSI	-0.1645	-0.1371	-0.0745	-0.0179	-0.0028
DSB	-0.3684	-0.3184	-0.1967	-0.0951	-0.0646
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0016	-0.0012	-0.0003	0.0004	0.0009
LNLAB	-0.0555	-0.0502	-0.0194	0.0225	0.0420
HSLAB	-0.1207	-0.0876	-0.0281	0.0283	0.0629
PLCNCR	-0.0309	-0.0233	-0.0049	0.0083	0.0169
TMPUM	-0.0182	-0.0089	0.0068	0.0301	0.0377
COMPUSE	-0.0330	-0.0266	-0.0107	0.0105	0.0219
SMEDO	-0.0634	-0.0439	-0.0108	0.0119	0.0221
ORGPROX	-0.0411	-0.0300	-0.0102	0.0096	0.0200
CLUSTER	-0.0029	-0.0011	0.0007	0.0027	0.0036
EDUCA	-0.0133	-0.0079	0.0000	0.0078	0.0120
FORLA	-0.0522	-0.0439	-0.0166	0.0179	0.0399
DSD	-0.0430	-0.0237	0.0295	0.0826	0.0954
DSI	-0.0258	-0.0121	0.0162	0.0508	0.0635
DSB	-0.0674	-0.0371	0.0418	0.1218	0.1433

A.5.17.1.: continued

Total	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0011	-0.0006	0.0013	0.0033	0.0043
LNLAB	0.0419	0.0486	0.0782	0.1257	0.1441
HSLAB	-0.0292	0.0004	0.1126	0.2300	0.2837
PLCNCR	-0.0227	-0.0135	0.0206	0.0627	0.0777
TMPUM	-0.0931	-0.0690	-0.0259	0.0156	0.0333
COMPUSE	0.0194	0.0237	0.0427	0.0666	0.0748
SMEDO	-0.0543	-0.0310	0.0401	0.1074	0.1338
ORGPROX	0.0040	0.0133	0.0394	0.0696	0.0784
CLUSTER	-0.0117	-0.0082	-0.0031	0.0009	0.0018
EDUCA	-0.0337	-0.0238	0.0000	0.0224	0.0334
FORLA	0.0246	0.0329	0.0674	0.1171	0.1329
DSD	-0.1859	-0.1654	-0.1074	-0.0596	-0.0475
DSI	-0.1314	-0.1055	-0.0583	-0.0129	-0.0027
DSB	-0.3009	-0.2476	-0.1549	-0.0716	-0.0456

A.5.18.: Bayesian spatial autoregressive probit model for Istanbul OIZ data with w1 (intra-OIZ neighborhood) matrix and industry dummies[4] by Gibbs sampling method

Variable	Coefficient	Std Deviation	p-level
LNAGE	0.0020	0.0050	0.3340
LNLAB	0.4344	0.0530	0.0000
HSLAB	0.4263	0.2998	0.0770
PLCNCR	0.0632	0.0747	0.2020
TMPUM	0.0575	0.0912	0.2540
COMPUSE	0.1172	0.0476	0.0040
SMEDO	0.2008	0.1746	0.1210
ORGPROX	0.1254	0.0347	0.0000
CLUSTER	-0.0424	0.0186	0.0160
EDUCA	0.0133	0.0527	0.3930
FORLA	0.1760	0.0726	0.0140
DS15	-0.6343	0.2769	0.0110
DS16	-0.6791	0.9753	0.2280
DS17	0.0804	0.1590	0.3070
DS18	-0.0983	0.2486	0.3550
DS19	0.2125	0.2376	0.1890
DS20	12.7784	6.7170	0.0020
DS21	-0.2526	0.3207	0.2270
DS22	-0.3920	0.3838	0.1560
DS23	0.1947	0.9200	0.4310
DS24	-0.5311	0.2256	0.0080

[4] 36 th industry is chosen as a base industry due to the highest number of observation (207) it has.

A.5.18.: continued

DS25	0.0300	0.1717	0.4430
DS26	-0.3142	0.3140	0.1610
DS27	-0.5710	0.1947	0.0020
DS28	-0.1463	0.1652	0.1790
DS29	0.1251	0.1392	0.1850
DS31	-0.1321	0.2135	0.2770
DS32	0.6468	0.8326	0.2200
DS34	0.2845	0.3174	0.1760
DS35	8.0250	6.1233	0.0070
DS37	0.3704	1.0045	0.3770
DS72	-8.9660	6.1774	0.0070
constant	-1.5319	0.1544	0.0000
rho	0.2722	0.0879	0.0000
LM-error	2.2752	17.6110*	0.1315
LM-sar	0.4709	6.6350*	0.4926
Moran's I	1.8702	0.0062	0.0615
# of obs.	1172		

*chi(1), 0.01 value

A.5.18.1.Marginal Effects of A.5.18.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0032	-0.0025	0.0006	0.0034	0.0045
LNLAB	0.0937	0.1016	0.1298	0.1585	0.1679
HSLAB	-0.0801	-0.0447	0.1273	0.3035	0.3734
PLCNCR	-0.0349	-0.0260	0.0189	0.0609	0.0765
TMPUM	-0.0612	-0.0420	0.0172	0.0691	0.0835
COMPUSE	0.0003	0.0079	0.0350	0.0623	0.0699
SMEDO	-0.0814	-0.0462	0.0601	0.1614	0.1969
ORGPROX	0.0115	0.0180	0.0375	0.0567	0.0633
CLUSTER	-0.0290	-0.0243	-0.0127	-0.0016	0.0019
EDUCA	-0.0376	-0.0295	0.0040	0.0348	0.0446
FORLA	-0.0094	0.0094	0.0526	0.0936	0.1077
DS15	-0.4216	-0.3488	-0.1897	-0.0358	0.0128
DS16	-0.9585	-0.7762	-0.2030	0.4031	0.5993
DS17	-0.0978	-0.0679	0.0240	0.1194	0.1386
DS18	-0.2372	-0.1762	-0.0295	0.1044	0.1393
DS19	-0.1274	-0.0736	0.0633	0.2016	0.2426
DS20	0.2582	0.7560	3.8248	7.4013	7.6222
DS21	-0.3357	-0.2630	-0.0757	0.0985	0.1750
DS22	-0.4227	-0.3460	-0.1170	0.1013	0.1793
DS23	-0.6051	-0.5045	0.0579	0.6288	0.7941
DS24	-0.3152	-0.2880	-0.1587	-0.0293	0.0118
DS25	-0.1263	-0.0865	0.0089	0.1075	0.1287
DS26	-0.3360	-0.2844	-0.0940	0.0930	0.1497
DS27	-0.3217	-0.2791	-0.1705	-0.0609	-0.0207
DS28	-0.1836	-0.1424	-0.0437	0.0529	0.0907
DS29	-0.0730	-0.0452	0.0373	0.1161	0.1373
DS31	-0.1987	-0.1666	-0.0395	0.0873	0.1324
DS32	-0.4000	-0.2748	0.1935	0.7508	0.9085
DS34	-0.1486	-0.0998	0.0849	0.2762	0.3308
DS35	-0.0191	0.1236	2.3998	6.2116	7.2459
DS37	-0.6408	-0.4744	0.1108	0.7034	0.9598
DS72	-8.0595	-7.4841	-2.6854	-0.1931	0.0216

A.5.18.1.: continued

Indirect	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0018	-0.0011	0.0002	0.0016	0.0020
LNLAB	0.0054	0.0132	0.0499	0.0988	0.1127
HSLAB	-0.0385	-0.0166	0.0483	0.1395	0.2001
PLCNCR	-0.0198	-0.0107	0.0073	0.0302	0.0372
TMPUM	-0.0304	-0.0160	0.0067	0.0320	0.0378
COMPUSE	0.0000	0.0017	0.0134	0.0328	0.0404
SMEDO	-0.0347	-0.0171	0.0229	0.0740	0.0977
ORGPROX	0.0014	0.0030	0.0144	0.0314	0.0394
CLUSTER	-0.0156	-0.0117	-0.0049	-0.0004	0.0007
EDUCA	-0.0214	-0.0123	0.0014	0.0157	0.0214
FORLA	-0.0046	0.0017	0.0205	0.0508	0.0623
DS15	-0.2337	-0.2061	-0.0751	-0.0056	0.0066
DS16	-0.5238	-0.3428	-0.0778	0.1376	0.3151
DS17	-0.0474	-0.0304	0.0091	0.0540	0.0741
DS18	-0.1230	-0.0860	-0.0112	0.0480	0.0652
DS19	-0.0575	-0.0300	0.0248	0.0959	0.1410
DS20	0.0384	0.1537	1.5024	4.0519	5.3300
DS21	-0.1931	-0.1401	-0.0303	0.0389	0.0582
DS22	-0.2637	-0.1715	-0.0452	0.0369	0.0723
DS23	-0.3373	-0.2292	0.0195	0.2784	0.3822
DS24	-0.1918	-0.1522	-0.0620	-0.0067	0.0057
DS25	-0.0565	-0.0390	0.0035	0.0494	0.0692
DS26	-0.1874	-0.1335	-0.0352	0.0394	0.0831
DS27	-0.2196	-0.1598	-0.0667	-0.0114	-0.0042
DS28	-0.1083	-0.0726	-0.0171	0.0191	0.0419
DS29	-0.0434	-0.0175	0.0143	0.0566	0.0761
DS31	-0.1153	-0.0812	-0.0156	0.0353	0.0555
DS32	-0.1628	-0.1062	0.0741	0.3380	0.4418
DS34	-0.0774	-0.0425	0.0323	0.1229	0.1533
DS35	-0.0060	0.0383	0.8786	2.9652	3.2697
DS37	-0.3578	-0.1987	0.0422	0.3316	0.5023
DS72	-5.3778	-3.4939	-1.0367	-0.0561	0.0126

A.5.18.1.: continued

Total	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0050	-0.0035	0.0008	0.0048	0.0062
LNLAB	0.1151	0.1314	0.1796	0.2379	0.2501
HSLAB	-0.1012	-0.0617	0.1756	0.4355	0.5181
PLCNCR	-0.0526	-0.0365	0.0262	0.0851	0.1040
TMPUM	-0.0928	-0.0569	0.0239	0.0977	0.1169
COMPUSE	0.0003	0.0103	0.0484	0.0893	0.1028
SMEDO	-0.1049	-0.0632	0.0830	0.2289	0.2738
ORGPROX	0.0160	0.0241	0.0518	0.0835	0.0908
CLUSTER	-0.0396	-0.0342	-0.0176	-0.0023	0.0025
EDUCA	-0.0542	-0.0409	0.0054	0.0500	0.0626
FORLA	-0.0150	0.0129	0.0730	0.1378	0.1580
DS15	-0.6195	-0.5255	-0.2648	-0.0458	0.0193
DS16	-1.3449	-1.0432	-0.2807	0.5070	0.9506
DS17	-0.1439	-0.0986	0.0331	0.1703	0.2016
DS18	-0.3400	-0.2563	-0.0407	0.1469	0.1980
DS19	-0.1833	-0.1014	0.0882	0.2791	0.3753
DS20	0.2827	0.9999	5.3272	11.0324	12.3260
DS21	-0.5006	-0.3838	-0.1060	0.1396	0.2407
DS22	-0.6408	-0.5100	-0.1622	0.1315	0.2459
DS23	-0.9118	-0.7177	0.0774	0.8742	1.0863
DS24	-0.4684	-0.4094	-0.2206	-0.0433	0.0175
DS25	-0.1714	-0.1215	0.0124	0.1510	0.1924
DS26	-0.4792	-0.3973	-0.1292	0.1419	0.2229
DS27	-0.4924	-0.4201	-0.2372	-0.0797	-0.0283
DS28	-0.2976	-0.2075	-0.0608	0.0741	0.1154
DS29	-0.1135	-0.0610	0.0516	0.1688	0.1976
DS31	-0.3139	-0.2411	-0.0551	0.1232	0.1690
DS32	-0.5286	-0.3688	0.2676	1.0115	1.3696
DS34	-0.2174	-0.1406	0.1172	0.3784	0.4635
DS35	-0.0251	0.1717	3.2784	8.2170	9.9703
DS37	-0.9104	-0.6736	0.1530	0.9662	1.3852
DS72	-12.2122	-10.0949	-3.7221	-0.2660	0.0318

A.5.19.: Bayesian spatial autoregressive probit model for Istanbul OIZ data with w1 (intra-OIZ neighborhood) matrix and pavitt sector dummies[5]by Gibbs sampling method

Variable	Coefficient	Std Deviation	p-level
LNAGE	0.0031	0.0046	0.2450
LNLAB	0.4250	0.0487	0.0000
HSLAB	0.4168	0.2881	0.0780
PLCNCR	0.0487	0.0733	0.2440
TMPUM	0.0883	0.0894	0.1690
COMPUSE	0.1256	0.0438	0.0000
SMEDO	0.2270	0.1739	0.1020
ORGPROX	0.1058	0.0333	0.0000
CLUSTER	-0.0358	0.0180	0.0250
EDUCA	-0.0075	0.0511	0.4440
FORLA	0.1763	0.0734	0.0080
DSI	-0.1316	0.1034	0.1080
DSS	0.0860	0.1080	0.2080
DSB	-0.4447	0.1912	0.0100
constant	-1.5003	0.1377	0.0000
rho	0.2431	0.0929	0.0080
LM-error	1.8150	17.6110*	0.1779
LM-sar	0.5696	6.6350*	0.4504
Moran's I	1.6040	0.0063	0.1087
# of obs.	1172		

*chi(1), 0.01 value

[5] DSD is chosen as a base industry due to the highest number of observation (615) it has.

A.5.19.1.Marginal Effects of A.5.19.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0026	-0.0019	0.0010	0.0038	0.0046
LNLAB	0.0960	0.1039	0.1316	0.1580	0.1650
HSLAB	-0.1101	-0.0513	0.1290	0.2978	0.3525
PLCNCR	-0.0447	-0.0295	0.0151	0.0601	0.0741
TMPUM	-0.0446	-0.0243	0.0274	0.0843	0.1000
COMPUSE	0.0070	0.0147	0.0389	0.0656	0.0724
SMEDO	-0.0813	-0.0382	0.0703	0.1699	0.2085
ORGPROX	0.0058	0.0110	0.0328	0.0522	0.0563
CLUSTER	-0.0261	-0.0223	-0.0111	-0.0003	0.0031
EDUCA	-0.0439	-0.0332	-0.0023	0.0288	0.0349
FORLA	-0.0100	0.0094	0.0545	0.1002	0.1076
DSI	-0.1193	-0.1019	-0.0408	0.0235	0.0385
DSS	-0.0649	-0.0374	0.0266	0.0935	0.1061
DSB	-0.2984	-0.2564	-0.1378	-0.0285	0.0151
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0011	-0.0007	0.0003	0.0016	0.0021
LNLAB	-0.0011	0.0062	0.0448	0.0919	0.1033
HSLAB	-0.0387	-0.0148	0.0446	0.1402	0.1817
PLCNCR	-0.0228	-0.0107	0.0053	0.0264	0.0359
TMPUM	-0.0173	-0.0082	0.0091	0.0355	0.0477
COMPUSE	-0.0006	0.0016	0.0132	0.0331	0.0456
SMEDO	-0.0308	-0.0139	0.0233	0.0753	0.0975
ORGPROX	-0.0004	0.0014	0.0112	0.0257	0.0306
CLUSTER	-0.0121	-0.0103	-0.0037	0.0002	0.0010
EDUCA	-0.0220	-0.0146	-0.0009	0.0108	0.0163
FORLA	-0.0035	0.0009	0.0186	0.0476	0.0625
DSI	-0.0662	-0.0512	-0.0139	0.0080	0.0170
DSS	-0.0306	-0.0129	0.0091	0.0398	0.0674
DSB	-0.1641	-0.1300	-0.0477	-0.0013	0.0090

A.5.19.1.: continued

Total	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0034	-0.0024	0.0013	0.0050	0.0060
LNLAB	0.1161	0.1268	0.1764	0.2323	0.2477
HSLAB	-0.1245	-0.0688	0.1736	0.4216	0.5142
PLCNCR	-0.0623	-0.0402	0.0203	0.0820	0.1047
TMPUM	-0.0619	-0.0320	0.0365	0.1144	0.1447
COMPUSE	0.0085	0.0188	0.0521	0.0922	0.1128
SMEDO	-0.1038	-0.0527	0.0936	0.2315	0.2808
ORGPROX	0.0083	0.0143	0.0440	0.0733	0.0831
CLUSTER	-0.0346	-0.0306	-0.0148	-0.0004	0.0038
EDUCA	-0.0632	-0.0474	-0.0032	0.0389	0.0482
FORLA	-0.0118	0.0121	0.0731	0.1372	0.1570
DSI	-0.1728	-0.1432	-0.0547	0.0315	0.0554
DSS	-0.0955	-0.0483	0.0357	0.1241	0.1691
DSB	-0.4391	-0.3677	-0.1854	-0.0314	0.0203

A.5.20.: Bayesian spatial autoregressive probit model for Istanbul OIZ data with w2 (intra-industry neighborhood) matrix without SMEDO and EDUCA variables by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0020	0.0045	0.3290
LNLAB	0.4251	0.0498	0.0000
HSLAB	0.3517	0.2793	0.1100
PLCNCR	0.0701	0.0727	0.1630
TMPUM	0.0928	0.0936	0.1530
COMPUSE	0.1384	0.0446	0.0000
ORGPROX	0.1106	0.0343	0.0000
CLUSTER	-0.0335	0.0183	0.0340
FORLA	0.1590	0.0661	0.0050
constant	-1.5590	0.1233	0.0000
rho	0.1784	0.1032	0.0560
LM-error	0.1970	17.6110*	0.6571
LM-sar	0.0013	6.6350*	0.9715
Moran's I	0.6577	0.0060	0.5107
# of obs.	1172		

*chi(1), 0.01 value

A.5.20.1.: Marginal effects of A.5.20.

Direct	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0032	-0.0020	0.0006	0.0032	0.0041
LNLAB	0.0962	0.1074	0.1326	0.1616	0.1678
HSLAB	-0.1093	-0.0623	0.1097	0.2786	0.3229
PLCNCR	-0.0426	-0.0224	0.0218	0.0668	0.0736
TMPUM	-0.0476	-0.0288	0.0289	0.0838	0.1054
COMPUSE	0.0074	0.0155	0.0432	0.0713	0.0799
ORGPROX	0.0060	0.0145	0.0345	0.0552	0.0624
CLUSTER	-0.0261	-0.0216	-0.0104	0.0007	0.0046
FORLA	-0.0006	0.0112	0.0496	0.0902	0.0996
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0011	-0.0006	0.0002	0.0012	0.0017
LNLAB	-0.0118	-0.0052	0.0316	0.0747	0.0910
HSLAB	-0.0436	-0.0166	0.0264	0.0919	0.1377
PLCNCR	-0.0097	-0.0052	0.0055	0.0222	0.0307
TMPUM	-0.0150	-0.0085	0.0072	0.0312	0.0490
COMPUSE	-0.0039	-0.0015	0.0105	0.0286	0.0379
ORGPROX	-0.0033	-0.0015	0.0082	0.0223	0.0275
CLUSTER	-0.0133	-0.0081	-0.0025	0.0005	0.0014
FORLA	-0.0041	-0.0020	0.0118	0.0364	0.0451
Total	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0043	-0.0025	0.0008	0.0042	0.0054
LNLAB	0.1115	0.1222	0.1642	0.2163	0.2286
HSLAB	-0.1452	-0.0771	0.1360	0.3513	0.4190
PLCNCR	-0.0496	-0.0271	0.0273	0.0833	0.0981
TMPUM	-0.0636	-0.0368	0.0361	0.1098	0.1337
COMPUSE	0.0082	0.0184	0.0537	0.0924	0.1080
ORGPROX	0.0071	0.0175	0.0427	0.0710	0.0831
CLUSTER	-0.0348	-0.0281	-0.0130	0.0010	0.0052
FORLA	-0.0008	0.0131	0.0614	0.1153	0.1308

A.5.21.: Bayesian spatial autoregressive probit model for Istanbul OIZ data with w2 (intra-industry neighborhood) matrix and pavitt sector dummies[6] by Gibbs sampling method

Variable	**Coefficient**	**Std Deviation**	**p-level**
LNAGE	0.0030	0.0045	0.2520
LNLAB	0.4425	0.0499	0.0000
HSLAB	0.4596	0.2915	0.0580
PLCNCR	0.0504	0.0716	0.2380
TMPUM	0.0839	0.0935	0.1890
COMPUSE	0.1347	0.0456	0.0010
SMEDO	0.2035	0.1713	0.1220
ORGPROX	0.1194	0.0332	0.0000
CLUSTER	-0.0370	0.0186	0.0220
EDUCA	-0.0010	0.0552	0.4940
FORLA	0.1666	0.0700	0.0090
DSI	-0.1123	0.0949	0.1160
DSS	0.0629	0.1031	0.2810
DSB	-0.4187	0.1877	0.0100
constant	-1.5935	0.1467	0.0000
rho	0.1417	0.1327	0.1440
LM-error	1.5681	17.6110*	0.2105
LM-sar	1.2948	6.6350*	0.2552
Moran's I	2.0121	0.0057	0.0442
# of obs.	1172		

*chi(1), 0.01 value

[6] DSD is chosen as a base industry due to the highest number of observation (615) it has.

A.5.21.1.Marginal Effects of A.5.20.

Direct	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0028	-0.0020	0.0009	0.0036	0.0045
LNLAB	0.1043	0.1106	0.1384	0.1642	0.1741
HSLAB	-0.0942	-0.0331	0.1437	0.3193	0.3638
PLCNCR	-0.0407	-0.0286	0.0157	0.0605	0.0695
TMPUM	-0.0503	-0.0320	0.0263	0.0831	0.0957
COMPUSE	0.0063	0.0128	0.0421	0.0688	0.0755
SMEDO	-0.0663	-0.0402	0.0636	0.1602	0.2049
ORGPROX	0.0099	0.0169	0.0373	0.0569	0.0620
CLUSTER	-0.0272	-0.0233	-0.0115	-0.0005	0.0026
EDUCA	-0.0477	-0.0347	-0.0003	0.0324	0.0427
FORLA	-0.0053	0.0084	0.0521	0.0923	0.1043
DSI	-0.1170	-0.0951	-0.0351	0.0210	0.0472
DSS	-0.0619	-0.0428	0.0196	0.0842	0.1054
DSB	-0.3166	-0.2502	-0.1309	-0.0212	0.0108
Indirect	**lower 01**	**lower 05**	**Coefficient**	**upper 95**	**upper 99**
LNAGE	-0.0008	-0.0004	0.0002	0.0011	0.0015
LNLAB	-0.0275	-0.0188	0.0249	0.0793	0.1048
HSLAB	-0.0375	-0.0225	0.0268	0.1174	0.1443
PLCNCR	-0.0118	-0.0076	0.0029	0.0191	0.0289
TMPUM	-0.0141	-0.0085	0.0044	0.0251	0.0362
COMPUSE	-0.0082	-0.0055	0.0079	0.0285	0.0457
SMEDO	-0.0230	-0.0147	0.0114	0.0541	0.0836
ORGPROX	-0.0074	-0.0049	0.0069	0.0244	0.0330
CLUSTER	-0.0132	-0.0086	-0.0021	0.0015	0.0029
EDUCA	-0.0159	-0.0106	-0.0002	0.0095	0.0143
FORLA	-0.0138	-0.0078	0.0094	0.0370	0.0494
DSI	-0.0540	-0.0335	-0.0066	0.0070	0.0138
DSS	-0.0236	-0.0132	0.0029	0.0235	0.0352
DSB	-0.1348	-0.0944	-0.0237	0.0184	0.0325

A.5.21.1.: continued

Total	lower 01	lower 05	Coefficient	upper 95	upper 99
LNAGE	-0.0035	-0.0023	0.0011	0.0044	0.0054
LNLAB	0.1051	0.1131	0.1633	0.2219	0.2461
HSLAB	-0.1038	-0.0420	0.1705	0.3995	0.4409
PLCNCR	-0.0500	-0.0344	0.0186	0.0722	0.0871
TMPUM	-0.0595	-0.0389	0.0307	0.0979	0.1185
COMPUSE	0.0074	0.0143	0.0500	0.0901	0.1095
SMEDO	-0.0845	-0.0449	0.0750	0.2026	0.2455
ORGPROX	0.0104	0.0194	0.0442	0.0749	0.0838
CLUSTER	-0.0385	-0.0301	-0.0137	-0.0007	0.0034
EDUCA	-0.0563	-0.0438	-0.0005	0.0397	0.0471
FORLA	-0.0056	0.0092	0.0615	0.1190	0.1339
DSI	-0.1535	-0.1209	-0.0418	0.0245	0.0510
DSS	-0.0783	-0.0548	0.0226	0.0984	0.1207
DSB	-0.3514	-0.3088	-0.1546	-0.0223	0.0115

A.5.22.: Industrial Distribution of SMEDO data (%)

	Turkey	**Turkey OIZs**	**Ankara OIZs**	**Istanbul OIZs**
Suppliers Dominated	59.38	43.98	25.70	52.47
Scale Intensive	21.69	28.23	33.27	22.10
Specialized Suppliers	12.81	21.67	34.56	20.65
Science Based	6.12	6.12	6.47	4.78
Observation number	24,214	4,457	1,545	1,172

A.5.23.: Summary table of the estimation results for Ankara OIZs

Variable	**Ankara-P**	**Ankara-P(ID)**	**Ankara-P(PT)**	**Ankara-SP(W1)**	**Ankara-SP(W2)**
LNAGE	*			*	**
LNLAB	***	***	***	***	***
HSLAB	*	**	**	**	*
PLCNCR				*	*
TMPUM				(-)*	(-)*
COMPUSE	***	***	***	***	***
SMEDO					
ORGPROX	***	***	***	***	***
CLUSTER		(-)***			(-)*
EDUCA					
FORLA	***	***	***	***	***
DSI			(-)***		
DSS			(-)**		
DSB			(-)***		
rho				**	*
LM-error				***	***
LM-sar				***	***
Moran's I				***	***

*** 1% significance level, ** 5% significance level, * 1% significance level,
(-) indicates the negative sign of the estimated variable,
where "P" stands for standard probit estimation,
where "ID" stands for estimation with industry dummies,
where "PT" stands for estimation with Pavitt taxonomies,
where "SP" stands for spatial probit estimation,
where "w1" stands for estimation with w1 weight matrix, i.e. intra-OIZ relations,
where "w2" stands for estimation with w2 weight matrix, i.e. intra-industry relations.

A.5.24.: Summary table of the estimation results for Istanbul OIZs

Variable	Istanbul-P	Istanbul-P(ID)	Istanbul-P(PT)	Istanbul-SP(W1)	Istanbul-SP(W2)
LNAGE					
LNLAB	***	***	***	***	***
HSLAB		**	**		
PLCNCR					
TMPUM					
COMPUSE	***	***	***	***	***
SMEDO				*	
ORGPROX	***	***	***	***	***
CLUSTER	(-)*	(-)**	(-)*	(-)**	(-)**
EDUCA					
FORLA	***	***	***	***	***
DSI					
DSS					
DSB			(-)**		
rho				**	
LM-error					**
LM-sar					**
Moran's I					**
# of obs.					

*** 1% significance level, ** 5% significance level, * 1% significance level,
(-) indicates the negative sign of the estimated variable,
where "P" stands for standard probit estimation,
where "ID" stands for estimation with industry dummies,
where "PT" stands for estimation with Pavitt taxonomies,
where "SP" stands for spatial probit estimation,
where "w1" stands for estimation with w1 weight matrix, i.e. intra-OIZ relations,
where "w2" stands for estimation with w2 weight matrix, i.e. intra-industry relations.

APPENDIX B: CURRICULUM VITAE

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Middle East Technical University, Faculty of Economic and Adminstrative Sciences, Department of Economics, Ph.D, 2012
"Exports and Clusters: A Spatial Econometric Analysis on Ankara and Istanbul OIZs", Supervisor: Prof. Dr. Erkan ERDİL

Akdeniz University, Faculty of Economic and Adminstrative Sciences, Department of Economics, Ms., 2001
"İşbirliğine Oyun Teorisi Yaklaşımı" (A Game Theoretic Approach to Cooperation), Supervisor: Prof. Dr. Erdal TÜRKKAN

Ankara University, Faculty of Political Science, Department of Economics, Bs., 1998

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Working Experience :

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Middle East Technical University, Faculty of Economic and Adminstrative Sciences, Department of Economics, Research Assistant

December 2008 – March 2010
European Commission, Joint Research Research Center, Institute for Prospective Technological Studies, Economics of Industrial Research and Innovation, Post-Doc Grandholder

September 2008 – December 2008
University of Barcelona, The Regional Quantitative Analysis research group of the Research Institute of Applied Economics, Visiting Researcher

September 1998 – January 2002
Akdeniz University, Faculty of Economic and Adminstrative Sciences, Department of Economics, Research Assistant

International Papers :

Erdil, E., **Cetin, D.** and Fındık, D., 2008, "Effect of Technology on Gender Wage Differential: A Panel Approach", Applied Economics Letters, 15, 821-25.

Working Papers:

Erdil, E. and **Cetin, D.**, 2008, Innovation and Interfirm Relations: Ankara Sincan Industrial District", Science and Technology Policy Research Center, TEKPOL Working Paper Series 08/02, http://www.stps.metu.edu.tr/sites/stps.metu.edu.tr/files/0802.pdf

International Proceeding :

Cetin, D. and Erdil E., 2007, “Does Technology Have any Effect on Productivity?”, 2nd International Conference on the Dynamics of Science and Technology Policies, 25th-26nd May, Izmir, Turkey, p. 654-663.

International Presentation :

Mulatero, F., Fernandez Zubieta, A., and **Cetin, D**., 2010, “The determinants of entrepreneurship among women and immigrants: A cross-national analysis”, VIII Triple Helix Conference, 20th - 22nd October, Madrid, Spain.

Cetin, D. and Mulatero, F., 2010, “The Effectiveness of Public Funding in Fostering Private Investment in Innovation: Evidence from the CIS3 Survey”, Technology and Economic Development: 4th International Conference on Industrial Dynamics, Innovation Policy and Growth, 21st-22nd May, Izmir, Turkey.

Cetin, D. and Cincera, M., 2010, “Mutual Dependence of R&D and Trade”, Technology and Economic Development: 4th International Conference on Industrial Dynamics, Innovation Policy and Growth, 2st-22nd May, Izmir, Turkey.

Erdem G. and **Cetin, D.,** 2008, “Gender Labor Force Participation: A Cross-Country Analysis”, 7th International Conference of the Middle East Economic Association (MEEA), 29th-31st May, Famagusta, North Cyprus.

Erdil, E. and **Cetin, D.**, 2007, Innovation and Interfirm Relations: Ankara Sincan Industrial District”, The 1st International Conference on “Innovation and Growth of the Economic Competitiveness", 1st-2nd November, Craiova, Dolj, Romania.

Cetin, D. and Erdil, E., 2007, "Does Technology Have any Effect on Productivity?", 2nd International Conference on the Dynamics of Science and Technology Policies, 25th-26th May, Izmir, Turkey.

Erdil, E. and **Cetin, D.,** 2007, "Innovation and Interfirm Relations: Ankara Sincan Industrial District", Engaging the neighbours: science, technology and innovation studies in Amsterdam … and beyond, Conference of Amsterdam Science, Technology and Innovation Studies (ASTIS) Supported by the Dutch research school for Science, Technology, and Modern Culture (WTMC), 2nd-3rd July, Amsterdam, Netherland.

Erdil, E., **Cetin, D.** and Fındık, D., 2006, "Effect of Technology on Gender Wage Differential: A Panel Approach", IAFFE's 15th Annual Conference on Feminist Economics, 7th-9th July, Sydney, New South Wales, Australia.

International Poster Presentation :

Cetin, D. and Cincera, M., 2010, "Mutual Dependence of R&D and Trade", 2nd European Conference on Corporate R&D (CONCORD-2010), 3rd – 4th March, Sevilla, Spain.

Erdil, E. and **Cetin, D.**, 2007, "Innovation and Interfirm Relations: Ankara Sincan Industrial District"– Knowledge for Growth: Role and Dynamics of Corporate R&D, First European Conference, 8th-9th October, Seville, Spain.

National Presentation :

Sadi, İ.E. and **Cetin D.,** 2007, "Fikri Mülkiyet Hakları Çerçevesinde Türkiye'de Bilimsel Üretim Süreçleri" (Scientific Production Processes in Turkey in the Perspective of Intellectual Property Rights), 2. Karaburun Bilim Kongresi (2nd Karaburun Science Congress), 7th-9th September, Izmir, Turkey.

Summer School :

2005 - "Cross-Section Analysis of Specialization and Productivity in Manufacturing Industry: Provincial-Based Approach", European Summer School on Industrial Dynamics (ESSID), 10th-17th September, Cargese, Corsica, France.

Foreign Language :

English - Advanced
Spanish and German - Intermediate
French - Beginner

Programs :

Matlab, STATA, Eviews and SPSS - Advanced
RATS and ArcGis - Intermediate
GeoDa and Pajek - Beginner

Fields of Interest:

Technology, Innovation, Industrial Dynamics, Regional Economics, Microeconometrics, Spatial Econometrics, Panel Data Econometrics.

APPENDIX C: TURKISH SUMMARY

İHRACAT VE KÜMELER: ANKARA VE İSTANBUL OSB'LERİNİN MEKANSAL EKONOMETRİ İLE İNCELENMESİ

1. GİRİŞ

Ekonomik büyüme için gerekli olan bilgi saçılmaları (knowledge spillovers) iktisat literatürüne neo-klasik iktisatçılar tarafından özellikle de ilk defa Marshall (1890) tarafından öne sürülmüştür. Daha sonra Porter (1990, 1996, 2000) tarafından 1990'larda meşhur edilmiştir. Bu konu, Porter'la birlikte iktisatçıların olduğu kadar politikacıların da dikkatini çekmiştir.

İktisat tarihinin başından beri iktisatçılar her zaman ulusların zenginliğini artırmak için bir yol bulmaya çalıştılar. Merkantilisler ve fizyokratlar uluslarının zenginliğinin altında yatan faktörleri altın rezervleri ve toprak olarak açıkladılar. Daha sonraki iktisatçılar, sermaye ve işgücü gibi sınırlı kaynaklarla açıkladılar. İktisat büyümesinin dinamikleri ve ülkelerin gelişiminin açıklanması için dışsal (exogeneous) ve içsel (endogeneous) büyüme modellerini oluşturdular.

Dışsal büyüme modelinde sabit stoklu işgücü ve sermayeye sahip ekonomilerin büyümesinin altında yatan temel sebep teknolojik ilerlemenin büyümesi ve işgücünün büyümesi gibi dışsal faktörlerle açıklanır. Model adını teknolojiyi dışsal olarak kabul etmesinden dolayı alır. Bu modelin eksikliklerinden biri teknolojik ilerlemenin gelişiminin nasıl ve neden olduğunu açıklayamamasıdır. Teori bütün ülkelerin en sonunda aynı noktaya ulaşacagını var saymaktır fakat gelişmiş ve gelişmekte olan ülkelerin arasındaki farkı açıklayamamaktadır.
İçsel büyüme ya da yeni büyüme teorisi yüksek gelirli ekonomilerin büyümesi için gerekli olan bilgiyi iktisadi sisteme içsel değişken olarak sokmaktadır. Modelin bu şekilde genişletilmesi dışsal büyüme modellerinin eksikliğini tamamlamaktadır. İçsel büyüme modellerinde özel Ar-Ge harcamaları sistemin sadece monopol altında çalışmasını sağlamaz aynı zamanda ekonomik büyümenin itici gücü olan teknolojik ilerlemenin kaynağıdır. Bu teoriye göre sistem pozitif dışsallıklar ve saçılmaların etkisiyle sabit ve artan getiriler altında da çalışır.

İçsel büyüme teorisinin en önemli katkısından biri de bilgi saçılmalarının önemini vurgulamasıdır. Bilgi saçılmasının türü ne olursa olsun - uluslar, iller yada endüstriler arasında olabilir – ticaret, Ar-Ge ya da doğrudan yabancı sermaye yatırımından doğan dışsallıklardan ülke her zaman fayda sağlar.

2. AMAÇ VE HİPOTEZ

Türkiye'de uygulanan sanayi politikalarından biriside Organize Sanayi Bölgeleri (OSB) (Organized Industrial Zones – OIZs), Teknoloji Geliştirme Bölgeleri (TGB) (Technology Development Zones – TDZs) ve Endüstri Bölgeleri (EB) (Industrial Zones – IZs) kurmaktır. OSB ve TGB'ler üzerine ayrı ayrı kanun (law) ve EB'ler üzerine de yasa (act) bulunmaktadır.

Türkiyede'deki ilk OSB 1969 yılında Bursa'da kurulmuştur. 2007'ye kadar 70 tane aktif OSB varken 2012 yılında bu rakam 148'i aktif ve 115'i de planlanan olmak üzere 263 OSB'ye çıkmıştır. Cografi olarak yığılmış firmalar kendi aralarında sadece etkileşime değil hem de bilgi aktarımında da bulunurlar. Bildiğimiz kadarıyla, firmalar arasındaki bu etkileşim şimdiye kadar Türkiye için test edilmedi. Bunun ana nedeni uygun veri ve (ekonometrik) analiz yönteminin yokluğundan kaynaklanmıştır.

Coğrafi yığılmalarda (kümelerde), firmalar diğer firmaların yarattığı (pozitif) dışsallıklardan (bilgi saçılmaları) faydalanmaktadırlar. Neo-klasik iktisatçılar ve içsel büyüme teorisyenleri modellerinde ve teorilerinde bilgi ve bilgi saçılmalarının önemini vurgulamışlardır. Kümeler bilgi saçılmalarından dolayı teşvik edildiği bilinmeketedir fakat asıl soru kümelerde b ilgi saçılmasının olup olmadığıdır. Bizim başlangıç noktamız, kümelerdeki bilgi saçılmalarını Türk OSB örneği üzerinden incelemektir.

2000'li yıllardan sonra Türkiye'de uygulanan ana sanayi politikası OSB, TGB ve EB kurulması üzerinedir. Bu çalışmadaki ana hipotez, ihracat kararı fonksiyonunu kullanarak bilgi saçılmaları bağlamında OSB içindeki firmaların OSB içindeki diğer firmalardan etkilenip etkilenmediğinin analizidir. Diğer bir deyişle, ana amacımız OSB içindeki mekansal bağımlılığı test etmektir. Bunun test edilmesi için Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme Dairesi Başkanlığı (KOSGEB) 'nın Saha Araştırma Anketi kullanılacaktır. Bu veri de OSB'lerle ilgili en çok gözlem Ankara ve İstanbul illerine ait olduğundan hipotezin teste edilmesinde bu il kullanılacaktır.

Alt-hipotez ya da ikincil olarak da, il içindeki endüstriyel dinamikler test edilecektir. Marshall, Arrow, Romer (MAR)' ın bilgi saçılmaları teorisine göre firmalar bölgelerindeki ya da illerindeki aynı endüstriden olan firmalardan daha çok etkilenirler. Çalışmamızda, ana hipotezle bağlantılı olarak, alt-hipotezi test ederken Ankara ve Istanbul illerine ait bütün datayı kullanmak yerine bu illerdeki OSB verisini kullanacağız.

Mekansal (spatial) ekonometrik analizin önemini ve farkını göstermek için standard ekonometrik analiz yaparak ikisi arasında kıyaslama yapacağız.

Çalışmanın ana hipotezi, Ankara ve İstanbul OSB'lerinde bilgi saçılmalarının olup olmadığının test edilmesidir. Alt-hipotez ya da ikincil hipotez olarak da Ankara ve İstanbul OSB'lerinde endüstri-içi bilgi saçılması olup olmadığının test edilmesidir.

OSB içindeki firmalar arasında etkileşim olup olmadığı hipotezinin test edilmesi için komşuluk (contiguity) yani ağırlık (weight) matrisi oluşturulacaktır. Buradaki ana varsayımımız OSB içindeki firmaların komşu olduklarıdır yani Ankara içindeki aynı Osb içinde bulunan firmalar komşu olarak kabul edilecektir. Alt-hipotez içinde, OSB içinde aynı endüstride olan firmalar komşu olarak kabul edilmiştir.

Mikro ve mekansal ekonometrik analizle KOSGEB verisi kullanılarak ihracat kararı fonksiyonu hem Ankara hem de İstanbul için tahmin edilmiştir. Mikroekonometrik analiz mekansal ekonometrik analizle karşılaştırma yapabilmek için yapılmıştır. Mikroekonometrik tahmin de standard probit tahmini kullanılmıştır. Spatial ekonometrik methot da, spatial probit modeli tahmini yapabilmek için Gibbs örnekleme methodu kullanılmıştır.

3. BİLGİ SAÇILMALARI

İçsel büyüme modelinin motoru olan bilgi saçılmaları, yenilikçinin (innovator) bir yenilikten (innovation) faydalanmasının yanı sıra etrafındaki diğer firmalarında doğan bilgi birikiminden faydalanması olarak tanımlanabilir (Branstetter, 2001). Mare (2004, 8)'e göre saçılmanın olabilmesi için bir girdi birikimin kasıtsız ve ödüllendirilmemiş verimlilik üzerindeki pozitif etkisidir. Bu saçılmaya bağlı olarak; firma, il ya da ülke bu verimilik artışından, maliyet düşüşünden veya yakınlarındaki firma, il ya da ülkeden fayda sağlamaktadır.

Arrow (1962) ve Krugman (1991) de çalışmalarında vurguladığı üzere bilgi saçılmalarının varlığını belirleyecek dolaysız bir yöntem bulunmamaktadır. Bu yüzden de iki yazar da yeni bilginin önemi üstünde durmuşlar ve bunu da Ar-Ge yoğunluğu ve Ar-Ge-satış oranıyla ölçmüşlerdir. Uygun veri ve tekniklerin artmasıyla birlikte bilgi saçılmalarının test edilmesi kolaylaşmasına rağmen dolaysız bir şekilde bilgi saçılmalarının incelenmesinde hala sorun bulunmaktadır.

Bilgi saçılmaları konusunda farklı iktisatçıların farklı varsayımları, bulguları ve politika uygulamaları bulunmaktadır. Özellikle üç teori ön plana çıkmaktadır: Marshall-Arrow-Romer, Jacobs ve Porter. Bu üç teori de firmalar arasındaki teknolojik bilgi saçılmaları üstünde durmaktadır. Glaeser v.d. (1992, 1128)'de de vurgulandığı üzere bu üç teorinin amacı şehirlerin nasıl oluştuğunu ve büyüdüğünü eşanlı (simultaneously) şekilde açıklamaktır. Marshall-Arrow-Romer (MAR) ve Jacobs teorisi genellikle birbiri karşısında test edilirken Porter teorisi MAR'ın alt hipotezi olarak test edilir.

MAR türü dışsallıklar (externalities) ilk olarak 1890 yılında Marshall tarafından geliştirilmiştir. Bu teoriyi Arrow 1962 yılında ve Romer 1986 yılında genişletmişlerdir. MAR dışsallığı özünde, bir endüstrinin yoğunlaşması arttıkça şehir ve firmalar açısından bilgi saçılması kolaylaşmaktadır der. MAR dışsallığı için vekil (proxy) değişken olarak genellikle endüstrinin yerelleşmesini gösteren şehirdeki endüstrilerin işgücü yoğunlaşması kullanılır. Bu gelişmiş (mature) endüstriler için doğrudur.

Arrow (1962)’nin de belirttiği üzere bilgi saçılmaları özellikle Ar-Ge yoğun endüstriler için önemlidir.

Jacobs (1969) türü dışsallıklar, çeşitlilik (diversification) ve yerellesşme (urbanization) kelimeleriyle tanımlanabilir. Şehir ne kadar büyükse, bilgi saçılması da o kadar büyük olacaktır. Bir endüstrideki firma en çok endüstri-yakın firmalardan yararlanacaktır. MAR’dan farklı olarak, Jacobs büyümeyi ve yeniliği teşvik eden yerel rekabeti (local competition) vurgulamaktadır. Jacobs’un fikri özellikle yeni kurulmuş ve yüksek-teknolojili endüstriler için geçerlidir.

Porter (1990) MAR dışsallığını genişletmişti. MAR dışssallığında yerel monopol bilgi saçılmasını maksimize eden unsurken Porter yerel monopolden ziyade yerel rekabetinin önemini vurgulamaktadır. Porter (1990)’a göre, firma coğrafik olarak rekabetçi ortamdan daha çok fayda sağlamaktadır. Coğrafi yığılmalar (geographical agglomerations) ya da kümeler (clusters) için bu temel argümandır.

Üç teorinin de ortak noktası, coğrafi yığılmaların avantajı konusunda hemfikir olmalarıdır. Üç teorinin ana farkı da, şehrin endüstri yapısı konusundaki fikir ayrılığıdır. MAR teorisine göre, bir bölgede bir endüstrinin uzmanlaşması çok endüstri olmasından daha iyidir. Jacobs’un teorisi ise endüstrilerin ilişkilerine dayanmaktadır ve bir firmanın aynı endüstriden değil fakat yakın ilişki içinde olduğu endüstriden daha çok fayda sağlayacağı argumanı üstüne kuruludur.

Bilgi ülkeler arasında mallar ve dolaysız yatırımlar aracılığıyla aktarılmaktadır. Literatürde teknolojik bilgi saçılmalarının üç ana kaynağı belirlenmiştir: doğrudan yabancı sermaye yatırımı (foreign direct investments (FDI)) Ar-Ge harcamaları (research and development investments (R&D)) ve ticaret (trade). Bunların yanı sıra uluslarası Ar-Ge işbirlikleri; teknik ve bilimsel makalele yayımlanması; ve bilim adamları ve yetenekli işgücünün göçü de bir ülkeden diğerine bilgi transferinde kullanıldan diğer yollardır

4. KÜMELER

Porter tipi dışsallıklarda olduğu gibi, bilgi firmaların yakın olduğu bir ortamda daha kolay yayılır. Coğrafi yığılmalar (geographical agglomerations) ya da kümeler (clusters) bilgi saçılmasını sağlamanın en iyi yoludur. Kümelerin tek-tip bir tanımı yoktur. Her iktisatçı ilgilendikleri parçasını vurgulamıştır.

Küme fikri Marshall (1890, 1920)'ın çalışmalarından ortaya çıkmaktadır. Yapılan ilk tanımlarda, işgücünün dağılımı en çok vurgulanan terimdir. Marshall (1890) tarafindan eğer bir kümedeki işgücü dağılımı etkin olduğu takdirde, küme endüstriyel bölge olarak adlandırılabileceğini öne sürülmüştür. Porter (2000, 16) tarafından küme, "belli bir alanda birbirleriyle bağlantılı firmalar ve bunlarla ilgili kurumların ortaklık ve tamamlayıcılıkla bağlandığı coğrafi olarak yakın grup " ("geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities") olarak tanımlanmıştır. "Coğrafi yakınlığın" (geographical concentration) kümenin varlığı için ana koşul haline gelmektedir.

Küme olmanın diğer bir koşulu da firmaların "rekabetçi" (competitive) olmalarının zorunluluğudur. Eğer bu koşul sağlanmazsa yani rekabetçi bir ortam olmağı takdirde, küme yerine endüstri merkezi (industrial complexes) olarak adlandırılması gerekir.

Enright (1996, 1919) ile birlikte Hill ve Brennan (2000, 67), bir kümenin en önemli özelliğinin rekabet avantajı iletmek olduğunu savundular. Bunun arkasındaki sebepte Enright (1996, 191) tarafından alıcı-tedarikçi ilişkilerinin (bölgedeki diğer sanayi ile), ortak teknolojiler, ortak alıcılar, ortak dağıtım kanalları, ya da ortak emek havuzları olarak açıklanmıştır.

Kümeler için üçüncü koşulda kurdukları ağlar (network)'dır. Cook ve Memedovic (2003, 2) kümeleri tanımlarken vurguyu ağlara yapar.. Hiçbir ağı olamayan rekabetçi firmaların coğrafi yığılmaları küme olarak kabul edilebilir mi? Cevabı onları küme olarak adlandıramayacağımız açıktır. Bir kümede, bilgi ve en önemlisi örtük bilgi (tacit knowledge) ağlar aracılığıyla aktarılır. .

Adam Smith'in iktisadi kişisel çıkarı (self-interest), kümeleri birarada tutan yapıştırıcıdır. Kişisel çıkarın olduğu yerde, kümeleri hayatta tutan (ve başarılı yapan) bireysel rekabetçiliktir (Bergman ve Feser, 1999, bölüm 2: Enright 1996, 191). Yine de, kümelerin "başarı"sını değerlendirmek için belli ve tanımlanmış bir yol yoktur. Çağlar ve Kurtsal (2011)'in de belirttiği üzere bunun ana sebebi uygun veri setinin bulunmayışıdır.

Son olarak, Porter (1990)'ında belirttiği üzere üç tür küme bulunmaktadır:

i. Dikey kümeler: aynı değer (ürün) zincirinin parçası olan firmalardan,
ii. Yatay Kümeler: aynı sektörde(ürün) bulunan firmalardan,
iii. Yenilik Kümeleri: örtük (tacit) bilgi değiştiren firmalardan oluşur.

Dikey Kümeler taşıdıkları önem nedeniyle en çok analiz edilen olanlardır. Bunlar "büyük firmaların" özellikle de çok uluslu şirketlerin etkilerini anlamada önemlidir. Alıcı-tedarikçi ilişkileri (tedarik zinciri) analizi ile, dikey kümeler incelenmiştir. Yatay kümeler endüstriyel yoğunlaşma oranları kontrol ederek kolayca saptanabilir. Yenilikçi kümelenmeleri analiz etmek en zor olanlarıdır. Yenilikçi bir kümedeki firmalar alıcı-tedarikçi ilişkisi veya aynı sektörde olmak zorundadırlar. Firmalar arasındaki saçılan bilgi örtük olabilir ve kolayca fark edilmiyor olabilir.

Bazı çalışamalarda da belirtildiği üzere kümelenme yaklaşımının yaygın popülerliliğinin sebebinin Silikon Vadisi modelini taklit etmek ve aynı zamanda Porter ve diğerlerinin kümelenme yaklaşımının etkili pazarlama tekniği olduğu savunuluyor (Martin ve Sunley, 2003). Küme tabanlı bir ekonomik kalkınmayı açıkçası yenilik ve verimlilik büyümesini destekler. Singh (2003)'in de belirttiği gibi, kümeler işbirliğini ve örtük bilgi yaratmayı teşvik etmektedir. Pietrobelli ve Barrera (2002, 542) kümelenmenin ölçek ekonomileri (scale economies) (uzmanlık yoluyla), kapsam ekonomileri (scope economies) (ürün farklılaşması yoluyla) ve dışsal ekonomiler (external economies) (bilgi aktarma yoluyla) desteklediğini iddia ettiler.

Kümeler yerel firmalara aynı anda rekabet ile işbirliği yapmak için izin verir. Yerel firmalar, pazar payı yakalamak için birbirleriyle rekabet ve geleneksel rakipleri ile başa çıkmak için de işbirliği yaparlar. Bu kümelerin ciddi avantajlarından birisidir (Cluster Consortium, 1999, 42). Firmalar arasındaki rekabet ve işbirliği, firmaların ve bölgenin "karşılıklı büyüme"sini sağlamaktadır. Ayrıca, bu karşılıklı büyüme ölçeğe artan getirileri tastikler (Hill ve Brennan, 2000, 66).

Kümelerin dikkat çeken ve göze batan özelliklerinden biri de yarattıkları dışsallıklardır. Toplu öğrenmeye (collective learning) neden olan dışsallıklar firmaların biraraya gelme sebeblerinden birisidir. Bu fikir, Shaver ve Flyer (2000) 'in "teknolojileri, insan sermayesi, eğitim programları, tedarikçi, veya distribütörleri zayıf olan firmaların kaybetmedecek az ve kazanmacak çok şeyleri vardır, bu nedenle, bu firmaların coğrafi kümelenme için motive olurlar" varsayımını desteklemektedir. Bunun arkasındaki neden bu dışsallıklardan yarar sağlayabilmektir.

Bir küme belirli bir zaman diliminde rekabet gücüne sahip olabilir ama uzun vadede sürdürülebilirliği için, sürekli kendini yenilemesi gerekir. 1990'lardan sonra, büyük sanayi merkezlerindeki gelişmeler yeniden inşa, sürekli öğrenme ve uyumluluğun önemi göstermektedir (Eraydın, 2011). Farklı sektörlerde olduğu gibi, tam bir küme teorisi inşa etmek mümkündür. Bir küme için, üretimin coğrafi deseni girdi ve piyasaların konumu ve ölçek ekonomilerine bağlı olabilir.

Bölge ekonomisi için önemli olan sürücü sanayileri (driver industries) bulmak isteyen analistler için küme tanımlanması bir sorundur. Bir kümeyi belirlemenin birkaç yolu vardır:

i. İstihdam yoğunlaşma oranları (employment concentration ratios),
ii. Ağ analizleri,
iii. Değer zinciri analizi,
iv. Anketler.

Bir kümenin üyesi olmanın avantajlarından biride işgücü havuzunun avantajlarından yararlanmaktır. Belirli bir bölge için bir endüstri istihdamının ülkenin aynı endüstri ortalamasına bölünerek bulunan istihdam yoğunlaşma oranları, o bölgede bir yığılma olup olmadığını gösterir. Alıcı-tedarikçi ilişkilerinin ağ analizi (network analysis), bilginin saçılımının bir göstergesi olan ilişkilerin yakınlık derecesini gösterecektir. Porter (2000)'ın elmas kesici (diamond cutter) analizi, değer zinciri (valu-chain) analizine bir örnektir. Küme analizinde firma düzeyinde veri daha uygun olmasına rağmen firma düzeyinde veri bulunabilirliği sınırlıdır. Bu kısıtlamayı aşmak için, anketler bir küme tanımlamak için kullanılabilir.

5. İHRACAT FONKSİYONU

Hipotezimiz de ihracat fonksiyonu yardımıyla OSB'lerde bilgi saçılmalarının olup olmadığını bulmaya çalışıyoruz. Bunun için öncelikle ihracat fonksiyonu belirleyicilerini tespit edilmesi gereklidir. Bu durum da makro, mezo ve mikro düzeyde incelenebilir. 1990 öncesinde yapılan çalışmalar özellikle makro düzeydedir ancak daha sonraki çalışmalarda firma düzeyinde veri setlerinin bulunabilirliğinin artamasıyla çalışmalar mikro düzeye kaymıştır. Makro düzeydeki çalışmalarında tek bir ülke veya ülkeler arası analizler odak noktasında iken (Montobbio ve Rampa, 2005: Alguasil et al., 2002: Andersson ve Ejermo, 2008) mikro düzeyde odak noktası firma düzeyinde ihracat davranışını incelemektir (Rodriguez ve Rodriguez, 2005: Barrios et al., 2003: Wakelin, 1998). Mezo düzeyde endüstrilerin karşılaştırılması özellikle de yüksek teknoloji sanayi ve düşük teknolojili sektörlerin karşılaştırması incelenmiştir (Dijk, 2002 Kumar ve Siddharthan, 1994).

Makro düzeyde çalışmalarda, özellikle doğrudan yabancı sermaye (DYS) yatırımları, teknoloji ve verimlilik konularında etkisi tartışılmaktadır. Giles ve Williams (2000) yüz elli'den fazla ampirik makaleyi incelemişlerdir ve, ihracat ve ekonomik büyüme arasında pozitif korelasyon olmasına rağmen etkinin yönünün belirsiz olduğu sonucuna varmışlartır. Ekonominin yapısı, örneğin açıklık (openness), veya ülkenin siyasi durumu, örneğin serbestleşme düzeyi (liberalization level), ticaret son derece önemlidir (Alguasil et al., 2002). Teknoloji de aynı zamanda ülkenin ihracat hacmi etkileyen önemli faktörlerden biridir. Andersson ve Ejermo (2008) teknolojinin uzmanlaşmasının etkili olduğunu bulmuşlardır. Teknoloji uzmanlığını göstermek için de patent verisini kullanmışlardır.

Makro ve mikro düzeyde çalışmalarla karşılaştırıldığında mezo düzey çalışmalar çok daha fazladır. Sanayi düzeyindeki ihracat davranışını büyük ölçüde firmaların özelliklerinden etkilenir (Kumar ve Siddarthan, 1994, 289). Dijk (2002) 1995 yılında aktif olan tüm imalat firmaları kapsayan bir veritabanı kullanarak Endonezya firmaların ihracat davranışını inceler. Örneklem üç haneli düzeyde 28 endüstriyi içermektedir. Kumar ve Siddhartan (1994) Hindistan'daki 13 imalat sanayi üzerine çalışmışlar ve teknolojinin özellikle de düşük teknolojili ve orta teknolojili sektörlerde ihracat davranışını açıklayan en önemli bir faktör olduğunu bulmuşlardır.

Mikro çalışmalarda, sık rastlanan bulgu ihracatçı firmaların olmayan firmalara kıyasla daha verimli, daha etkin, daha teknolojik ve daha büyük firmalar olmasıdır (Aw ve ark, 1998: Bernard ve Jensen, 1999: Bleaney ve Wakelin, 2002: Aitken et al., 1997:. Bernard ve Jensen, 1999: Clerides et al, 1998). Çalışmaların çoğunda verimli (productive) firmaların ihracat yapmasının daha muhtemel olduğunu bulunmaktadır ve bu da kendine seçim hipotezi (self-selection) hipotezi ile izah edilebilir (Aw et al., 1998:. Bernard ve Jensen, 1999: Clerides et al., 1998).

6. MEKANSAL (SPATIAL) EKONOMETRİ

Mekansal ekometri (spatial econometrics) ile standard ekonometri arasındaki fark, birincisinde mekansal bağımlılığın göz önünde bulundurulmasıdır. Mekansal ekonometri özünde "mesafenin önemli" (space matters) olup olmadığı sorusundan çıkmaktadır. Tabii ki, buradaki asıl soru mekansal birimin - ki bu bölge, il ya da ülke olabilir – komşularından etkilenip etkilenmediğidir. Bu aslında Tobler (1979)'in coğrafyanın birinci kanunuyla (first law of geography) yani "herşey birbiriyle ilgilidir ama yakın olanlar daha çok" (everything is related to everythin else, but closer things more so) açıklanabilir.

Bu tezde ana hipotezimiz firmaların (coğrafi) olarak diğer firmalar tarafından etkilenip etkilenmediğini test etmek için olduğu için mekansal ekonometri kullanmak için en uygun ekonometrik araç olarak görünmektedir. Mekansal ekonometri analizinde standart ekonometri farklı olarak komşuluk matrisi oluşturulmuştur. Mekansal bağımlılık ile tahmini hem zor hem de standart tahmin tekniklerinden farklıdır.

Pozitif mekansal ardışık bağımlılık (positive spatial autocorrelation) olumsuz olandan daha anlamlı olduğundan çoğu zaman odak üzerindedir. Pozitif mekansal ardışık bağımlılık benzer değerler ile çevrili bir mekansal birim olarak tanımlanabilir. Örneğin, yüksek değerlere sahip bir mekansal birim yüksek değerler ile çevrilidir ve aynı durum düşük değerler için de söylenebilir. Negatif mekansal ardışık bağımlılık düşük değerlere sahip bir mekansal birimin yüksek değerler çevrili olduğunu gösterir. Bu bir dama tahtası deseni benzer ve negatif mekansal ardışık bağımlılık için kontrol etmek anlamlı değildir. Pozitif mekansal ardışık bağımlılığı test etmek ve yorumlamak daha kolaydır(Viton, 2010: Lesage, 1998: Anselin ve Bera, 1998).

Mekansal bağımlılık göz ardı edilirse ne olur? Mekansal bağımlılık gözarı edildiğinde verilerin gerçek varyansı eksik tahmin edilir. Olumlu mekansal otokorelasyon durumda "örneğin ortalaması daha az hassas olacaktır" (Ward ve Gleditsch, 2008, 10). Sonuç olarak, tip 1 hata, yani hipotez doğru olduğunda reddedilmesi durumu oluşur. Bu da sonuçların tahmin edilmesi ve yorumlanmasında sorunlara neden olur.

Standart ve mekansal ekonometri arasındaki temel fark, ikincinin mekansal etkileri dikkate almasıdır. Mekansal etkilerin iki türü vardır; ilk ve en yaygın olanı mekansal bağımlılık (spatial dependence) ve nadir görülen türü de mekansal heterojenlik (spatial heterogeneity) (Anselin, 1988).

Mekansal bağımlılık (ya da mekansal otokorelasyon) kısaca Tobler'in coğrafyanın ilk yasasıyla, "her şeyi her şey ile ilgilidir, ama yakın şeyler uzak şeylerden daha alakalıdır" ile açılanabilir (Tobler, 1970). Mesafe mekansal bağımlılığın temelindedir. Anselin (1988, 9) belirttiği gibi mekansal bağımlılığı test etmek zaman bağımlılığını test etmeye çok benzer.

İkinci tür mekansal etki olan mekansal heterojenlik "mekan üzerinde kararlılık eksikliği" (the lack of stability over space) olarak tarif edilebilir (Anselin, 1988, 9). Mekansal heterojenlik doğrudan doğruya mekansal biriminin konumu ile bağlanır. Bunun en temel örneği zengin kuzey ve yoksul güneydir. Yoksul bölgelerin ülkenin güneyinde ve zengin bölgelerin de ülkenin kuzeyinde kümelenmesidir. Mekansal heterojenliği ele almak için çoğu zaman farklı mekansal birimler (ülke / bölge / il / ilçe) kukla değişkenleri (dummy variables) ekonometrik modele dahil edilir (Ward ve Gleditsch, 2008 Anselin, 1988).

Temel sorun hangi tahmin yöntemi daha iyi olduğudur, standart ekonometri mi mekansal ekonometri mi? Sorun aslında mekansal ekononometri modeli kullanarak tahmin yapmak, kukla değişkenler ile en küçük kareler (EKK) modeli tahmin etmekten daha iyi olup olmadığı şeklinde de sunulabilir. Cevap modellerin cimriliğinde (parsimony) yatıyor. Mekansal otokorelasyon modellerinin, kolay uygulanabilir olması nedeniyle çok popüler olan kukla değişkenli EKK modellerinden daha düşük bir logaritmik olabilirlik (log likelihood) değeri vardır ama kukla değişkenli EKK modelinde hala kalıntı mekansal kümelenme (residual spatial clustering) vardır. Temel endişe en uygun veya en yüksek logaritmik olabilirlik (log likelihood) sahip model kullanmak ise kukla değişkenli EKK modeli daha iyidir olmasına rağmen bu modeller olarak mekansal (bölgesel / il) farkları dikkate almazlar ki bu da mekansal modellerin bir avantajıdır (Ward ve Gleditsch, 2008).

7. VERİ SETİ VE ÖZELLİKLERİ

Bu çalışmada, Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme Dairesi Başkanlığı (KOSGEB) tarafından yapılan "Saha Araştırma Anketi"'nin verileri kullanmaktadır. Bu 2004 ve 2007 yılları arasında 81 ilde 24 sektörlerden 62.137 firmaya ait benzersiz bir veridir. Türk İstatistik Kurumu (TÜİK) verilerine göre, yaklaşık 250.000 küçük ve orta ölçekli işletmelerin (KOBİ) olduğu varsayılır.Veri seti Türkiye'deki KOBİ'lerin dörtte birini kapsamaktadır. Firmaların konum bilgileri yani OSB, TGB veya EB'de olup olmadığı bilgisine sahip olduğu için benzersiz bir veri setidir.Veri kümesinin sorunlarının yanı sıra, firmaların OSB ile ilişkileri gibi değerli konular hakkında bilgi bulunmaktadır.

Bu çalışmanın ana hipotezi OSB'ler üzerinedir. KOSGEB veri setinde OSB'ler için en yüksek gözlem sayısı Ankara ve İstanbul illerine aittir ve bu yüzden analiz için seçilmiştir. Veriler temizlendikten sonra, analiz de kullanılmak üzere Ankara için 1545 gözlem (firma) ve İstanbul için de 1172 gözlem (firma) kalmıştır.

Bilgi transferi mekanizması birisi de ticarettir. Bilginin saçılımı hipotezinin testinde ikili değer değişkeni (binary variable) yani 0-1 değeri alan bir değişken olan ihracat kararının kullanması tercih edilmiştir. Ihracat kararında, firmalara gerekli olan bazı bilgilere ihtiyacı vardır. İhraç kararı alma sürecindeki firmanın çevresindeki firmalar söz konusu firma için bilgi kaynağıdır.Ihracat karar modeli, ihracat fonksiyonu literatürü doğrultusunda inşa edilmiştir.

8. SONUÇLAR

Ankara ve İstanbul Organize Sanayi Bölgelerindeki bilgi saçılmaları hipotezi mikro ve mekansal ekonometri tekniği ile test edilmiştir. Bunun için firma seviyesinde KOSGEB datası ile ihracat kararı fonksiyonu tahmin edilmiştir. Mikro ve mekansal ekonometri tahminlerinin kıyaslanmasının yanı sıra iki ildeki davranışsal farklar da karşılaştırılmıştır.

İhracat kararı fonksiyonunda KOSGEB datasından oluşturulmuş beş farklı grup değişken kullanılmakatadır. Birinci grupta, firmanın karakteristiğini gösteren firmanın yaşı (LNAGE), toplam işgücü sayısı (LNLAB) ve yüksek yetenekli işgücü oranı kullanılmıştır. İkinci grupta ise firmanın teknoloji seviyesini gösteren değişkenler kullanılmıştır. PLC, CNC ya da robot sahipliği (PLCNCR); tescilli marka, patent ya da faydalı model sahipliği (TMPUM) ve son olarak da üretimde, tasarımda veya araştırmada bilgisayar kullanımı (COMPUSE) değişkenleri teknoloji göstergeleri olarak seçilmişlerdir.

Yöneticinin karakteristikleri yani eğitim seviyesi (EDUCA) ve yabancı dil bilip bilmemesi (FORLA) de dördüncü grubu oluşturmaktadır. Firmanın KOSGEB teşviklerinden faydalanması (SMEDO), organizasyonel yakınlık (ORGPROX) ve kümeye olan yakınlık da (CLUSTER) firmanın ihracat kararında etkili olan değişkenlerdir. Son olarak da ilin sınırda mı (BDUM) yoksa deniz kenarında (SDUM) mı olduğunu gösteren kukla değişkenler kullanılcaktır. Endüstriyel farklılıkları görmek için de Pavitt sınıflandırılması kullanılmıştır.

Pavitt sınıflandırmasına göre endüstrilerin dağılımı Türkiye'de farklıdır. Türkiyedeki firmaların %60'ı arz baskın (suppliers dominated) endüstrilerdir. Bu endüstrilerin Ankara ve İstanbuldaki dağılımı sırasıyla %26 ve %53'tür. Ankara OSB'leri uzmanlaşmış arz (specialized suppliers) ve ölçek yoğun (scale intensive) endüstrilerdir. Arz baskın endüstriler Türkiye de olduğu gibi İstanbul'da da ağırlıktadırlar. Bilime dayalı (science based) endüstriler hem Türkiye de hem de iki ilde çok düşük paya sahiptirler. İki ilin endüstri yapısı birbirinden farklıdır. Bu farklılık, bazı soruların da cevabını oluşturmaktadır.

Ankara ve İstanbul için özellikle dört değişken – LNLAB, COMPUSE, ORGPROX ve FORLA – dikkati çekmektedir. Bu değişkenler hem mikro hem de mekansal ekonometrik analizde anlamlıdırlar. Firmanın büyüklüğünün anlamlı olması ölçek ekonomilerinin avantajlı olduğunu göstermektedir. Firma ne kadar büyükse, ihracat olasılığı da o kadar büyüktür. Üretimde, tasarımda veya araştırma yapma bilgisayar kullanımının yani teknolojinin de beklenildiği üzere ihracat kararına pozitif etkisi bulunmaktadır. Firmanın bağlantı kapasitesini arttıran profesyonel organizasyonlara üyelikte firmanın ihracat ihtimalini arttırmaktadır. Son olarak da yöneticinin yabancı dil kabiliyeti firmanın ihracat yapma olasılığını etkilemektedir.

Mekansal ekonometrik analizle Ankara'da OSB-içi ilişkilerin etkili olduğu kanıtlanmaktadır. Toplam etkinin üçte biri mekansal etkilerden gelmektedir. Mekansal bağımlılık dikkate alınmadan yapılan bir analizde, değişkenlerin etkisi olandan daha az olarak tahmin edilecektir. Ankara'daki OSB içindeki endüstri-içi ilişkiler de anlamlıdır. Toplam etkinin dörtte biri mekansal etkilerden kaynaklanmaktadır. İstanbul'da ise hem OSB-içi hem de endüstri-içi ilişkilerin dörtte biri mekansal etkilerden oluşmaktadır. Ankara'daki firmalar ihracat kararı verirken komşu firmalara daha duyarlıdırlar.

İstanbul'un mekansal ekonometri analiz sonuçlarında mekansal ardışık bağımlılık testiyle OSB-içi ve endüstri-içi ilişkiler için kullanılan gecikmeli değişkenin anlamlılığı arasında tutarsızlık bulunmaktadır. OSB-içi ilişkiler test edildiğinde mekansal ardışık bağımlılık testine göre mekansal etkilerden iz yokken tahmin edilen mekansal gecikme anlamlıdır. Endüstri-içi ilişkiler test ediliğinde is tam tersi söz konusudur yani ardışık bağımlılık testi mekansal bağımlılığa dikkat çekerken mekansal gecikme değişkeni anlamsızdır. Bu sorunun çözümü için anlamsız olan değişkenlerden bazıları (SMEDO ve EDUCA) modelden çıkarılıp, iki hipotez tekrar test edildiğinde endüstri-içi ilişkiler için tutarlı sonuçlar elde edilmiştir. Bütün çalışma boyunca tutarlı olabilmek adına bütün çalışma boyunca aynı bağımsız değişkenlerle elde edilen sonuçlar sunulmuştur.

Özetle, firma büyüklüğü, teknoloji, organizasyonel yakınlık ve yöneticinin yabancı dil bilgisi hem Ankara hem de İstanbul için ihracat kararının temel belirleyicileridir. Ankara için OSB-içi ve endüstri-içi ilişkilerin varlığı ispatlanmış olmasına rağmen İstanbul için mekansal ekonometrik analiz sonuçları güvenilir değildir. Ankara'da OSB-içi ilişkilerden doğan mekansal etki toplam etkinin üçte biri iken OSB'deki firmalar arasındaki endüstri-içi ilişkilerden doğan mekansal etki toplam etkinin dörtte biridir.

APPENDIX D: TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	
Sosyal Bilimler Enstitüsü	X
Uygulamalı Matematik Enstitüsü	
Enformatik Enstitüsü	
Deniz Bilimleri Enstitüsü	

YAZARIN

Soyadı : ÇETİN
Adı : DİLEK
Bölümü : İKTİSAT

TEZİN ADI (İngilizce) : "EXPORTS AND CLUSTERS: A SPATIAL ECONOMETRIC ANALYSIS ON ANKARA AND ISTANBUL OIZs"

TEZİN TÜRÜ : Yüksek Lisans [ ] Doktora [X]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. [X]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: