ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

ANALYSING THE ECONOMIC RESILIENCE OF AUTOMOTIVE MANUFACTURING SPECIALIZED REGIONS IN EU AND TURKEY

M.Sc. THESIS

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Department of Urban and Regional Planning

Regional Planning Master Programme

JANUARY, 2014

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

OTOMOTİV ENDÜSTRİSİNDE UZMANLAŞMIŞ BÖLGELERİN EKONOMİK DAYANIKLILIK ANALİZİ: AVRUPA VE TÜRKİYE ÖRNEĞİ

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FOREWORD

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December 201 Burak Sunay

Urban and Regional Planner

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ABBREVIATIONS

EU	**:**	European Union
GVA	**:**	Gross Value Added
NACE	**:**	Nomenclature generale des Activites economiques dans les Communautes europeennes
NUTS	**:**	Nomenclature of territorial units for statistics
OICA	**:**	Organisation Internationale des Constructeurs d'Automobiles

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ANALYSING THE ECONOMIC RESILIENCE OF AUTOMOTIVE MANUFACTURING SPECIALIZED REGIONS IN EU AND TURKEY

ABSTRACT

Since the globalization and global production chains have dominated the world, crisis have bigger effects on economies. In 70's, 80's, 90's and now in 2000's global financial crisis affect not only countries economies but also global economy. It has become a must for countries and economies to take precautions to stop system failure or to take less damage from big scale impact crisis.

In order to lower the possibility of systems malfunctions in economies in case of crisis, countries or regions have to prepare themselves to reduce their vulnerability to external disturbances. Regional resilience, as the term of resilience generated in biology, describes the phenomenon of adapting capacity of a habitat against external effects. In common use it is the ability of a system to leap back or to rebound or to recover after any kind of external and internal disturb shocks and effects. Concerning the regional resilience, a diverse business structure, economy's innovation capacity and generated added value are beneficial.

In this thesis, to test the main requirements of regional resilience conducive to building it, automotive manufactory in European Union and Turkey has been analyzed. Not only because of its specialized production process, innovative designs and technology have been created, and the diversified economy it generates within the region, but also it has one of the most important economic sectors by revenue, automotive manufactory has been a key sector for measuring regional resilience.

In addition to measure the effect of automotive industry on regional resilience, the automotive manufacturing specialized regions in EU and Turkey have been defined with location quotient technique by the employment numbers of automotive manufacturing (C29, manufacturing of motor vehicles as defined in NACE Rev.2 by Eurostat) in year 2010. Secondly, the economic performance of 20 top automotive manufacturing specialized regions across the global financial crisis in 2008 have been analyzed in years between 2006 and 2010 with shift-share analysis by employment numbers in automotive manufacturing to compare the pre-shock and post-shock positions of the regions. Finally, an evaluation of the economic resilience performance of the automotive specialized regions has been applied to clarify the reasons of the performances of the regions that shift-share analysis could not explain. Eventually, this thesis clarifies the good and the bad performance of the automotive industry specialized regions; and factors behind their performance, which build their regional economic resilience strong or weak against 2008 global financial crisis.

Keywords: Automotive industry, regional resilience, economic crisis, location quotient, performance measurement, shift-share analysis.

OTOMOTİV ENDÜSTRİSİNDE UZMANLAŞMIŞ BÖLGELERİN EKONOMİK DAYANIKLILIK ANALİZİ: AVRUPA VE TÜRKİYE ÖRNEĞİ

ÖZET

Dünya son yarım yüzyıldır izlenen küresel politikalar sebebiyle daha sık krizler yaşanmaktadır. Krizlerin etkileri her geçen gün daha da büyümekte etkilenen insan sayısı da artmaktadır. Sıklaşan küresel doğal ve ekonomik krizlerin önüne geçilebilmesi için gerekli koruyucu önlemlerin alınması bu krizlerden daha az zararla çıkılması için önem teşkil etmektedir.

Küreselleşme sürecinde üretim sistemleri süreç boyunca hiç olmadığı kadar birbirine bağlı hale gelmiş, bu doğrultuda 1970'lerden itibaren büyük ekonomik krizlerin yaşanma sıklığında da artış yaşanmıştır. 1970'lerde yaşanan Petrol Krizi, 1980'lerdeki Körfez Krizi, 2000'lerde yaşanan Asya krizi ve son olarak da 2008'de yaşanan Küresel Finansal Krizin etkileri tüm dünyadaki piyasaları etkilemiştir. Yaşanan krizlerde ekonomilerin büyüme rakamları düşmekte, işsizlik rakamları ise artış göstermektedir. Ekonomilerin dış etkenlere verdikleri tepkiler ve mevcut gelişme stratejilerini bozan yakınsama bölgesel eşitlik politikalarını ortadan kaldırmaktadır.

Dış etkenlere karşı ekonomilerin mevcut kalkınma stratejilerini korumak ve gelişim politikalarını devam ettirmek için 'dayanıklılıklarını' geliştirmeye çalışırlar. Bu tez kapsamında da dayanıklılık kavramı bölgesel düzeyde ele alınmıştır. NUTS 2 düzeyinde yapılan bu çalışmada Avrupa Birliği'nde ve Türkiye'de otomotiv sektöründe uzmanlaşmış bölgeler belirlenmiş, bu bölgelerin 2008 Küresel Kriz karşısında önceki ve sonraki ikişer yıllık periyotta (2006-2008 ve 2008-2010 yılları arasında) kriz karşısındaki performansları bölgesel ekonomik dayanıklılık literatürü kapsamında incelenmiştir.

Bölgesel ekonomik dayanıklılık; bir dış etkenlere açık bir ekonomik sistemin söz konusu etkenlerden doğacak dış şokları zarar görmeden soğurması, şoklardan olumsuz yönde etkilense bile eski pozisyonuna geri gelebilmesi ya da yeni bir gelişme yönü bulabilmesidir. Dayanıklılığı yüksek olan sistemler bu süreçleri dış etkenlere karşı daha kırılgan olan bölgelere göre daha kısa sürede tamamlar. Dış etkenlere karşı daha kırılgan olan bölgelerin ise kriz dönemlerindeki tepki süreleri dayanıklı olan bölgelere karşı daha yavaştır. Yüksek dayanıklı sistemlerin dış etkenlere karşı hata olasılıkları, dış etkenlerden zarar görme oranları ve iyileşme süreleri daha düşüktür.

Dayanıklılığı yüksek olan bölgeler karmaşık uyum süreçleri sergilerler. Karmaşık sistemlerinin temel kaynağı olan esneklik bölgede var olan ekonomik yapının sonucunda şekillenir. Yerel sektörlerin yapısal özellikleri, ekonomik akımlara karşı yeniden şekillenme kabiliyetleri ve yenilikçilik ölçekleri sonucunda oluşan sektörel dağılım sistemlere dış etkenler karşısında dayanıklılık kapasitesini arttırır. Sektörel dağılımları yüksek olan ve kriz ortamlarında yeni fırsatlar yaratan bölgelerin yeni teknolojiler üretme ve kendilerine yeni bir gelişme yönü tayin etme kapasiteleri daha yüksektir.

Bölgesel dayanıklılık için önemli olan çeşitli sektörlere sahip olma ve bu sektörler arasında geçiş yapma gücü her ne kadar bölgesel dayanıklılığı arttırsa da, tek bir sektörde uzmanlaşmış bölgelerin de yüksek bölgesel dayanıklılığa sahip olduğu gözlemlenmektedir. Çalışmada, ekonomiye en çok katma değer sağlayan ve en yüksek ithalat-ihracat kapasitesini barındıran sektörlerden birisi olan otomotiv sektörünün kriz süresince, bu sektörde uzmanlaşmış bölgelerde, bölgesel dayanıklılık kapsamında bölgelerin gösterdikleri performansları karşılaştırmalı olarak incelenmiştir. Otomotiv sektörü sadece yüksek ihracat rakamları sağlamakla kalmayıp aynı zamanda istihdam, katma değer ve sektörel çeşitlilik de sağlamaktadır. Bu kapsamda, 2008-2010 arasında en fazla üçüncü ciro, imalat sektöründe en yüksek ciroya sahip olan, birçok sektörden girdi alan ve bulunduğu bölgelere yan sektörleri çeken otomotiv sektörü seçilmiştir.

19. yüzyılın sonunda üretilen ilk otomobilden sonra Fordist üretimin benimsenmesi ve artan arz ile herkesin erişebileceği bir pazar yaratan otomotiv sektörü 20. yüzyıl boyunca yeni üretim merkezi arayışını sürdürmüştür. Yarattığı yan sanayi ile sadece otomobil üretiminde değil diğer sektörlerde de istihdam yaratan, geniş kapsamlı bir sanayi olmuştur. Amerika'da icat edilen Fordist sistem önce Avrupa, daha sonra Asya'ya yayılmış, yeni bir market ve daha ucuz iş gücü arayışını aralıksız sürdürmüştür. 1980'ler sonrası düşen sosyalist rejimler ile de üretim merkezleri bu ülkelere kaymıştır.

Zaman içinde sürekli değişen otomotiv üretim noktaları arasında Türkiye; 1960'larda ilk adımları atılan, 1980'lerde serbest piyasalara geçiş ile ihracata yönelen, gerek devlet teşvikleri gerek özel yatırımlarla küresel anlamda otomotiv sektörümde önemli bir üretici haline gelmiştir. Devlet Planlama Teşkilatı tarafından üretilen Kalkınma Planlarında zaman içerisinde önem kazanmış, küresel pazarda rekabetçiliğini sürdürebilmesi için çeşitli teşvikler sağlanmıştır.

Türkiye ekonomisi hala kırılgan olmakla beraber son on yılın yükselen ekonomilerindendir. Sadece kendi yerel üretici ve yerel üretim ağına ev sahipliği yapmakla kalmamakta, aynı zamanda küresel aktörleri de ağırlamaktadır. 1994 ve 2001 ekonomik krizleri ülke ekonomisinin gelişimine sekte vurmuş olsa da, 2001 yılında Avrupa pazarına giriş ve devlet teşvikleri Türkiye'de gelişmekte olan otomotiv sektörü için bir dönüm noktası teşkil etmektedir. Yaşanan bu krizler sonucunda ülke gayri safi milli hasılasında yaşanan düşüş otomotiv sektörü için geçerli olmadığı gibi, Avrupa pazarında edinmiş olduğu hacim ile Türkiye ekonomisinin ihracattaki lokomotif sektörü haline gelmiştir. 2008 yılında yaşanmış olan Küresel Finans Krizi ile tüketimin azalması küresel üretim zincirlerini direkt etkilemiş, uluslararası piyasalar durgunluk dönemine girmiştir. Türkiye'nin sürdürmüş olduğu ekonomi politikaları, ekonomisine ilişkin göstergeler krizin etkilerini diğer ülkelere göre daha az hissedildiğini ortaya koymaktadır.

Bu doğrultuda otomotiv sektöründe uzmanlaşmış sektörlerin 2008 krizi sürecinde dayanıklılık performanslarının ölçülmesi için otomotiv sektöründe uzmanlaşmış sektörler belirlenmiştir. Literatürde incelenmiş örneklerde dayanıklılık; bölgelerin tüm ekonomik yapısının incelenmesi şeklinde incelenebileceği gibi uzmanlaştığı sektörün bölge üzerinde yaratmış olduğu etkinin değerlendirilmesi için uzmanlaştığı sektörün verileri üzerinden de değerlendirilebilmektedir. Yerellik katsayısı ve değişim analizi sektörel olarak uzmanlaşmış bölgelerin belirlenmesi ve sektörün bölgedeki durumunu yıllar bazında incelenmesine olanak sağladığı için literatürde bahsi geçmektedir.

Bölgelerin uzmanlaşmalarının belirlenmesi için yerleşim katsayıları analizi sektörde yaratılan istihdam üzerinden NUTS 2 düzeyinde hesaplanmıştır. Yerellik katsayısı;

bir sektörün bölgedeki baskınlığının, aynı sektörün ülkedeki baskınlığına oranıdır. Yerellik katsayısı; ciro, istihdam, ihracat veya firma sayısı üzerinden hesaplanabilmektedir. Yerellik katsayısı sonucunun bir bölgedeki bir sektör için 1 çıkması söz konusu sektörün baskınlığının ülke genelinde aynı sektördeki baskınlık ile aynı olduğunu ifade etmektedir. Yerellik katsayısı 1'in altında kalan bölgedeki söz konusu sektörün bölge için üretim yaptığını veya aynı sektörde ithalat yaptığını, 1'in üstünde elde edilen yerellik katsayısı ise aynı sektörün o bölgeden diğer bölgelere ihracat yaptığını göstermektedir.

Sektör verileri (NACE Rev.2 kodlu Eurostat sınıflamasında "Motorlu kara taşıtı, treyler (römork) ve yarı treyler (yarı römork) imalatı" olarak belirtildiği üzere) tez kapsamında incelenmiş olup Avrupa ve Türkiye'de otomotiv sektöründe uzmanlaşmış bölgeler ortaya konmuştur. Yerleşim katsayısı analizi bölgelerin sektörlerde uzmanlaşmalarını belirlemek için kullanılabilecek analiz yöntemleri arasında en elverişlisidir. Yaygın kullanımına ve daha sonra yapılacak analizlere altlık olmasına rağmen sektörlerde üretim, idare ve tasarım birimlerini birbirinden ayıramamaktadır.

Birbirlerine rakip ve ortak olan Avrupa ve Türkiye'deki otomotiv sektöründe uzmanlaşmış bölgelerin 2008 krizi öncesi ve sonrası göstergeleri değerlendirilmiş; bölgesel dayanıklılık bağlamında göstermiş oldukları performansları, yerellik katsayısında olduğu gibi sektördeki istihdam verileri üzerinden değişim analizi ile hesaplanmıştır. Temel olarak değişim analizi, var olan minimum gözlem seti ile bölgesel ekonomik hareketlerin, bölgeler arasındaki büyüme farklılıklarının etkilerini; istihdam, gelir ve çıktı düzeyi gibi bölgesel değişkenlerin hesaplanmasını büyüme kalemlerini dikkate alarak çeşitli bileşenlere ayırmaya olanak sağlayan bir analiz yöntemidir. Dolayısıyla bu teknik, belli bir bölge ve bölgenin dahil olduğu ülkenin ekonomik büyüme farklılıklarına ilişkin nedenleri ortaya çıkarmayı sağlayan önemli bir tekniktir.

Değişim analizi yardımıyla araştırılacak olan bölgesel istihdamın kalkınma süreci üzerindeki etkileri temel olarak üç bileşen yardımıyla incelenmektedir. Bunlardan ilki olan "ulusal pay (National Share)" etkisi, ulusal ekonomik trendin yarattığı değişimin payını ifade etmektedir. İkinci faktörü oluşturan "endüstri karması (Industrial Mix)", endüstri bileşeni ya da bölgesel karma etkisi nedeniyle ortaya çıkan değişim payını vurgulamaktadır. Üçüncüsü ve en önemli olan "bölgesel değişim (Regional Shift)" ise, bölgesel avantaj ya da rekabet etkisinden kaynaklanan değişim payını belirtmektedir. Bu bileşen bölgelerin performanslarında bölgesel bileşenlerin ne kadar etkin olduğunu göstermektedir.

Değişim analizi otomotiv sektöründe uzmanlaşmış bölgelerin kriz sürecinde performanslarını değerlendirmek adına etkili bir analiz olmasına rağmen performanslarını ve bu performansları göstermelerini sağlayan bileşenlerin nedenselliklerini ortaya koyamamakta ve açıklayamamaktadır. Bu bileşenleri tanımlamak ve otomotiv sektöründe uzmanlaşmış bölgelerin dayanıklılık kavramına ilişkin belirleyiciliklerini ortaya koymak için ilgili literatürde daha önceki çalışmalarda ele alınan dayanıklılığın oluşumunda belirleyici bileşenler, otomotiv sektöründe uzmanlaşmış bölgeler için taranmıştır.

Çalışmanın sonucunda bölgelerin kriz süresince performansları, dışsal şoklara karşı dayanıklılıklarını arttırmaya yönelik hazırlıkları ve arka planlarındaki nedensellikleri karşılaştırılmış, farklılıkları ve benzerliklerine ilişkin değerlendirmelerde bulunulmuştur.

Anahtar Kelimeleri: Otomotiv endüstrisi, bölgesel dayanıklılık, ekonomik kriz, performans ölçümü, değişim payı analizi

1. INTRODUCTION

There is a lot of doubt and divergence to define the particular meaning of regional or local economic resilience. In addition, it is not clear that resilience is a positive or negative concept and what does it mean for policy maker and what does it mean for researchers. Since 1970s, business world has faced with major recessions almost in every decade. Yet the past three decades have hardly been recession free. Although having a lot of experience against major recessions, it is difficult to tell this is a constructive for business world. "System-wide' shocks periodically interrupt and disrupt the process of economic growth and development" (Martin, 2012).

After millennium, business world has faced with global external shocks much more than previous decades, and their size and effect getting bigger and global. Global shocks are highly related to disturb regional policies and regional growth patterns. During financial crises economies tend to have lower growth rate, it might also lead to higher unemployment ratio. Broken development pattern and policies cause interruption convergence in national and regional equality process.

Since last decades, during 1990's and 2000's, global crises have seen much more often. They have different scale of effects from different countries, regions and cities; environmental, social and economic. Today's question of planning is, how could cities and regions improve their resilience? What is the notion of resilience? How could we describe the abilities of region, with patterns of uneven regional development?

Beyond this questions, our understanding capacity of regions' economy is much more important. Different sectors, production chains, connection to global networks and labor pool create regions 'economical' resilience. Economic resilience phenomenon lasts until facing a crisis. Crises define a regions development policy' success. If the economy suffers from a crisis, it means end of the resilience and it would take time to get back a better situation. Meanwhile, there are different after-shock recovery processes; to get the same path before crisis, to define another path.

1.1 Purpose of the Study

This research explains the different and common point of the notion of regional economic resilience, how it should be measured, dimensions, positive and negative attribute of concept. As the term of resilience generated in biology, it describe the phenomenon of adapting capacity of a habitat against external effects. In common use it is the ability of a system to leap back or to rebound or to recover after any kind of external and internal disturb shocks and effects.

Furthermore, effects of a specialized regional economy on its resilience against shocks are aimed to explain. Diversified economies are more flexible than specialized economies although it is not certain that specialized region could not have a diversified economy. This leaves specialized economies more open and vulnerable against external shocks. Moreover, ability of avoiding from external shocks does not depend on character of the economy only. Internal attributes of the regions play more significant role in building resilience.

In this case, automotive industry has been selected for empirical study. The rise of the automotive industry in Turkey made it one of the global actors. Some regions in Turkey, which are specialized for the automotive industry, have the competitiveness advantage against the European rivals. On the other hand, performance of automotive-industry-specialized regions not only in Turkey but also in Europe during the 2008 global crisis is big question.

In a nutshell, this research aims to clarify resilience performance and reasons of being resilient of the automotive-industry-specialized regions in Turkey and Europe against 2008 global crisis, which affects manufacturing industry badly.

1.2 Content of the Study

This research consists of five main chapters. In first chapter, introduction, purpose of study, content of the study and methodology have been explained. In second chapter, a literature of resilience concept, origin of resilience, explanation of resilience and dimension of resilience, has been defined. In third chapter, brief history of automotive industry all around the world and in Turkey has been described. In fourth chapter, European regional indicators have been analyzed to define automotive-industry-specialized regions. In addition, during crisis performances of the regions

have been evaluated with shift-share analysis in order to compare regions' resilience performance. Shift-share analysis has been calculated based on two different scenarios.

In first scenario, national accounts have been taken to clarify regions' performances within countries. In second scenario, the sum of European Union plus Turkey's employment numbers have been used to compare different automotive centers in Europe and Turkey. These regions These two scenarios are based on NACE Rev. 2 C29 Manufacture of motor vehicles, trailers and semi-trailers 2006-2012 person of employment numbers.

In fifth and final chapter, regional indicators, which build regional resilience, have been tested to exploit the reasons of resilience performance of automotive-industry-specialized regions.

1.3 Methodology

First of all, a detailed literature survey has been done to clarify the concept of regional economic resilience. In addition, different dimensions and ingredients of regional economic resilience have been explained to identify different aspects of concept. Furthermore, a brief history of automotive industry and its current situation in Turkey and Europe have been identified.

Moreover, to generate an empirical research, datasets of European and Turkish regions have been analyzed to point out the regions, which specialized in automotive industry. After defining regions, their performance analyses during 2008 world global crisis have been done. Shift-share analysis has been used as a performance measurement method between years 2006 and 2010. In this chapter two scenarios have been applied to show different growing paths in different countries: 1- what if automotive industry specialized regions in European Union and Turkey have been developed according to European Union's growth rate, 2- what if automotive industry specialized regions in European Union and Turkey have been developed according to their national growth rate?

To define the economic resilience of automotive industry specialized regions in EU and Turkey, "C29 - Manufacture of motor vehicles, trailers and semi-trailers employment numbers 2006-2010" have been taken from Eurostat. For location

quotient analysis, 2010 employment number of C29 - Manufacture of motor vehicles, trailers and semi-trailers as the current data have been analyzed. 2006-2010 C29 numbers have been analyzed in shift-share analysis to identify the resilience performance of regions. 2008 and 2009 C29 employment numbers for FR10 (Ile de France) are not given, therefore they have not been added to shift-share analysis. Furthermore, Eurostat data have been used to explain the background of regions resilience.

Finally, according to regional economic resilience dimension, different performances, which have been shown, of regions during the crisis have been explained.

2. RESILIENCE CONCEPT

There is a lot of doubt and divergence to define the particular meaning of regional or local economic resilience. In addition, it is not clear that resilience is a positive or negative concept and what does it mean for policy maker and what does it mean for researchers. Since 1970s, business world has faced with major recessions almost in every decade. Yet the past three decades have hardly been recession free. Although having a lot of experience against major recessions, it is difficult to tell this is a constructive for business world. "System-wide' shocks periodically interrupt and disrupt the process of economic growth and development" (Martin, 2012).

After millennium, business world has faced with global external shocks much more than previous decades, and their size and effect getting bigger and global. Global shocks are highly related to disturb regional policies and regional growth patterns. During financial crises economies tend to have lower growth rate (see **Figure 2.1**), it might also lead to higher unemployment ratio. Broken development pattern and policies cause interruption convergence in national and regional equality process.

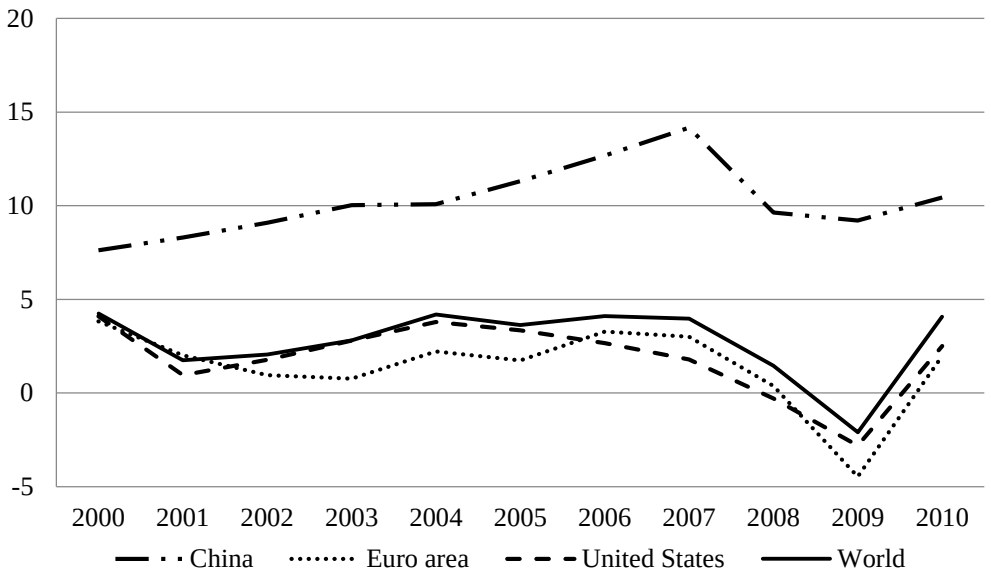

Figure 2.1: Growth rates (World-Bank, 2014a).

2.1. Origin of Resilience Notion

According to its strict Latin root, resilire, to leap back or to rebound, the idea of 'resilience' refers to the ability of an entity or system to 'recover form and position elastically' following a disturbance or disruption of some kind (Martin, 2012). Regional resilience as the ability of a region to anticipate, prepare for, respond to and recover from a disturbance (Foster, 2007). In addition, Hill, Edward et al. (2008) conceptualizes regional economic resilience as the ability of a region to recover successfully from shocks to its economy that either throw it off its growth path or have the potential to throw it off its growth path. Martin (2012) defines three different types of resilience 'engineering resilience and regional economic rebound', 'ecological resilience and regional economic hysteresis' and 'adaptive resilience and regional economic realignment'. Briguglio et al. (2009) define economic vulnerability and economic resilience separately. He claims that economic vulnerability and economic resilience have different perspective and different features.

Economic systems are assumed to be in equilibrium position during regular period. In case of crisis, external shock situations, systems lose their stability and ability of acting in development paths. More resilient systems can get over the effects of a crisis much quicker than a system, which is less resilient. Martin (2012) claims, "It may be that those compensating, self-correcting adjustments take a while to have effect, but the assumption nevertheless is that the economy will sooner or later return to its pre-shock equilibrium state." Hill, Edward et al. (2008) claim that different resilience concepts can be combined for focusing on the aspect from a different point of view.

Bruneau et al. (2003) define the notion of resilience "as the ability of the system to reduce the chances of a shock, to absorb a shock if it occurs (abrupt reduction of performance) and to recover quickly after a shock (re-establish normal performance)". In the same paper it is added that a resilient system has to show:

- Reduced failure probabilities
- Reduced consequences from failures, in terms of lives lost, damage, and negative economic and social consequences

- Reduced time to recovery (restoration of a specific system or set of systems to their ‘‘normal’’ level of performance)

Engineering resilience phenomenon focuses on returning process of a system to pre-shock level. If a system could resist external shocks and be able to return its pre-shock level, that system can define as a resilient system (or less vulnerable). That system would be more resistant than a system, which needs more time to return its previous steady level. This perspective assumes that regional economies act automatically under any circumstances. “…but assumption nevertheless is that the economy will sooner or later return to its pre-shock equilibrium state” (Simmie et al., 2010). In addition, it is easy to say that this model does not consist any permanent effect on regions long-term development path.

Ecological resilience concept focuses on elasticity threshold of a system, which is pushed by shocks to its limits. The resilience is the capacity to tolerate disturbance without collapsing and maintain the system with setting a new and different structure. This is also called multiple stability domains. In this notion, a system’s resistant is measured by the size of shock, which it can absorb before collapse.

On the other hand, when a system would face a shock, which is bigger than it can absorb, it would change its post-shock path. Old path and new path of the system are totally different than each other. In economy, the term of ‘hysteresis is used to explain this phenomenon.

According to Setterfield (2010), hysteresis almost invariably involves structural change in the economy. Hysteresis can be seen as a form of path dependence. When a shock affects a region’s economy even a small effect, it leads a permanent effect in post-shock situation. It means, repeatedly shocks give harm to large sectors in economy, it would have negative effect on supportive sectors. It may reduce region’s output level. Hysteresis can occur upward effect in some extreme situations. In some issues, post-shock output levels would grow and it can sustain. Regions, which experienced positive hysteretic effect, could count as highly resilient.

Christopherson et al. (2010) claims resilience process, which associated with globalization have made places and regions more permeable to the effects of what were once thought to be external, encompasses rebound, adaptation and recovery. In addition, they add that it is wrong to accept resilience as an ability of a region to

recover to its pre-shock growth path. Economic resilience depends on the aspects, which used to define features of a region. When measuring economic resilience, time should be measured in moments; pre-shock, shock and post-shock (Christopherson et al., 2010).

Further, the concept of resilience does always not imply to rebound to pre-existing state. It also refers to be open to respond opportunities during crises period. A system, which is locked in to resist against a solid and continuous stress would be more conservative and internally focused than others. This brings the region much more sensitive to external shocks and disturbances (Foster, 2007; Mancini et al., 2012).

This theory depends on the systems, which has complex adaptive organizing behaviour. This behaviour leads them to rearrange their path, which they will follow. This kind of resilience depends on existing of innovation in the region and flexibility. Martin (2012) mentioned "…resilience is a dynamic process, not just a characteristic or property, and it resonates closely with the Schumpeterian notion of 'gales of creative destruction'".

In addition, Amin (2013) emphasizes that the frame of social justice cannot be forgotten in discussion of regional resilience. In his case study in Sweden, he mentions that central authorities in Sweden should fully protect civil society in normal and abnormal times. Indeed, normal and abnormal times mean times of shocks and disturbances.

2.2. Dimension of Resilience

Statistical indicators play crucial to measure regional economic resilience. It is the only way to monitor the progress of an economy. Until now, there is no empirical attempt to determine definite indicators for the measurement of resilience. Most of the researchers are using Gross Domestic Product (GDP), although its limitations are big debate question. However, GDP constitutes basic of the most of the economic research.

Although Martin (2012) says that "Regional growth in output and population or rates of unemployment, poverty or labor force participation can be considered at least partly equilibrium phenomena", it should be taken into account not only as the

results of economy, but also the main drivers of policy making process of development and growth. In addition, he mentioned, “Since all these subjects offer significant interest for researchers and policy-makers alike, the single equilibrium version of resilience offers on important and legitimate metaphor for understanding regions.”

Hill, Edward et al. (2008) claim: “Regional economies can be thrown off their growth paths through (a) structural change resulting from global or domestic competition, from changes in the region’s competitive advantage for various products, and/or from changes in consumer demand for products the region produces, or b) other external shocks (a natural disaster, closure of a military base, movement of an important firm out of the area, etc.)”

Heavy deindustrialized regions may suffer from economic crises more. According to Martin (2012), “Destruction of large sections of the region’s industrial base may have negative multiplier effects on other local sectors of activity, such as supporting suppliers and business services. It may so reduce the region’s employment and associated incomes that local purchasing power is seriously reduced with additional knock-on effects on a whole range of consumer services”.

Resilience capacity of a system depends on the system’s pre-shock existing situation. Industrial variety, re-orientating skills and technologies build up systems resilience capacity. These indicators come through time in a successful economy. When these indicators are equal, industrial portfolio (industrial diversification) brings economic resistance to a region, than an industrial specialized region. Considering different industrial activities have different business structure and different markets, diversified economies have the ability to resist against external shock (Boschma, 2014; Christopherson et al., 2010; Martin, 2012).

Boschma (2014) states that resilient region should create its own opportunities or new combination to increase its resilience through evolving itself into new growth paths. He claims main factor to achieve is that to have a diversified economy because of limited ability of specialized economies. In addition, attempt of a specialized economy to become more diversified might have difficulties because of their industrial structure. However, it is also a resilience capacity to be adaptive into new forms. In addition, he mentioned that diversified economies consist of different

elements and they are built of the combination of those elements. It is highly possible to adjust a new combination and to adapt new formalities.

On the other hand, highly specialized economies are more vulnerable to disturbance. Since having only one type of business structure and one type of external/internal market naturally create more dependence than ever. Surprisingly specialized service industries have more resilience than manufacturing and construction industries. Being independent on a stable location brings more resilience than stabilized industries (Martin, 2012).

In addition, to measure end-state resilience, which is the real performance result of a system against any shock, Bruneau et al. (2003) mention robustness and rapidity, to build and achieve resilience capacity, offer redundancy and resourcefulness. According to their conceptual work, first of all, robustness is the power of a system to resist against any disturbance without having any damage of failure. Secondly, redundancy is the amount of a system to secure itself. Thirdly, resourcefulness is the scope of a system to clarify problems, form its priorities, and finally, rapidity is the scope to reach those priorities in a defined period of time before and future disturbance (Bruneau et al., 2003).

Foster (2007) categorizes the determination of resilience process in two parts. Preparation resilience contains assessment and readiness; performance resilience contains response and recovery. According to their preparation and performance resilience achievements, Foster divides regions into four groups in her “Regional Resilience Matrix”. The resilience level regions, which can show preparation and performance resilience, is called intentional resilience.

Regions, which show good performance resilience but do not have preparation resilience, are called ephemeral resilience. In addition, when regions have strong preparation resilience but could not show performance resilience called ineffectual resilience. On the other hand regions could not manage to show any kind of resilience. Preparation and performance resilience have 2 criteria for both. Assessment criteria, which is the responding capacity to disturbance, and readiness criteria, which is how is a region ready to respond, build preparation criteria. Further, response, which is how effective a region can response, and recovery which is how

effective a region can recover itself, build performance resilience (Foster, 2007). Foster (2007) conceptualized her matrix in figure 2.2.

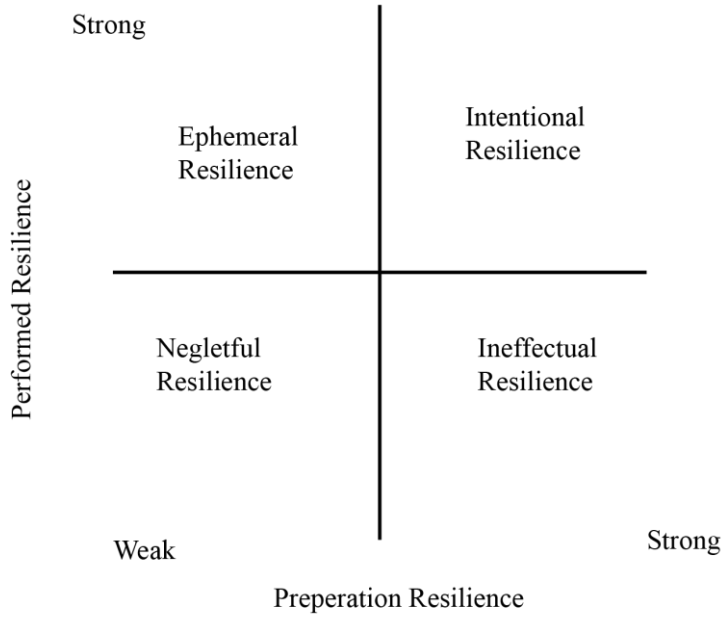

Figure 2.2: Foster's regional resilience matrix.

2.3. Measuring Resilience

Although there is a growing importance of economic resilience in literature, there is no certain way to measure it. Briguglio et al. (2009) analyse economic resilience in their survey with three components as national level. Macroeconomic stability, microeconomic market efficiency, good governance and social development are defined as main components to measure resilience. Foster (2007) uses population change, employment change, income and poverty in selected areas. Simmie et al. (2010) take employment change indifferent sectors and number of new firms established in the regions into the account in their resilience analysis survey. In addition, Karoulia et al. (2013) use income, education level, unemployment rate for young people to identify Greek regions resilience.

Martin (2012) analyses that regional dependency, employment changes, and income to show the resilience performance of British regions from 1972 to 2010, consist of three downturns period. Kumral et al. (2012) generate vulnerability index for Turkish NUTS2 regions between years 1994 and 2001 in order to measure resilience of

Turkish regions. They used employment as the main indicator. Psycharis et al. (2012) state that comparing population density, employment rate, value of export, savings, new constructions, and energy consumption and automotive sales could be used in defining resilience.

Hill, Edward et al. (2008) suggest that to compare regional resilience, some selection of analyses must be done. First of all, to define the case study regions to take into account, location quotient must be performed at various stages and in certain period of time. It brings the relatively close regions in certain sectors. A shift-share analysis for selected regions would explain regions industries and their expected and occurred growth rates. It would also define national trends, industrial structure and regions competitive advantages. Besides quantitative analysis for measuring resilience, some qualitative case study analysis must be performed. The regional shift component of shift-share analysis gives the competitive advantages of a region however; it does not explain the reasons. At this point, Hill et al. claim to understand the economic resilience first the social and economic structure, policies and externalities must be identified.

In addition, Lagravinese (2014) use a dynamic shift-share model to explore resilience capacity of Italian regions year by year in between 1970-2010. However, Van Egeraat (2014) claims that the traditional approach ignores possibility of industry-region interaction effects and this can affect both the industry-mix and the regional share components. He uses in his survey Ray-Srinath shift-share to model to addressee the firm structure in Ireland.

2.4. Summary

To sum up, resilience is the ability to get over the external shock. Systems might find recover or rebound to its pre-shock level. Systems, which are more resilient, could perform a faster recover process from disturbances than systems, which are more vulnerable. On the other hand, resilience does not mean only find the pre-shock path. It also means adapting or replying new and different opportunities during crisis. In a nutshell, resilience is the capacity to reduce failure probabilities. Resilience depends on the aspects, which builds economic systems.

Economic indicators define the systems' economic resilience. Industrial diversification, re-orientating capacity and innovation bring innovation. These

indicators affect directly regions resilience performance. To calculate resilience performance, shift-share is a useful analysis. On the other hand, it is not enough alone to explain the factors built the resilience like; GDP, GVA diversification, innovation and human capital.

3. AUTOMOTIVE INDUSTRY

Martin et al. (2013) state that the local economies have been converged over the last 40 years. Diversified economies build the strong resilience, specialized regions become less popular and it is decreasing. This addresses the economic structures' motions after crisis. Automotive industry is a major sector since it is a combination of output from different sectors thus it could affect several sectors. Besides being in the middle of sectorial linkages, it could provide technological development and information spill over and a diversified economy. However, it creates highly specialized economic structures, automotive industry has direct or indirect connection to textile, rubber and plastic products, machinery, chemical and chemical products, electrical equipment, electronic, and metal production sectors; therefore it is also related to diversity because sectors needs other sectors. The outcomes of automotive industry are a part of daily life. In order to compare resilience performance between diversified and specialized economies, automotive industry gives a perfect case study option.

3.1. Global Production Networks

Automotive industry is top five biggest industries with huge networks of global production system in 2010 (**Figure3.1**). Therefore, automotive industry could be categorized as a "production network" whose interconnected nodes and links extend spatiality across national boundaries and in doing so integrates parts of disparate national and sub-national territories".

Globalization of world economies brought new organization forms, which can affect competitiveness and economic policies. Although the number of spare parts producers was much higher, in the beginning of 1980' there were 85 independent major passenger automotive assembly companies around the world. This number decreased to 20 in the year of 2000. The main reason of shrinking numbers of automotive producers is mergers and acquisitions. In addition, those major passenger automotive producers became minority although they could sustain their

production. USA, European Union members and Japan occupy 60% of global market.

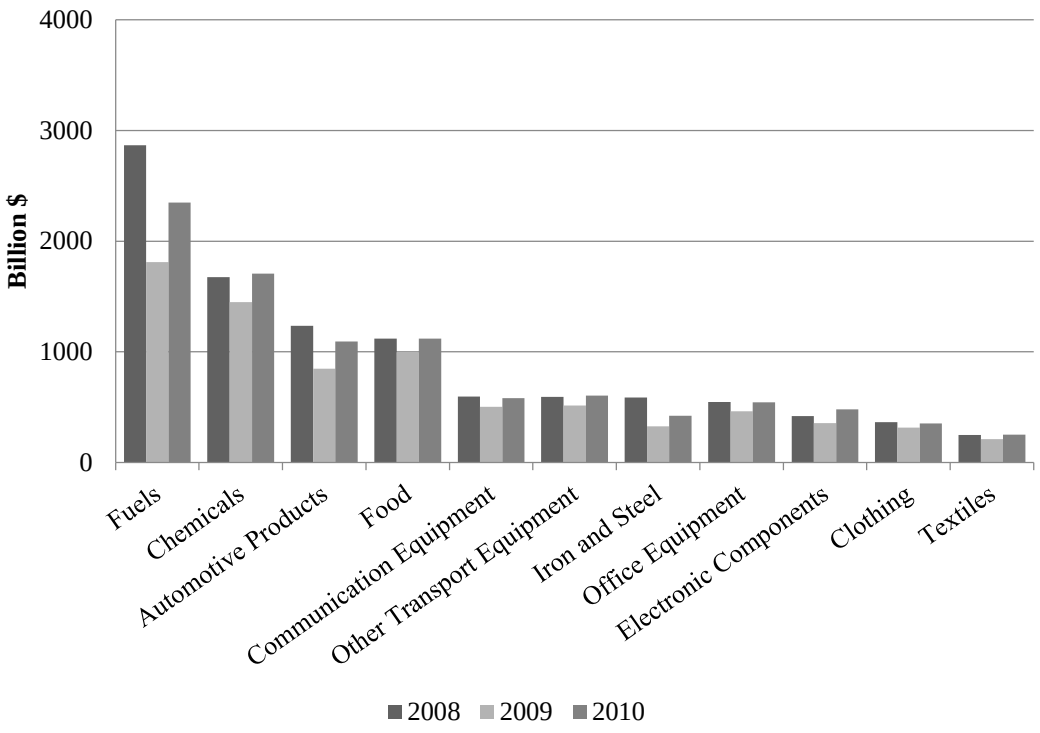

Figure 3.1: Total trade volume of sectors (World) (WTO, 2011).

Automotive industry is an extremely concentrated industry. However, it brings economies additional sectors, which support and supply automotive industry. This structure makes regions and economies specialized and also diversified. Sturgeon, Timothy et al. (2000) stated that the structure of industry creates limits and high barriers for small companies to enter. The cost of a new design of a vehicle requires 3-5 years and billions of dollars to complete. The smaller firms, which cannot struggle this cost, focus on information technology, spare parts and equipment for customizing. Concentration and competition leave no place for small firms to increase their markets but only developing their own unique technologies (Sturgeon, Timothy J., 2008; Sturgeon, Timothy et al., 2008).

Type of production has been change last century more than once. Gereffi et al. (1994) assumed that network based production became common in post-Fordist period, which depends on horizontal linkages that allows no property relationships, allows independent firms, multi-national partnership without any boundaries and distance. On the other hand, Fordist period depends on close distance, vertical hierarchical relationships. In addition, they claimed that outcomes of post-Fordist

period encouraged big companies to choose their location independent from distance but on expanses, which caused multi-national companies and flexible structures.

Table 3.1: OICA 2010 world motor vehicle protection numbers by countries.

China	18.264.761	23,4%	Indonesia	702.508	0,9%
Japan	9.628.920	12,3%	Malaysia	567.715	0,7%
USA	7.743.093	9,9%	Slovakia	561.933	0,7%
Germany	5.905.985	7,6%	Belgium	555.302	0,7%
South Korea	4.271.741	5,5%	Others	486.785	0,6%
India	3.557.073	4,6%	South Africa	472.049	0,6%
Brazil	3.381.728	4,3%	Romania	350.912	0,4%
Spain	2.387.900	3,1%	Taiwan	303.456	0,4%
Mexico	2.342.282	3,0%	Australia	244.007	0,3%
France	2.229.421	2,9%	Sweden	217.084	0,3%
Canada	2.068.189	2,7%	Hungary	211.461	0,3%
Thailand	1.644.513	2,1%	Slovenia	211.340	0,3%
Iran	1.599.454	2,0%	Portugal	158.729	0,2%
Russia	1.403.244	1,8%	Uzbekistan	156.880	0,2%
UK	1.393.463	1,8%	Egypt	116.683	0,1%
Turkey	1.094.557	1,4%	Austria	104.997	0,1%
Czech Rep.	1.076.384	1,4%	Netherlands	94.132	0,1%
Poland	869.474	1,1%	Ukraine	83.133	0,1%
Italy	838.186	1,1%	Serbia	15.200	0,0%
Argentina	716.540	0,9%	Finland	6.665	0,0%
Sub-Total	72.416.908	92,8%	Total	78.037.879	

Source: (OICA, 2014a)

The costs of productions are converging and companies are investing in the countries, in where they could optimize their expenditure due to keep their competitive advantages. In addition, companies choose different countries for different parts, which have different production technique and substance. Moreover, every single part might be produced in different land and assembled in another one. Countries could be divided in three categories; pioneers, producers, consumers. The countries, which are called pioneers, have their own brand. Those countries are specialized and focused on management, administration and innovation in automotive industry; production rate remains low. Second class, producer countries are specialized on producing spare parts and/or assembly automotive. Those countries often get their agendas, plans and programs from pioneers. Third class, consumer countries could not develop and produce any vehicle; they are depended on import of those vehicle.

In automotive industry, there are many firms such as automotive manufacturer companies (assembly and integrated production), original parts manufacturers, spare parts manufacturers, supplier industry firms that do subcontractor production, raw material manufacturers, distributors, vehicle and parts dealers and transporters. Automotive sector production chain consist of various numbers of activities from design to distribution, and many firms from raw materials manufacturers to distributor firms. All this system creates huge numbers of employment. 8 million people are employed in this production chain, and 50 million people have a position in supplier industries (OICA, 2014c).

Perception of automotive production as a major and significant sector has brought competition and conflict between producers although they have huge cooperation. Furthermore, international companies, which want to increase their competitive capacity, started to expand their investments through other countries in order to decrease their production costs. Finally, trade numbers, labor force, economic stability became more significant.

Table 3.2: OICA world motor vehicle protection employment numbers by country.

China	1.605.000	19,3%	Egypt	73.200	0,9%
USA	954.210	11,5%	Indonesia	64.000	0,8%
Germany	773.217	9,3%	Romania	59.000	0,7%
Russia	755.000	9,1%	Slovakia	57.376	0,7%
Japan	725.000	8,7%	Malaysia	47.000	0,6%
Spain	330.000	4,0%	Belgium	45.600	0,5%
France	304.000	3,7%	Australia	43.000	0,5%
Brazil	289.082	3,5%	Hungary	40.800	0,5%
India	270.000	3,3%	Austria	32.000	0,4%
South Korea	246.900	3,0%	Netherlands	24.500	0,3%
Turkey	230.736	2,8%	Portugal	22.800	0,3%
UK	213.000	2,6%	Switzerland	15.500	0,2%
Italy	196.000	2,4%	Serbia	14.454	0,2%
Thailand	182.300	2,2%	Argentina	12.166	0,1%
Canada	159.000	1,9%	Slovenia	7.900	0,1%
Sweden	140.000	1,7%	Finland	6.530	0,1%
Mexico	137.000	1,6%	Denmark	6.300	0,1%
South Africa	112.300	1,4%	Croatia	4.861	0,1%
Czech Rep.	101.500	1,2%	Greece	2.219	0,0%
Poland	94.000	1,1%	**Total**	8.303.451	

Source: (OICA, 2014b)

3.2. Brief History of Automotive Industry

As all well known, first engine was invented in France at the end of 19. Century, first automotive was sold by Karl Benz Gottlieb Daimler in Germany and Albert de Dion and Armand Peugeot in France. But none of them has changed the world too much as Henry Ford introduced brand new band system, which allows to mass production, called Fordism. This new technology reduced production cost, increased specialization and outcomes of the factories.

With the invention of band production, companies could have allowed to avoid high labor costs, small production capacity and long waiting periods of receiving parts. This band system, also called assembly line, led producers to standardized and interchangeable parts and mechanization of production and assembly. Assembly line was invented in America and put American firms in an advantageous position. With the invention of mass production in early times of industrialization sales of automotives had a booming effect all over the world, American firms increased their sales rapidly and required to build new assembly plants. Low labor cost in other countries and low transportation cost to other countries turned them invest offshore production. Building offshore plants gave them opportunity to enter these emerging markets. Their first priority was to enter to European market. Correspondingly, first offshore assembly plants were built in Europe: Russelsheim-Germany (GM, 1929), Istanbul-Turkey (Ford, 1929), Heilbronn-Germany (Fiat, 1930), Russia (Ford, 1930), Australia (GM, 1931), France (Fiat, 1932), Poland (Fiat, 1932), Cologne-France (Ford, 1932) (now Germany), Dagenham-England (Ford, 1932), Paris-France (Ford, 1934), England (Citroen, 1935 and Renault, 1935) and Bucharest-Romania (Ford, 1936) (Kiroglu, 2010; Sturgeon, Timothy et al., 2000).

Kiroglu (2010) stated that "the earlier introduction of mass production techniques in the United States meant that the U.S. firms enjoyed a considerable competitive advantage over the European producers in the years immediately after World War I... this was the main factor behind the increased concentration of the interwar period. This led the European countries to adopt tariffs, local content requirements, and import restrictions to protect their infant automotive industries against U.S. competition... This created an international structure with the United States, Britain, France, Germany and Italy dominating as exporters while at the same time enjoying virtually isolated domestic markets." with the beginning of World War II automotive

industry shifted into combat vehicles production. Offshore assembly plants in Europe were nationalized (Jenkins, 1984; Sturgeon, Timothy et al., 2000).

American Marshall Plan aimed to restore Europe's economy. It mostly focused on France, West Germany and England. Automotive industry, nationalized during WWII, also had its portion, and increased its production. Industry in Italy, France and West Germany became at the same level like United States and these counties expanded their markets from only Europe, to United States and South America (Gereffi, 1994; Jenkins, 1984, 1987).

Furthermore, American Marshall Plan was not only helping to rebuild Europe's physical and economic environment, but also put them again standing on their feet. In the middle of 1950s, competitive economy, enlarging markets foreign investments forced European automotive industry to follow the same path like United State did in 1930s: offshore automotive assembly plant investment. Similarly to United States, European producers also invested new offshore assembly plants to new countries for them, in where they wanted to enter to the market too; Brazil, Argentina, South Africa, Spain, and Mexico, as well as other countries in Northern Europe (Gereffi, 2006; Jenkins, 1987; Sturgeon, Timothy et al., 2000).

In 1960s and 1970s building offshore assembly plants became a must to remain competitive. Most of the American offshore assembly plants were located in Latin America, while Japanese firms preferred to locate in Asia. Japanese firms performed same type production systems like in their country in those offshore assembly plants, like American and European companies did their own style. American and European firms build large and more integrated plants; nevertheless Japanese stayed smaller sized and focused on markets demands (Doner, 1991; Hill, Richard Child et al., 1994).

Due to its high skilled and flexible workforce, and preserved local market, Japanese did not prefer to invest for offshore assembly plants. In addition, Japan was not affected labor movements, since workers in Japan were organized in company union, although workers were not unionized. Instead of exporting big numbers of automotive, Japanese producers focused of high productivity domestically developed technology, and expanded reproduction through export. Eventually, Japanese spare manufacturers started to produce some low added value parts, like batteries, tires,

glass, wire in South East Asia. This is the first attempt of Japanese manufacturers of producing automotive parts outside of the Japan. In 1970's Japans manufacturers transferred the production of small parts and effortful parts to East Asian countries. American companies followed Japanese competitor to invest in East Asia. In addition, American companies went into partnership with Japanese companies, but at the same time, competition increased. In mid 1970s, Korean government ordered Hyundai, Kia and Daewoo to develop Korean automotives to invert automotive industry as a major strategic national industry. These three-automotive producers ultimate aim was to accomplish economies of scale with Korean-made automotives (Doner, 1991; Florida et al., 1991; Hill, Richard Child et al., 1994; Lautier, 2004).

Labor move in Europe caused changes in employment system. Worker wages increased and weekly working hours decreased. Womack et al. (1992) stated that the effect of rising labor move did not appear because of the oil crisis, as well European and American automotive producers could have managed to get over although labor wages and labor cost were higher than Japan. Furthermore, competition in variety of models and appeared instead, like Japanese manufacturer had before (Jenkins, 1984).

Kiroglu (2010) claimed "oil crisis caused reestablishment of capitalism with neoliberal policies in late 1970s. Import substitution industrialization policies were addressed as reasons. Social security policies and working conditions, created after World War II, were criticized hence Keynesian policies ended in 1980s. Neoliberal policies became powerful and forced undeveloped and developing countries to remove trade barriers through World Bank and IMF for trade liberation.

After the first oil crisis, Japanese firms dominated the small automotive market. This caused in late 1980s the expanding of flexible specialization and just in time delivering concepts through undeveloped countries with unskilled labor force and export oriented industrialization policy. Domination in the world market let Japanese automotive companies also enter to the American market through their American partners in the industry. Entering Japanese producers into the American market increased competition between them. However, American companies could not have access to the Japanese market. Due to growing Japanese share in American market, American government demanded from Japanese government to put some restriction on automotive export. Japanese companies replied this call with joint ventures in North America. Japanese manufacturers invested also in Europe to avoid European

import restriction. As a result of low cost labor, productivity in South Korea, Korean automotive companies had increasing competitiveness in global market. In the beginning of 1980s, they entered to the American market as a challenger against Japanese producers (Florida et al., 1991; Hill, Richard Child et al., 1994; Lautier, 2004; Sturgeon, Timothy et al., 2004).

In 1990s financial liberalization started all over the world with the end of the Cold War. The state lost its importance and production forms entered a new era. Globalization arose and economical geography changed. During this period most of the eastern and western countries converged, capital moved to new investment centers. Big companies became much more international. Kiroglu (2010) stated, "Although the liberalization of trade and finance had taken place before, especially the restraints of production on world scale occurred. The process to eliminate the barriers before movement of money capital and productive capital was nearly complete in early 1990s. The financial market and FDI regulations took place in this process" (Coe, Neil M. et al., 2008; Gereffi et al., 2005; Gereffi et al., 1994; Gibbon et al., 2008; Sturgeon, Timothy J., 2008; Sturgeon, Timothy et al., 2004; Sturgeon, Timothy et al., 2008).

Japanese success of production forced other producers to change their production forms. Use of robot technology take place in late 1990's in assembly plants. Replacing robots in production instead of human power shortened production time and expenses. Human power shifted to producing supplier industry. It was natural to employ fewer workers and complete the product in less time as a result of robotizing in assembly plants. While robotizing process was popular in around the world, Japanese producers focused on increasing their innovations in the organization of production rather than production technology. As a result their competitive power increased (Guiheux et al., 2000; Hill, Richard Child et al., 1994).

With the fall of Berlin Wall, German automotive manufacturers made international expansion attempt. Although they have many offshore assembly plants, especially in Latin America, they have produced mainly for Germany and Europe. Increment of their foreign direct investment ability made them global actors. They bought or found many assembly plants in former socialist Central Eastern European countries, Czech Republic, Slovakia, Slovenia, Poland and Romania. However, while their global

market share increases they also explored Eastern Asian countries (Coe, Neil M et al., 2004; Radosevic et al., 2005).

The rise of the investment possibilities in Central Eastern European countries took the attention of Western European manufacturers. Although many of those old socialist Central Eastern European countries had their local automotive brand, none of them could have manage to compete with western rivals and survived. However, the automotive assembly infrastructure and human capital in those have been a benefit for foreign brand to reduce the production and transportation cost, considering their main production is going to Europe (Radosevic et al., 2005).

As a result of robotizing in 1990's automotive industry has become extremely concentrated structure. To be a part of increasing competition, manufacturers had to reduce their production expenses. In addition, they had to invest big amounts of money to robotize their production and assembly plants. Few producers could have provided this cost of transformation. In 2000's small number of companies dominate most markets.

Automotive Industry in Turkey

From the beginning of automotive industry has had some major steps in Turkey, it could be divided in five thematic groups; in 1960', producing tractors and commercial vehicle to export, in 1970' producing spare parts to assemble in order to nationalize automotive production, in 1980' making first structural investment to improve and increase producing capacity and technology, in 1990' reconfiguration of automotive industry and integration to global production network to have a competitive role in global market, in 2000' entering global competitive era to develop new designs and to increase the added value in assembly (Taymaz et al., 2008).

First development plan, between 1963-1967, by State Planning Organization (DPT) aimed to decrease dependence of auto import. To achieve this aim, development plan consisted of several principles. First, to efficient use of existing reserve, imports of new trucks were cancelled. In the time of need, it would have been carried out under control. The imports of equal amount of passenger automotive and bus, which could have been produced and assembled, were cancelled (DPT, 1962).

In years 1968-1972, the second development plan aimed to spend minimum foreign currency. In addition, to increase the effect of economies of scale, some regulations

were made on capacity and size of firms. In this period, automotive companies could not have achieved the aims by State Planning Organization (DPT). This result decreased the amount of produced automotive and increased the automotive price. Eventually, investing on automotive assembly industry became attractive (DPT, 1967).

The third development plan, 1973-1977, consisted of tempting principles for automotive industry. Existing bus production would have been sustained and supplier industry would have been tempted (DPT, 1973).

Producing to export was the main objective of fourth development plan in between 1979-1983. For the first time in this development plan, DPT charged metropolitan municipalities to support automotive firms to enlarge their facilities. This was the first official structural investment endeavor to automotive sector from government (DPT, 1979).

Goals for automotive industry in fifth development plan, 1985-1989, could be explained in one sentence: "reconfigure automotive industry into a modern and innovative sector, which has high quality equal to global standards, to increase the competitiveness advantage in automotive assembly and producing spare parts with having benefits of economy of scale (DPT, 1985).

In sixth development, 1990-1994, plan research and development in automotive industry became one of the most important topics. First of all spare parts production would be developed and having benefits of economy of scale will be priority. Another aim was to integration new producing systems, which are environmental friendly and smart (DPT, 1990).

In ninth development plan between 2007-2013, Turkey was foreseen as the most competitive, and advantages and developed research and development center in Europe. Stability in economy and politics would be balanced, and there would be sustainable growth. It was aimed to bring justice of taxation, stop informal economy in order to converge regions in Turkey. In this period, Brazil, China, India and Central Eastern European countries are defined as main rivals, and competitive advantages have kept against these countries. One of the fragile point of Turkish economy, flexible exchange system, was considered as balanced in order to not disturbing competitiveness (DPT, 2007).

The national policies of automotive investments in Turkey for local demand was successfully covered the Turkish market. During second development plan period, the policy of increment of assembly plants resulted as the entrance of two big companies: Renault and Fiat. In addition, there were no sufficient parts and resource industries, although a small part industry in Bursa and Kocaeli, Marmara Region, nowadays TR41 and TR42. During 80's liberalization of foreign trade, one of the national policies was to make the industry export oriented. In sixth plan period, with the priority of economic of scale, automotive industry took structural investments and production of automotive jumped from about 50.000 to 450.000 in late 90's (Goktas, 2013).

3.3. Summary

From the beginning of industrial revolution, Fordism has changed a lot in industrial production like the new techniques in the very early times of automotive industry, band production, and specialized production. However, global economic relations and production networks have moved and are moving the production centers. In addition, new era of has been called post-Fordism hence it has also changed a lot. With the beginning of industrial revolution, capital always follows the best production possibilities to lowering cost; increasing market share is another key factor.

Big structural investments, starts with World War II, were located at the beginning in America, where new production technologies have been found. The pursuit of looking for new markets and lowering production cost has been changed the production centers through time multiple times. Because of the size of market, Europe was the first big leap of automotive industry after America. Asian countries, Japan and Korea, have become second major producers due to their organizing scheme and low production cost. Currently, after fall of communist block countries and new trade liberations, automotive industry is located around the peripheral belt of big markets, like Southeastern Asia, Eastern Europe and Turkey.

New technological developments in industry and global world structure have allowed the producers to change their policies freely. As the results of these policies in industry, small numbers of American, European and Asian firms dominate the market in 2000. However, important crucial assembly plants have been located in

different crucial geographies. Turkey has become one of the most important stops and actors although it does not have a local brand.

4. ANALYSING THE ECONOMIC RESILIENCE OF AUTOMOTIVE MANUFACTURING SPECIALIZED REGIONS IN EU AND TURKEY

In this section some performance techniques have been applied to identify the recent situation of automotive industry. Economic base theories (location quotient and basic sector employment) have been used to define the automotive specialized regions. Shift share analysis has identified those automotive specialized regions before and after crisis performance on employment account. These analyses have shown the regional performance to identify their resilience. It is important to measure their performance to define their achievement. However, only measuring regions' performance is not enough to identify their resilience and the factors, which build resilience.

Moreover, to generate an empirical research, datasets of European and Turkish regions have been analyzed to point out the regions, which specialized in automotive industry. After defining regions, their performance analyses during 2008 world global crisis has been done. Shift-share analysis has been used as a performance measurement indicator between years 2006 and 2010. In this chapter two scenarios have been applied to show different growing paths in different countries: 1- what if automotive specialized regions in European Union and Turkey have been developed according to European Union's growth rate, 2- what if automotive specialized regions in European Union and Turkey have been developed according to their national growth rate? With doing two analyses, it was aimed to see regions' real conditions and to create comparability.

To define the economic resilience of automotive industry specialized regions in EU and Turkey, "C29 - Manufacture of motor vehicles, trailers and semi-trailers employment numbers 2006-2010" have been taken from Eurostat. For location quotient analysis, 2010 employment number of C29 - Manufacture of motor vehicles, trailers and semi-trailers as the current data have been analyzed. To see the industry capacity in the regions basic sector employment has been calculated. Basic sector employment analysis shows how many jobs would create in region when one employment would be created in the main sector in the same region.

In addition, 2006-2010 C29 numbers have been analyzed in shift-share analysis to identify the resilience performance of regions. 2008 and 2009 C29 employment numbers for FR10 (Ile de France) are not given, therefore they have not been added to shift-share analysis. Shift-share analysis is a key factor to show the resilience performance of the regions because the components of the analysis, especially regional shift, give the expected shifting trends in the regions. Regional shift does not explain the reasons of regional factors, which build resilience but it allows comparing the regions resilience.

4.1. Performance Measurement Techniques Used In Resilience Literature

4.1.1. Economic base theory

The economic base model is a method for analyzing the local economy in a region by dividing it into two very general sectors, basic and non-basic. The reason of using this method is forecasting future growth of a region. By dividing two different sectors, this model identifies all local economic activities as basic or non-basic. It gives some clues to researchers how to illustrate the important economic activities and to estimate or forecasts to the future of local economy (McNulty, 1977).

Identifying local economy can be done via using variety analysis of economic base analytical techniques. The economic base technique is the oldest, simplest and most widely used technique for regional economic analysis. It is an analytical method that illustrates many fundamental techniques used by local and regional planners, including areal comparisons, local versus regional/national conditions, and standardizing values.

Shortly, economic activities in a region are divided into two categories in economic base theory: basic and non-basic. Basic industries are focused on exporting supplies from the region and bringing abundance. On the other hand, non-basic industries support basic industries. Most of the time service industries are called non-basic industries.

Basic Sector: The local businesses firms, form this sector, are completely dependent on external factor. For example, Airbus is a European cooperation, makes and sells airplanes to airline companies or logistic firms from all around the world. It does not sell its products to small households. Its success depends of its external relations outside of the region. Even though it is dependent on external raw material flows, its

main focus groups are located outside of the region. In addition, manufacturing is usually considered to be a basic sector industry. On the other hand, local resource-oriented firms, mining logging, forestry, are counted as basic sector industries, as they export mainly their products (Dinc, 2002).

Non-basic Sector: The non-basic sector, in contrast, is composed of those firms that depend largely upon local business conditions. For example, a local grocery store sells its goods to local households, businesses, and individuals. Its clientele is locally based and, therefore, its products are consumed locally. Almost all local services (like drycleaners, restaurants, and drug stores) are identified as non-basic because they depend almost entirely on local factors.

Economic Base Theory also considers that the local economy is strongest when it develops those economic sectors that are not closely bound to the local economy. By developing firms that commit primarily on external markets, the local economy can better isolate itself from economic downturns because these external markets will stay strong even if the local economy would face problems. In contrast, if a local economy totally dependent upon local factors would have great trouble responding to economic crashes (Quintero, 2007).

There are many different ways to analyze the local economy. Economic Base Analysis Techniques offer researchers a set of simple tools (Dinc, 2002).

Assumption Technique: The Assumption Technique is the simplest and most easily performed economic base analysis technique. Allocate all local employment to basic or non-basic sectors, the assumption technique literally "assumes" that certain industries are naturally basic sector jobs and others are non-basic sector jobs. When utilizing this technique, it is common practice to assume that all manufacturing, mining, agriculture, and governmental institutions are basic sector activities because (it is assumed) they rely largely upon non-local conditions. In contrast, all other industries are assumed to be non-basic, or entirely dependent upon local conditions.

Location Quotient Technique: The Location Quotient Technique is the most commonly utilized economic base analysis method. This technique compares the industries in the local economy, in the process attempting of identifying specializations in the local economy. The location quotient technique is based upon a

calculated ratio between the local economy and the economy of some reference unit. This ratio, called an industry "location quotient" gives this technique its name.

Location quotients are calculated for all industries to determine the local economies, have a greater share of each industry than expected when compared to a reference economy. If an industry has a greater share than expected of a given industry, then that industry employment is assumed to be Basic because those jobs are above what a local economy should have to serve local needs. Location Quotient Technique determines the levels of Basic and Non-Basic local employment through a comparison between Local conditions and (usually) National conditions (Miller et al., 1991).

Minimum Requirements Technique: The Minimum Requirements Technique is the most complex economic base analysis method. This method compares the local economy with the economies of a sample of similarly sized regions. For each industry the Minimum Requirements Technique assumes that the "minimum share region" has just enough employment to satisfy local demand for that industry's goods and services. It follows that all other regions will have some Basic sector employment because their "share" in that industry is greater than that in the "minimum shares region" (Esteban-Marquillas et al., 1972).

Location quotient technique

The Location Quotient Technique is the most commonly utilized economic base analysis method. This technique compares the local economy to a reference economy (most of the time national economy), in the process attempting to identify specializations in the local economy. The location quotient technique is based on a calculated ratio between the local economy and the economy of some reference unit. This ratio, called an industry "Location Quotient" gives this technique its name.

Location quotients are calculated for all industries to complete whether or not the local economy has a greater share of each industry than average when compared to a reference economy (national economy). If an industry has a greater share than average of the national level, then that industry employment is assumed to be Basic because those jobs are above what a local economy should have to serve local needs (Leigh, 1970).

On the other hand, location quotient technique emerged in 1920's, when the economics focused on industrial strengths caused by mass production. The changes in trade of mass produced products might have growth or decline in industries. However, current production system is more complex than this. Input and outputs of industries, backwards and forwards linkages of production system allow a huge variety of production types. In addition, trade activities cover many service sectors, dominated by knowledge and design. At this point, it is difficult to distinguish the production process and management process of industries in location quotient analysis. However, location quotient is still a basic start-up analysis to proceed to next steps.

Calculation

To calculate any location quotient the following formula is applied. In this formula, regional economy is compared to the nation economy. To allocate employment to the basic and non-basic sectors, location quotients are calculated for each industry. The location quotient provides evidence for the existence of basic employment in a given industry.

The formula for computing location quotients can be written as:

$$LQ = (Eir / Er) / (Ein / En)$$

Where:

Eir = Local employment in industry i

Er = Total local employment

Ein = Reference area employment in industry i

En = Total reference area employment

It is assumed that the base year is identical in all of the above variables.

Only three general outcomes are possible when calculating location quotients. In location quotient "1.0" is main value.

LQ < 1.0 - Non-Basic Industry: When LQ that is less than zero that local employment is less than national level for a given industry. Therefore, that industry is not even meeting local demand for a given good or service. The sectors below 1.0 are considered non-basic by definition.

LQ = 1.0 - Non-Basic Industry: When LQ that is equal to zero that the local employment is exactly sufficient to meet the local demand for a given industry. Therefore, all of this employment is also considered non-basic because none of these goods or services is exported to outside of the region

LQ > 1.0 - Basic Industry: LQ that is greater than zero provides evidence of basic employment for a given industry. When an LQ is bigger than 1.0, analysis addresses the economies, which have greater local employment than national level in specific sector. These additional employments must create surplus in the region and it must be exported. According the LQ, this makes them Basic sector employment.

Basic sector employment

Although location quotient is a basic, common and reliable analysis method, it does not mean that it will always show the precise results. Because of the assumptions of the Location Quotient approach, a second formula must be applied to determine the number of Basic sector employment when the LQ is greater than 1.0 (Dinc, 2002). By using the same notation the equation for Basic Sector can be derived as:

$$BSir = (Eir / Ein – Er / En) * Ein$$

Where:

Eir = Local employment in industry i

Er = Total local employment

Ein = Reference area employment in industry i

En = Total reference area employment

It can also be defined as the employment multiplier that estimates local basic sector employment impacts and allows analysts to project non-basic sector job creation given an increase in basic sector employment. The Base Multiplier can provide insight as to how many non-basic jobs are created by one basic job.

4.1.2. Shift-share analysis

Shift-share analysis is an analysis tool, which is used in regional science and politics as well as in urban studies. It determines the regional growth or decline proportion in three different components. The analysis helps to identify growth pattern of industries where a regional economy has competitive advantages over the larger

economy. It also identifies the effect of national growth trends and the shift of industry. A shift-share analysis takes the change over time of an economic variable, such as employment, GDP and GVA within industries of a regional economy, and divides that change into various components (Dinc, 2002; Esteban-Marquillas et al., 1972).

A shift-share analysis attempts to identify the sources of regional economic changes. The analysis examines changes in an economic variable, such as migration, firm growth, or firm formations, GDP, GVA, although employment is most commonly used. The analysis separates the regional economic changes within each industry into different categories. Although there are different versions of a shift-share analysis, they all identify national, industry, and regional factors that influence the variable changes.

The traditional form of the shift-share analysis was developed by Daniel Creamer in the early 1940s, and was later formalized by Edgar S. Dunn in 1960. Also known as the comparative static model, it examines changes in the economic variable between two years (ChunYun et al., 2008). In this research, employment data have been taken into the account and examined in three components.

National growth share: the share of local employment growth, which can be related to the growth of the national economy. This factor describes that if the nation as a whole is experiencing same employment growth, it could occur in every region the same growth trend, and examine first the national growth share in the regions on employment change increase or decrease.

Industry mix effect: is the portion of the change attributed to the performance of the specific economic industry. The share of local employment growth that can be attributed to the region's mix of industries is analyzed. This second component is the change in a local industry that would be attributed to the growth of decline of the industry. However, this component isolates the fact that not all the industry grow same. It represents the contribution that a specific industry on national level changes the number of employment in region.

Regional shift: this component measures the change in a particular industry in the region due to the difference between the industry's local growth (decline) rate and the industry's reference area growth rate. It also indicates growth or decline in

industries due to the local area's competitive position in a given industry. It is generally observed that some regions and some industries grow faster than others, even during periods of growth. This is usually attributed to some local comparative advantage such as natural resources, linked industries, or favorable local labor situations. The regional share component can help identifying a local area's economic strengths and point to industries that enjoy local comparative advantage. It cannot, however, identify what the actual comparative advantage is (Barff et al., 1988; Dinc, 2002; Elburz et al., 2012).

However Knudsen (2000) states that "traditionally, shift-share analysis has utilized accounting identities, but the shift-share problem also can be thought of as partitioning of variation in a three dimensional contingency table having the dimensions industrial sector, spatial unit, and year. As such, shift-share analysis is a special case of a very general set of descriptive statistical models of aggregate tabular data that play a central role in the analysis of geographic and regional issues".

Calculation

As stated above, the shift-share analysis divides the change in local economy into three components. The employment numbers have been used as the variable to examine the economic change in the region.

The formulas for computing three different shift share components can be written as:

$$e_{i,t} \equiv e_{i,t-1} + (NS_i + IM_i + RS_i)$$

$$\Delta e_i \equiv e_{i,t} - e_{i,t-1} \equiv NS_i + IM_i + RS_i$$

National Share $NS_i \equiv e_{i,t-1} (E_t / E_{t-1} - 1)$

Industrial Mix $IM_i \equiv e_{i,t-1} (E_{i,t} / E_{i,t-1} - E_t / E_{t-1} - 1)$

Regional Share $RS_i \equiv e_{i,t-1} (e_{i,t} / e_{i,t-1} - E_{i,t} / E_{i,t-1})$

e_i = regional employment in ith sector	E = national total employment
E_i = national employment in ith sector	t-1= initial year of period
E = regional total employment	t = finish year of period

It is assumed that the base year is identical in all of the above variables.

4.2. Defining Specialized Regions in Automotive Industry in Europe and Turkey

In this research, to measure the economic performance of regions to understand their regional economic resilience capacity, location quotient method has been used. During the analyzing process one of the main question was what will be the reference area in analyzing process. Due to free-moving policy in European Union, labor force is free to choose their place to live and work, people, living in European Union (except Turkey), have more possibility to work in different countries. This leads the method to the question; European Union countries should be taken as a whole reference area, or every country should be taken as individual. To get rid of this problem during the analyzing process two possibilities have been taken into account.

In first step, automotive industry data of regions are calculated in location quotient equation according to countries, which regions belong. In second step, same regions have been measured in location quotient again, but this time reference area have been taken European Union borders (EU-27). After two-location quotient analyses, results have been cross-examined with Basic Sector equation for both national scale and whole European Union scale. The results have been mapped in according to standard deviation of analysis results.

To introduce the methodology of this research different economic base analysis techniques would be mentioned generally. First of all, it has been identified two key decisions that need to be made at the beginning of this analytical process.

1) Identifying Study area: It is important to note that the "local economy" means different things to different people. To define the size of local economy is rather difficult to underestimate. In order to define study area, different definition of region could be used. In this research, common definition of NUTS 2 (The Nomenclature of Territorial Units for Statistics) has been chosen to achieve defining regions. The NUTS classification is a hierarchical system for dividing up the economic territory of the European Union for the purpose of collection, development and harmonization of EU regional statistics, socio-economic analyses of the regions and framing of EU regional policies

2) Selecting Measurement Units: Economic base analysis usually is undertaken using Employment data. This unit of analysis, the number of jobs, is most common.

However, these same techniques can be used on other economic units like wages and sales and value added. In this research, employment data has been used in economic base analysis.

For analyses, NACE Rev.2 has been chosen. NACE is the European standard classification of productive economic activities. NACE presents the universe of economic activities partitioned in such a way that a NACE code can be associated with a statistical unit carrying them out. NACE consists of a hierarchical structure (as established in the NACE Regulation), the introductory guidelines and the explanatory notes. The structure of NACE is described in the NACE Regulation as follows:

i. a first level identified by an alphabetical code (sections),

ii. a second level identified by a two-digit numerical code (divisions),

iii. a third identified by a three-digit numerical code (groups),

iv. a fourth level identified by a four-digit numerical code (classes).

According to this definition, manufacturing industry is classification under alphabetical code C. Second level of coding includes numerical code 29 for Manufacture of motor vehicles, trailers and semi-trailers. This division includes the manufacture of motor vehicles for transporting passengers or freight. It does not include maintenance and repair of vehicles (European-Commission, 2008).

The findings have been proved that German automotive industry sector has far beyond employment rather than any other regions. After first location quotient analysis, which based on countries, it is difficult to recognize an agglomeration effect or any cluster. In the map, it is easy to notice some specialized regions in every country. On the other hand, second location quotient, which based on whole European Union as reference area, shows agglomeration effect on middle and middle-east Europe. This effect creates a corridor from south Germany through Czech Republic, Hungary and Romania. It is seen that some small agglomeration areas occurs through this corridor; in north Spain, middle Italy and northwest Turkey (**Figure 4.1, Figure 4.2**).

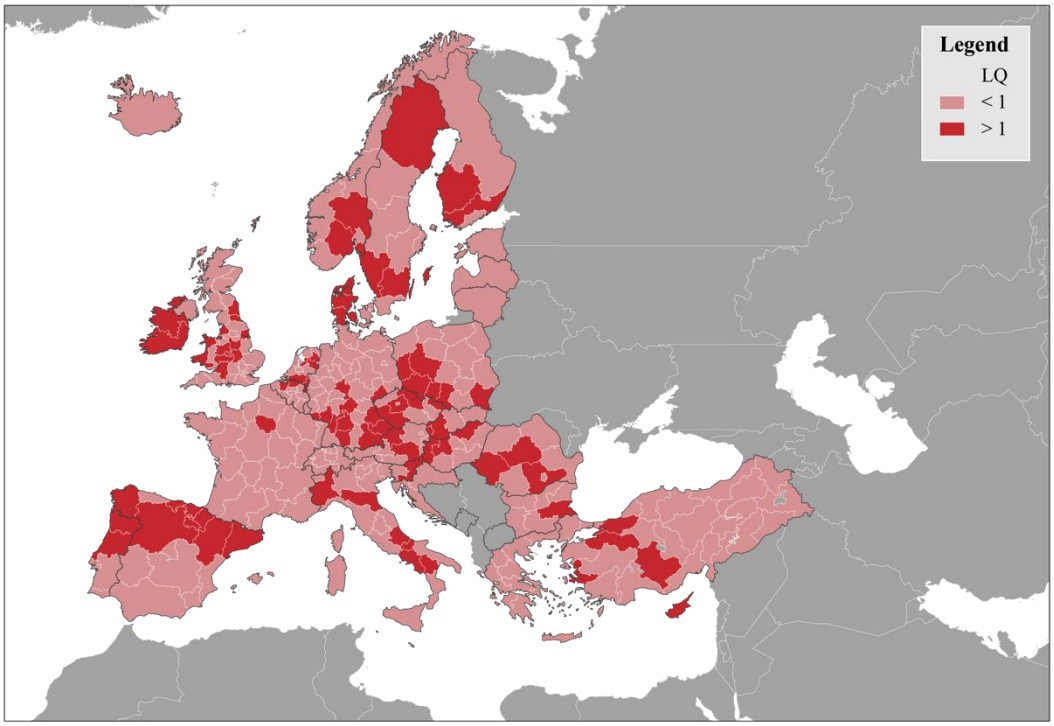

Figure 4.1: Location quotient results of automotive industry at NUTS2 level (ref: national).

To determine the number of Basic sector employment, two Basic Sector analyses have been calculated for both national and European Union level. Results approve first findings after location quotient analyses but they don't show any agglomeration corridor along the middle Europe. Rather proving production corridors, it shows automotive industry poles. Results match through south Germany, Hungary, Czech Republic northwest Turkey and north Spain. The only difference between two Basic Sector analyses is range of results. In first analysis, for national level, it shows wider range of employment rather than European Union level, because of sampling difference. The main reason is the different level of employment numbers. Second analysis, which covers whole European Union, indicates employment number, this leads to different range in results because the multiplier effect of some regions is decreased. In addition, this result shows that taking into account of different reference areas shows and proves each other, but also shows different range of results in same scale.

As the results of location quotient and basic sector employment analysis, 20 highest location quotient and basic sector employment resulted regions have been defined automotive industry specialized regions because of the limited time of this thesis.

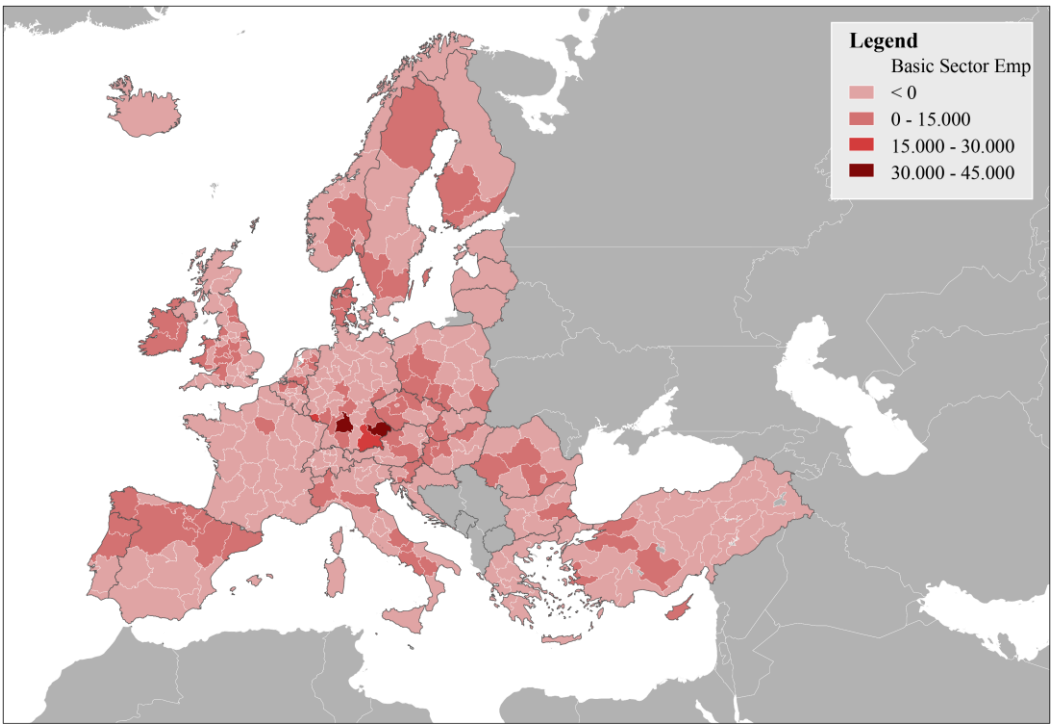

Figure 4.2: Basic sector employment results of automotive industry at NUTS2 level (ref: national).

In selection of regions, countries consist of only one NUTS 2 level region, Cyprus, Iceland, Estonia, Latvia, Lithuania and Luxemburg, have not been considered because the location quotation results would be 1,00 as there is no other region to compare. On the other hand , regions with high location quotient results and low basic sector employment result have not been taken into account in order to compare the regions with same automotive industry structure.

Nine regions from Germany have specialized on automotive industry. They have been located especially in south Germany. These regions, Stuttgart, Nierbayern, Saarland, Oberbayern, Kassel, Karlsruhe, Oberpfalz, Chemnitz, Unterfranken, host major automotive manufacturer like BMW, Mercedes-Benz, Audi and Opel. Not only having headquarters and big factories in Germany, playing a role in global market makes these companies as important players. On the other hand, France does not have the same characteristic like Germany. Locating of automotive companies headquarters in different regions like in Germany does not occur in France. Two of big three French automotive companies, Citroen and Renault, locate in the region of Ile de France, French capital. They have their headquarters in Ile de France, also have major factories around the world (T**able 4.1**).

Table 4.1: Location quotient and basic sector results of automotive industry employment in Europe and Turkey by NUTS2 region.

Region	LQ	BS
DE11	3,44	44.618
DE22	2,84	33.542
DEC0	1,90	16.401
DE21	1,88	16.075
DE73	1,81	14.790
DE12	1,60	11.011
DE23	1,51	9.391
DE26	1,44	8.111
ITF5	5,89	5.907
ES22	5,69	5.129
CZ02	2,19	4.872
TR41	6,92	4.719
RO42	4,14	4.714
ITF2	4,17	3.833
ITC1	3,86	3.451
TR42	4,71	2.955
ITF1	3,19	2.651
HU21	2,94	2.193
SE23	2,54	1.545
CZ08	1,29	1.206

Moreover, Italian major automotive manufacturer Fiat has some Italian and non-Italian minor automotive manufacturer and supplier. According to Fiat's headquarter; Italian automotive industry locates in north Italy and south Italy, Basilicata, Piemonte and Molise. In addition, Stredni Cechy, Czech Republic, is hosting biggest Czech automotive company Skoda. Although Skoda belongs to Volkswagen Group, Skoda was established in Mlada Boleslav, Czech Republic, one of oldest companies that began producing automotives. Moravskoslezsko also has automotive supplier industry in Czech Republic. On the contrary, other regions, Comunidad Foral de Navarra, Spain, Közép-Dunántúl, Hungary, Bursa and Kocaeli, Turkey, Vest, Romania, do not have any special automotive company. Although these regions have low innovation, they have high export numbers. In addition, these regions produce automotive and supply materials for big automotive companies from Europe and Asia (Welfens, 2012).

4.3. Measuring Performance of the Regions By Using Shift-Share Analysis

In order to explore the resilience of the automotive specialized industries, a dynamic shift-share analysis has been applied. A dynamic shift-share analysis gives not only the possibility to investigate the regional growth paths but also the changes through years. The decomposition capacity of shift-share could be obtained valuable information in terms of national effects on a regions, industrial presence and at last but not least regional competition for developing regional goals.

Table 4.2: 2006-2010 employment changes in automotive industry and total in automotive industry specialized regions.

Region	2006 Employment		2010 Employment		Change (%)	
	Automotive Industry	Total	Automotive Industry	Total	Automotive	Total
CZ02	41.069	559.500	37.942	593.800	-8,2%	5,8%
CZ08	12.765	533.200	18.575	538.600	31,3%	1,0%
DE11	154.287	1.901.000	145.162	1.924.800	-6,3%	1,2%
DE12	41.193	1.262.200	45.597	1.298.900	9,7%	2,8%
DE21	92.065	2.075.000	89.721	2.178.800	-2,6%	4,8%
DE22	33.422	579.700	36.831	592.800	9,3%	2,2%
DE23	15.220	518.400	17.685	533.300	13,9%	2,8%
DE26	17.386	620.100	20.244	640.100	14,1%	3,1%
DE73	23.505	539.300	22.181	559.600	-6,0%	3,6%
DEC0	23.709	432.100	18.607	447.600	-27,4%	3,5%
ES22	11.564	284.200	11.908	279.100	2,9%	-1,8%
FR10	54.017	5.051.200	142.423	5.124.400	62,1%	1,4%
HU21	14.746	463.700	21.988	430.800	32,9%	-7,6%
ITC1	64.631	1.820.500	51.228	1.812.500	-26,2%	-0,4%
ITF2	2.661	108.200	3.272	107.000	18,7%	-1,1%
ITF5	7.667	195.000	7.924	183.600	3,2%	-6,2%
RO42	18.068	797.100	42.745	791.200	57,7%	-0,7%
SE23	46.604	885.100	34.065	883.400	-36,8%	-0,2%
TR41	30.594	1.091.500	46.647	1.119.800	34,4%	2,5%
TR42	27.976	844.100	28.913	1.020.300	3,2%	17,3%

Shift-share

First of all, Shift-Share analysis identified total employment change in 20 NUTS 2 regions from 2006 to 2010. Two different scenarios have been applied to see the difference with different trends.

First of all, what if automotive specialized regions in European Union and Turkey have been developed according to European Union's average growth rate. Secondly how would be the development pattern would be formed what if automotive specialized regions in European Union and Turkey have been developed according to their national growth rate.

In table 4.2, where employment changes in automotive industry and total in automotive industry specialized regions between 2006 and 2010 have been shown, there are considerable differences between automotive employment change and total employment change. Some regions seem that they could have survived the effect of the crisis; some of them could have not. However, none of them could have match their automotive industry employment growth change with their total employment change. All German regions have positive total employment at the end of period although some have negative automotive industry employment change; some of them positive. In addition, they have similar percentage. Nonetheless, other regions growth or decline in automotive industry employment way different then their total employment change.

In addition, TR42 (Kocaeli), CZ02 (Stredni Cechy) and DE21 (Oberbayern) are the regions with highest employment increment. On the other hand, Hungarian HU21 (Moravskoslezsko) and Italian region ITF5 (Basilicata) have diminishing change in employment. FR 10 and RO42 (Vest) and TR41 (Bursa) have the highest increment in employment in automotive industry, although RO42 has negative employment change in total employment.

4.3.1.1. First scenario

First scenario shows the employment change in automotive industry what if automotive specialized regions in European Union and Turkey have been growing according to European Union's average growth rate.

Table 4.3 shows that regional shift ratio of the regions is the main factor in increasing and decreasing employment. Most of the German regions DE11 (Stuttgart), DE21 (Oberbayern), and Italian region ITC1 (Piemonte) have high positive Industrial Mix component, which can be interpreted that fast growing

sectors have located in these regions. On the other hand, the regions with high Industrial Mix component have negative Regional Shift component.

Table 4.3: First scenario - 2006-2010 shift-share results of automotive-industry-specialized regions.

Region	National Share	Industrial Mix	Regional Shift	Total Shift
CZ02	505	2.583	-6.215	-3.127
CZ08	73	1.077	4.661	5.810
DE11	2.270	9.876	-21.270	-9.125
DE12	450	2.517	1.437	4.404
DE21	1.373	6.026	-9.743	-2.344
DE22	433	2.241	735	3.409
DE23	155	966	1.344	2.465
DE26	220	1.227	1.410	2.858
DE73	315	1.530	-3.169	-1.324
DEC0	285	1.491	-6.877	-5.102
ES22	141	777	-574	344
FR10	667	3.412	84.327	88.406
HU21	66	1.380	5.796	7.242
ITC1	922	3.987	-18.313	-13.403
ITF2	63	326	222	611
ITF5	94	527	-364	257
RO42	1	1.779	22.899	24.679
SE23	616	2.665	-15.820	-12.539
TR41	278	2.732	13.044	16.053
TR42	348	2.084	-1.495	937

FR10 (Ile de France), RO42 (Vest), TR41 (Bursa) have high Regional Shift component, which means their competitive advantages are higher than other regions. In addition, RO42 and TR41 have highest national share.

One of the results of shift-share analysis, National Share, which means EU level, reflects the possibility how regional employment could have changed if it would have had same trend like national economy. National Share results of automotive-industry-specialized regions can be seen in Table 4.4. First of all, the very first trace of a pending crisis could be seen before crisis period. In addition, in period 2006-2008 industry has a downward trend.

National share also shows a small amount of effect of governmental policies on employment change. National share in this period is still negative but it has a

decrease. In addition, high positive national shift compensates the negative numbers of last two periods and makes them positive in total.

Table 4.4: 2006-2010 National Shift results of automotive-industry-specialized regions.

Region	2006-2007	2007-2008	2008-2009	2009-2010
CZ02	757	466	-665	-52
CZ08	235	175	-312	-25
DE11	2.842	1.755	-2.152	-176
DE12	759	477	-732	-54
DE21	1.696	1.065	-1.283	-105
DE22	616	389	-529	-43
DE23	280	169	-273	-22
DE26	320	209	-286	-24
DE73	433	275	-364	-29
DEC0	437	266	-387	-31
ES22	213	130	-186	-16
FR10	No Data	No Data	No Data	No Data
HU21	272	236	-412	-30
ITC1	1.191	757	-954	-71
ITF2	49	32	-13	-4
ITF5	141	90	-127	-10
RO42	333	219	-503	-50
SE23	859	508	-697	-53
TR41	564	453	-686	-53
TR42	515	348	-477	-40

Automotive-industry-specialized regions have a different pattern in Industrial Mix then national share. As seen in table 4.5, regions had negative growth rate in automotive industry first period, although they have all positive in next period. With the beginning of crisis all regions hit the bottom in automotive industry. After crisis (the period of 2009-2010) automotive sector starts to grow again.

Most important component of the Shift-Share analysis for regional economic resilience is Regional Shift (**Table 4.6**). Regional shift is the part of change attributable to regional advantage or competitiveness. The regional share component measures the differential shift due to differences in rates of growth of the same industry between the region and the nation as a result of factors such as national resources, other comparative advantages or disadvantages, leadership and entrepreneurial ability, and the effects of regional policy. The regional share

component can help identifying a local area's economic strengths and competitive advantage.

Table 4.5: 2006-2010 Industrial Mix results of automotive-industry-specialized regions.

Region	2006-2007	2007-2008	2008-2009	2009-2010
CZ02	-1.093	3.422	-2.156	2.410
CZ08	-340	1.282	-1.012	1.146
DE11	-4.105	12.888	-6.974	8.067
DE12	-1.096	3.503	-2.371	2.482
DE21	-2.450	7.825	-4.160	4.809
DE22	-889	2.860	-1.714	1.985
DE23	-405	1.245	-886	1.012
DE26	-463	1.536	-926	1.080
DE73	-625	2.016	-1.180	1.320
DEC0	-631	1.956	-1.256	1.421
ES22	-308	955	-604	734
FR10	No Data	No Data	No Data	No Data
HU21	-392	1.734	-1.335	1.373
ITC1	-1.720	5.559	-3.093	3.241
ITF2	-71	232	-42	207
ITF5	-204	663	-413	481
RO42	-481	1.610	-1.631	2.280
SE23	-1.240	3.732	-2.260	2.434
TR41	-814	3.326	-2.222	2.442
TR42	-744	2.559	-1.545	1.814

First of all, Turkish region TR 41 (Bursa), Romanian region RO42 (Vest) and French region FR10 (Ile de France) have highest competitive advantages. Romanian region RO42 could manage to keep its competitive advantage through crisis period. Although Turkish regions TR 41 (Bursa) and TR42 (Kocaeli) have positive Regional Shift just before crisis, they could not have kept it. Italian regions' regional shift deceases before and after crisis. German regions have an unsteady pattern through crisis. Half of them (DE11, DE21, DE73 and DEC0) lose their competitive advantages in automotive industry before the crisis. Recovery period for German regions means increment of competitive advantages and they are least affected regions from the crisis. Czech region CZ02 and Spanish region ES22 have an

unstable regional shift until fourth period. During after crisis period these two regions could not manage to recover their competitiveness to before crisis period.

Table 4.6: 2006-2010 Regional Shift results of automotive-industry-specialized regions.

Region	2006-2007	2007-2008	2008-2009	2009-2010
CZ02	-204	-2.643	-386	-2.982
CZ08	2.527	2.964	54	-885
DE11	-378	-32.143	3.081	8.170
DE12	632	486	-3.132	3.450
DE21	1.376	-20.967	1.798	8.050
DE22	726	-3.899	779	3.130
DE23	-352	1.006	189	502
DE26	951	-1.998	548	1.910
DE73	566	-3.297	-205	-234
DEC0	-342	-1.064	44	-5.516
ES22	-161	-696	833	-550
FR10	No Data	No Data	No Data	No Data
HU21	5.908	3.362	-2.140	-1.333
ITC1	1.738	-12.209	-4.025	-3.817
ITF2	108	-2.203	2.552	-235
ITF5	254	-608	234	-245
RO42	1.155	10.709	7.013	4.022
SE23	-2.024	-4.638	-1.897	-7.262
TR41	9.048	-111	-1.076	5.182
TR42	2.565	-3.281	1.116	-1.895

Elburz et al. (2012) classified Industrial Mix and Regional Shift components in four different zones:

First zone - Industrial mix and regional shift are both positive: region has initially fast growing sectors and their share has been increased.

Second zone - Industrial mix is negative and regional shift is positive: region has initially slow growing sectors but their share has been decreased.

Third zone - Industrial mix and regional shift are both negative: region has initially slow growing sectors and their share has been increased.

Fourth zone - Industrial mix is positive and regional shift is negative: region has initially fast growing sectors but their share has been decreased.

According to this classification, results of industrial mix and regional shift components have been shown in figure 4.3. All of the regions have clustered in first and fourth zones. Common point of those regions is that they have fast growing automotive industries.

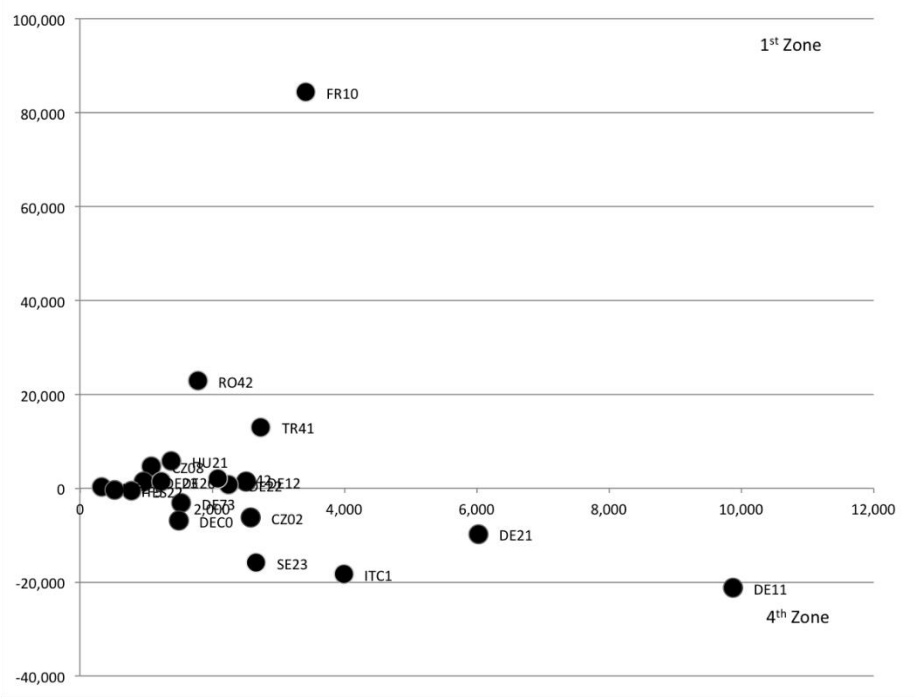

Figure 4.3: Industrial Mix and Regional Shift component zones for total employment change for the first scenario.

When the regional shift and total shift results are assumed as prepared (regional shifts) and performed resilience (total shift), the distribution of the regions has been shown on figure 4.4. DE11, ITC1 and SE23 could not have surprisingly shown good performances hence their preparation resilience is lower than other regions. FR10, RO42 and TR41 have remarkable results and “Intentional Resilience”, positive preparation and performance resilience. They both performed and preparation resilience is quite high.

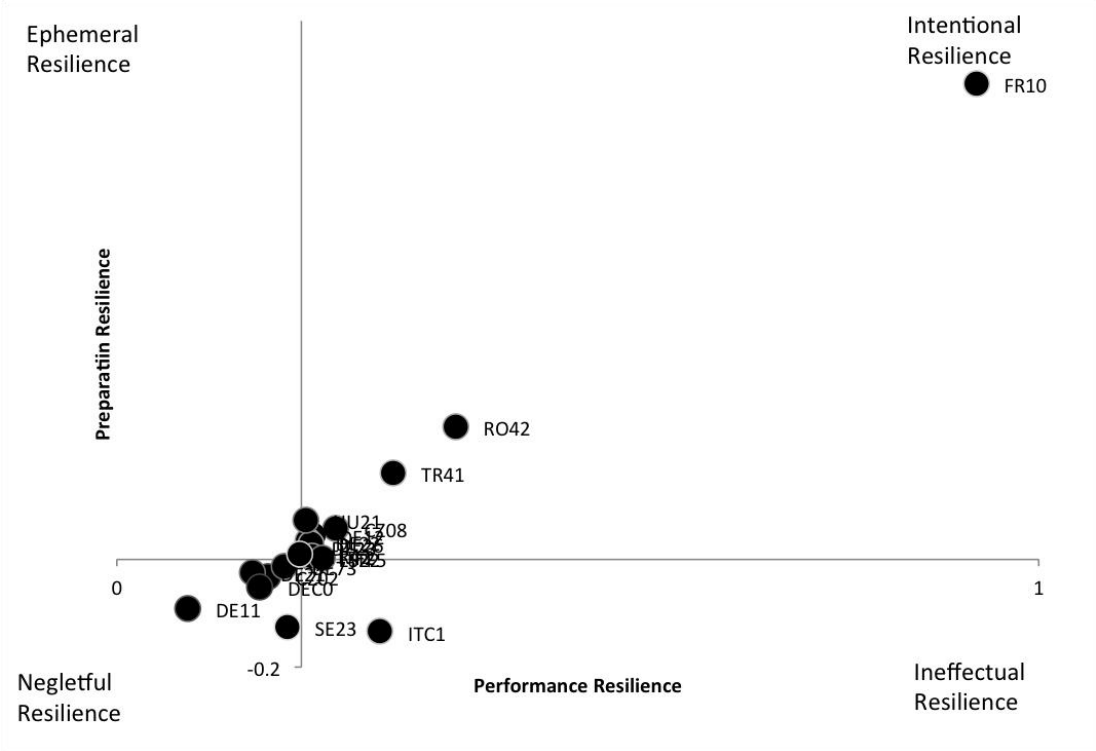

Figure 4.4: Preparation and performed resilience of automotive-industry-specialized regions for the first scenario.

4.3.1.2. Second scenario

In the second scenario shift-share analysis has been calculated according to regions own national data of employment change in automotive industry in to show what if automotive specialized regions in European Union and Turkey have been developed according to regions own national growth rate.

In second scenario all three components are different than first scenario (**Table 4.7**). The effect of positive national share cannot be seen in Spanish region, Hungarian region and Romanian region and Italian regions, which means Spain, Hungary, Romania and Italy, have negative national growth rate. In addition, these regions' industrial mix components are positive, which means they have growing automotive industry during analysis period, except Spanish region ES22, however, most of the regions have slow growing automotive industry sector during analysis period, reason is that automotive industry is a slow growing industry in some countries. German regions do not show same pattern. This is the main difference between first and second scenario; automotive industry is mostly a slow growing sector if national data is referenced. On the other hand automotive industry is successful and fast growing sector in European Union, if its data is referenced.

Table 4.7: Second scenario 2006-2010 shift-share results of automotive-industry-specialized regions.

Region	National Share	Industrial Mix	Regional Shift	Total Shift
CZ02	369	2.009	-5.504	-3.127
CZ08	-9	254	5.565	5.810
DE11	5.848	3.495	-18.468	-9.125
DE12	1.583	1.133	1.688	4.404
DE21	3.511	2.040	-7.895	-2.344
DE22	1.294	1.053	1.061	3.409
DE23	587	628	1.250	2.465
DE26	685	604	1.570	2.858
DE73	904	600	-2.828	-1.324
DEC0	906	756	-6.765	-5.102
ES22	-11.871	10.711	1.504	344
FR10	1.227	-22.648	109.827	88.406
HU21	-951	7.546	647	7.242
ITC1	-167	-26.078	12.842	-13.403
ITF2	11	-1.068	1.668	611
ITF5	-44	-3.169	3.470	257
RO42	-108	-336	25.121	24.677
SE23	594	-10.833	-2.301	-12.539
TR41	3.920	-2.811	14.944	16.053
TR42	3.015	-1.740	-339	937

In addition, FR10 (in the center of Europe), RO42 and TR41 (cheaper work force than European Union level), and ITC1 (producing for significant brands, which have high market share) have competitive advantages among all other regions. This result is same like in the first scenario. All other regional shift results of shift-share analysis for those regions are close to each other.

The results of second scenario for national shift are shown same pattern in table 4.8, during crisis national effect on regional automotive industry shows negative employment. This decrease does not sustain during and after crisis period in Turkey. Spanish region ES22 and Hungarian region HU21 have both negative national shares during analyse period. Italian regions and Czech regions also have negative national shift after crisis period although rest of the regions do have positive national share after crisis. This is a sum up and indicator of national policies in different countries. Turkey and Germany are affected least according to the national shift numbers.

In table 4.9 it can be seen the Industrial Mix component of shift-share analysis. The

Table 4.8: 2006-2010 National Shift results of automotive-industry-specialized regions.

Region	2006-2007	2007-2008	2008-2009	2009-2010
CZ02	745	648	-646	-378
CZ08	232	243	-303	-180
DE11	3.219	2.062	-337	905
DE12	859	560	-115	278
DE21	1.921	1.252	-201	539
DE22	697	458	-83	223
DE23	318	199	-43	113
DE26	363	246	-45	121
DE73	490	323	-57	148
DEC0	495	313	-61	159
ES22	377	-11.227	-782	-238
FR10	No Data	No Data	No Data	No Data
HU21	-34	-252	-659	-6
ITC1	651	473	-939	-352
ITF2	27	20	-13	-22
ITF5	77	57	-125	-52
RO42	10	86	-276	72
SE23	1.086	402	-998	105
TR41	514	808	134	2.464
TR42	470	622	93	1.831

main difference between two scenarios is: in the second scenario sector starts to grow slower earlier. Automotive industry sector in CZ02, TR41 and TR42 do not suffer from same situation. With the end of the crisis automotive industry sector starts to grow again in the regions specialized about it, although Turkish regions TR41 and TR42, and Swedish region Västsverige (SE23) keep suffering from slow growing.

In addition, automobile industry has grown faster again after economic crisis. Although it has fast growing rate after crisis, the growth numbers do not compensate the decrease during the crisis period. This might be the result of fast growing service sector in Europe. Another possibility of this result might be the fact of decentralization of industry from Europe. These two facts are related in fact and even in the fast growing automotive industry specialized regions in Europe are focusing on designing, administrative and management functions of automotive industry.

The results of Regional Shift for the second scenario can be seen in table 4.10. The equation of Regional Shift is not highly depended on national account. As a result,

Table 4.9: 2006-2010 Industrial Mix results of automotive-industry-specialized regions.

Region	2006-2007	2007-2008	2008-2009	2009-2010
CZ02	2.149	3.747	-5.002	1.115
CZ08	668	1.404	-2.348	530
DE11	-3.618	-3.565	-6.717	17.394
DE12	-966	-969	-2.284	5.351
DE21	-2.159	-2.164	-4.007	10.370
DE22	-784	-791	-1.651	4.279
DE23	-357	-344	-853	2.182
DE26	-408	-425	-892	2.328
DE73	-551	-558	-1.137	2.846
DEC0	-556	-541	-1.209	3.063
ES22	-593	11.961	-527	-130
FR10	No Data	No Data	No Data	No Data
HU21	2.860	8.065	-3.821	442
ITC1	1.401	-24.752	-1.607	-1.121
ITF2	58	-1.033	-22	-71
ITF5	166	-2.954	-215	-166
RO42	213	-1.919	-970	2.340
SE23	-1.360	-1.287	-4.976	-3.210
TR41	984	104	-3.710	-188
TR42	900	80	-2.579	-140

outputs of two different scenarios are different in range, which means the results of second scenario are positive or negative like in first scenario, but the numbers are different. One and only difference between them is ITC1 has a positive advantage in second period, years between 2007 and 2008. In addition, these small differences mean a lot for regions in national perspective. It clarifies national pattern of automotive specialized regions competitive advantages within their countries.

Moreover, the difference between two scenarios in regional shift components reflects countries competitive advantages against each other in Europe and Turkey. The competitive advantages in second scenario between regions and also between countries is closer to each other than first scenario, which means competition between countries is lower in reality. This result also support the assumption of low automotive industry employment increase in core countries like Germany, France and Italy.

Table 4.10: 2006-2010 Regional Shift results of automotive-industry-specialized regions.

Region	2006-2007	2007-2008	2008-2009	2009-2010
CZ02	-3.434	-3.149	2.441	-1.362
CZ08	1.523	2.774	1.381	-115
DE11	-1.242	-15.997	1.009	-2.238
DE12	402	4.874	-3.836	248
DE21	860	-11.163	563	1.846
DE22	538	-317	270	569
DE23	-438	2.565	-74	-803
DE26	854	-74	272	517
DE73	435	-771	-555	-1.937
DEC0	-475	1.387	-329	-7.348
ES22	-39	-345	1.352	536
FR10	No Data	No Data	No Data	No Data
HU21	2.961	-2.481	592	-425
ITC1	-843	18.385	-5.527	827
ITF2	2	-926	2.531	61
ITF5	-52	3.044	34	445
RO42	784	14.372	6.124	3.841
SE23	-2.131	487	1.119	-1.776
TR41	7.300	2.757	-408	5.296
TR42	966	-1.074	1.580	-1.811

Figure 4.5 shows us results of industrial mix and regional shift components. Most of the regions have close results in this zoning, although they are located in different zones, however, FR10 and ITC1 show quite different performance than rest of the

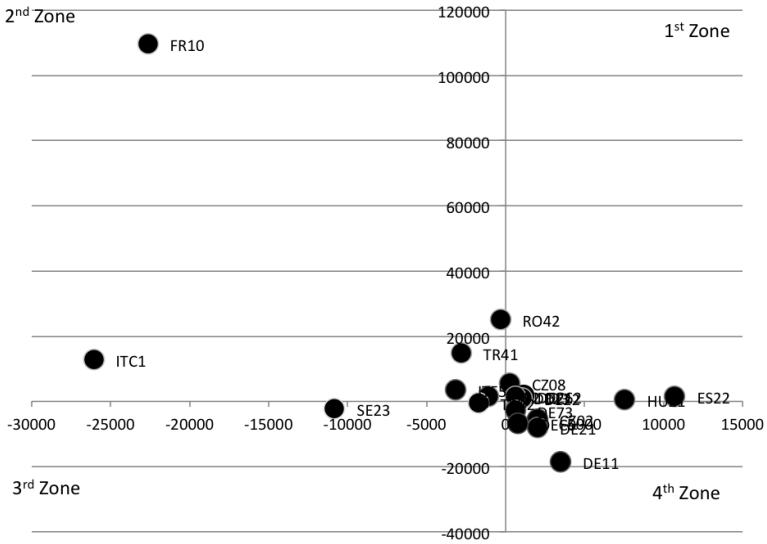

Figure 4.5: Industrial Mix and Regional Shift component zones for total employment change for the second scenario.

regions because of its service sector share. These two regions have really slow growing automotive industry, nevertheless they have high regional shift (competitiveness advantage). In addition, these two regions have shown same performance in first scenario.

For the second scenario, Foster's diagram shows the position of the regions according to preparation and performed resilience in figure 4.6. DE11 and SE23 could not have shown well performance and do not have well preparation. ITC1 could not have shown good performance although it has remarkably good preparation. Like in the first scenario FR10, RO42 and TR41 have shown good performance and they have good preparation resilience.

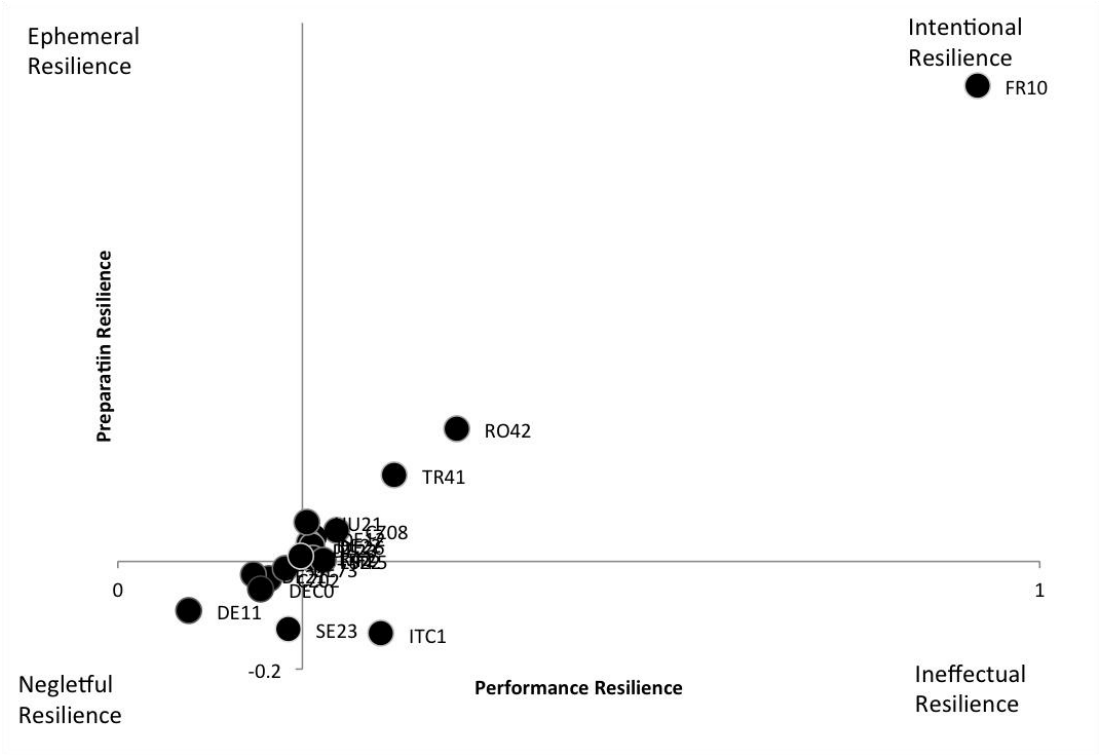

Figure 4.6: Preparation and performed resilience of automotive-industry-specialized regions for the second scenario.

To sum up, two different scenarios give quite different results than each other. In second scenario, national growth rates affect national share and give ideas about national economies. In addition, industrial mix structure describes a slow growing industry in all countries in second scenario although in first scenario it has an unsteady pattern. Regional shift numbers are different in each scenario and it has been explained in next section to understand the components of regional structure, which builds regional economic resilience, because the limited capacity of shift-share

explaining the positive or negative competitiveness. These explanatory indicators will show the background details of regions' performances and competitive advantages.

5. EVALUATION OF THE ECONOMIC RESILIENCE PERFORMANCE

Shift-share analyses for automotive specialized industry regions showed their performances; however, it is not adequate to explain resilience. In literature to explain the background of resilience performance some indicators have been used. These indicators create the basis of the economic structure, therefore kind of essential elements for resilience.

Scientists have taken different indicators as in previous chapter mentioned. The indicators, which have been taken into account, and their relations, as mentioned in the literature, have been shown in the diagram below (**Figure 5.1**).

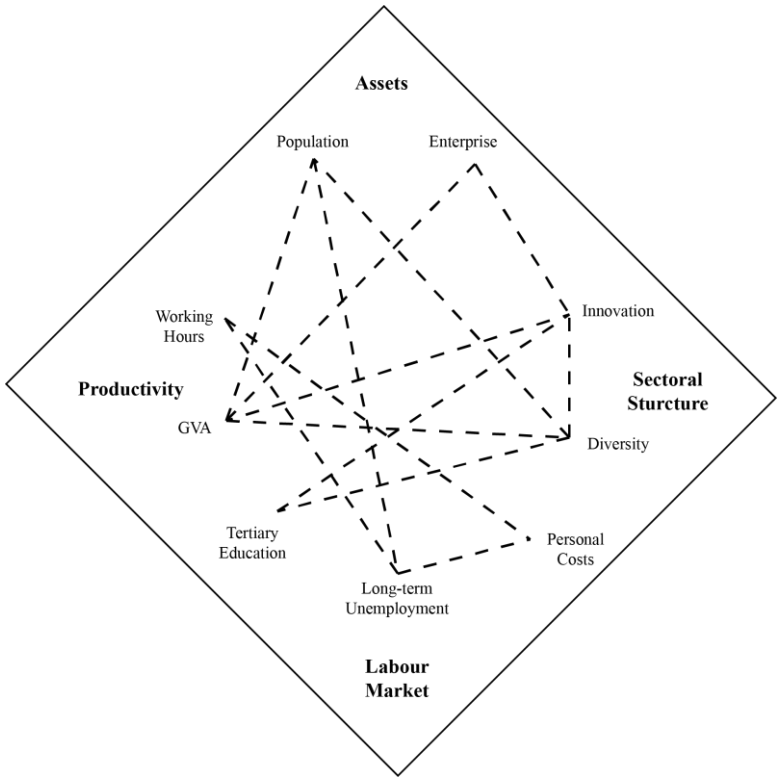

Figure 5.1: Resilience components' relations' matrix.

Resilience Components' Relations' Matrix has been generated with the indicators from the literature. According to this diagram different aspects of resilience have been grouped and analyzed.

5.1. Assets

An asset is anything tangible or intangible that is capable to produce value and that is held to have an economic value. An asset could be physical or nonphysical. It could be building or equipment as well as copyrights or patents. In this section, population and enterprise accounts have been taken as a key feature for economic resilience.

5.1.1. Population

Large population, as a good consumption and production source, could be an asset when all the people are educated, majority having jobs, have propensity to spend and consume goods, majority have proper shelter, water, electricity, infrastructure and majority are taxpayers. Unfortunately this is not the reality. Nevertheless large population cannot reach enough resources. Population has been assumed that it creates jobs and growth, economic incentives and investments.

Classic economy claims that demographic changes affect macroeconomic dynamics directly or indirectly. Bakshi et al. (1994) state that it is a key factor to identify population age structure to understand the capital markets. Different age groups demands and supplies to the economy are different then each other. While young age group creates supply to labor market, as mostly considered as a window of opportunity, older people create demand for financial support and health investment.

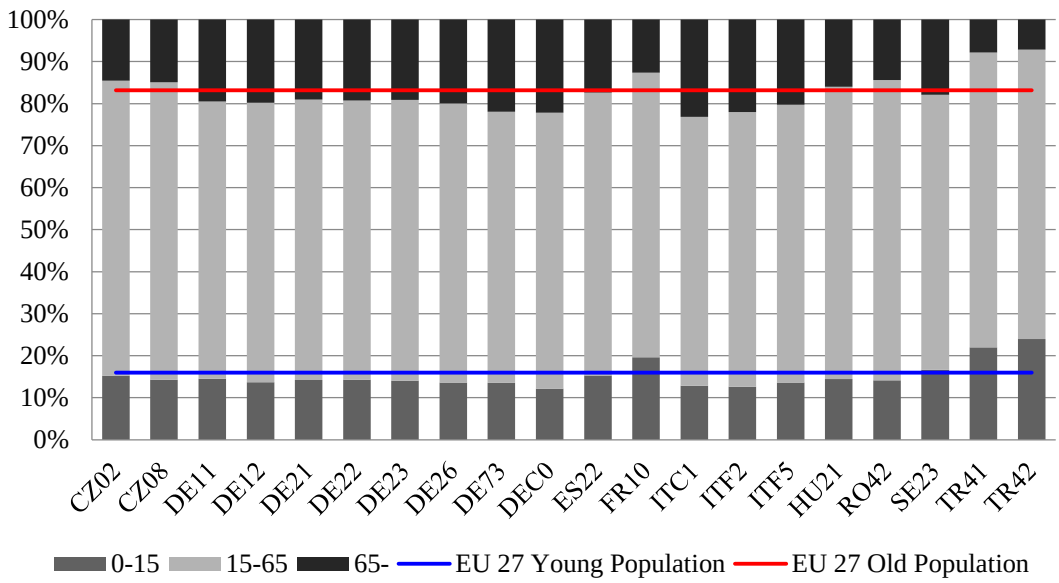

Figure 5.2: 2010 age structure (Eurostat, 2014e).

In figure 5.2, age structure of automotive industry specialized regions in 2010 can be seen. While European Union member states' regions have same structure, Turkish regions have more population. This generates more economically active population. This structure is same in year 2006.

As mention above, population has been assumed that it creates jobs and growth. On the other hand, it might be a problem, when there is not enough job opportunities. In figure 5.3, total population and growth rate of regions have been shown. German regions and Italian regions have negative population growth while Spanish and French regions have positive. Different regions in same countries also have different pattern, this might be a result of within countries' regional disparities. FR10 has the highest population, (almost 12 million people) and it has fourth high population growth rate. However, Turkish region TR42 Kocaeli has highest population growth rate 8,9% and TR41 Bursa has the second highest growth rate 7,9%. This fact is one of the reasons that Turkish regions have higher young population ratio.

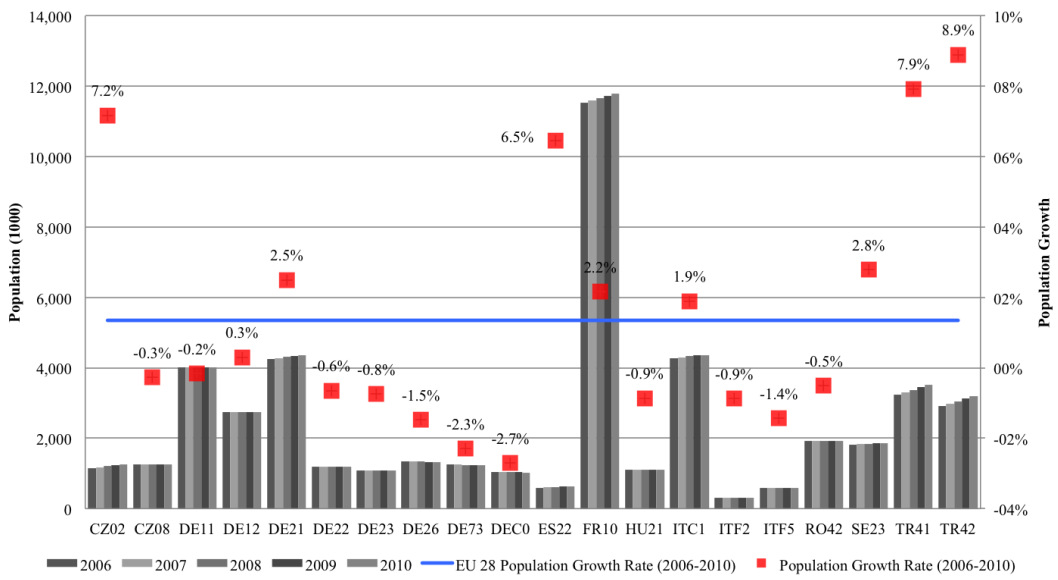

Figure 5.3: Population change and population growth rate (Eurostat, 2014e).

5.1.2. Enterprise

A business, which is involved in production or trade or services, is the key factor of the economy. It creates employment, production, export, import and management of all this chain. New formation of enterprises could a hint of an active economy. Oguz et al. (2010) state "new enterprises can bring innovative processes and technologies to the market, forcing existing ones to improve their productivity in order to remain competitive. A relatively large proportion of enterprises joining and leaving the stock

can be seen as desirable, as new enterprises entering the market are considered to bring innovative processes and technologies that drive up productivity and force unproductive enterprises to leave the market".

Analyzing number of enterprises might give an idea of an active economy; however, without birth and death number of enterprises and survival time of enterprises it is difficult to show a clear image. Unfortunately, these accounts of automotive industry specialized regions are not accessible and not added to the account.

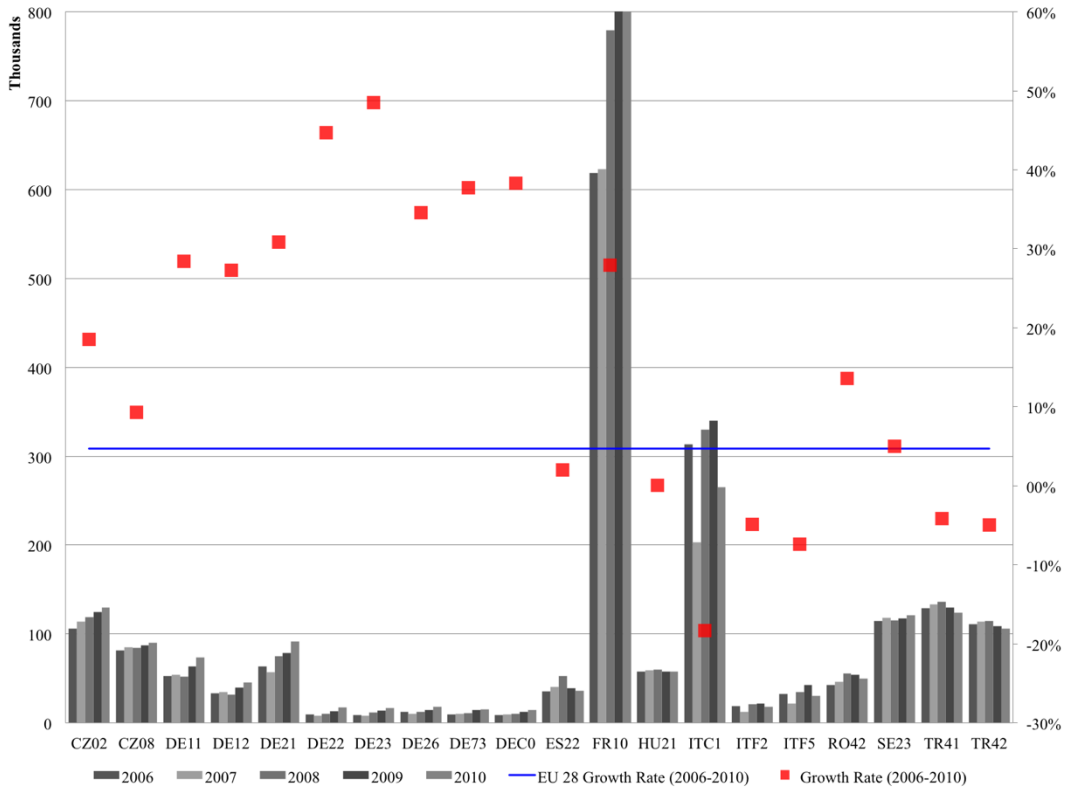

Figure 5.4: Enterprise change and enterprise growth rate (Eurostat, 2014e).

On the other hand, total enterprise numbers in the regions in figure 5.4 gives some tips. French region FR10 has the highest enterprise number and remarkably high growth rate, further high enterprise number is related with high regional population of FR10. Although German regions have small numbers of enterprises the growth rate is above average. Czech regions and Romanian RO42 have higher number of enterprises and also have positive growth rate. On the other hand, Turkish regions have similar amount of enterprises, but there is a declining trend. Italian regions have small numbers like German regions however, negative growth rates.

5.2. Productivity

To compare regional resilience in terms of productivity, gross value added per person, gross value added total and working hours are the preferred indicators. These aspects of productivity refer to the qualitative dimensions of labor output.

5.2.1. Gross value added

Gross Value Added (GVA) is the value of goods or services produced in an economy. Generally GVA plus the taxes on products, minus the subsidies on products gives the GDP. But in this study neither the taxes nor the subsidies is taken into consideration. OECD (2001) states gross value added is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector; gross value added is the source from which the primary incomes of the GVA are generated and is therefore carried forward into the primary distribution of income account.

GVA per person is calculated as the simple ratio of the economic activity in a region divided by the number of people living in a region, while productivity is defined as the ratio of GVA divided by the labor input used to create it. GVA per head does not take account of:

- People commuting in and out of regions to work
- Residents who are not directly contributing to GVA, such as young people or pensioners
- Different labor situation, such as full- and part- time working arrangements
- Therefore, GVA per hour worked or GVA per filled job are more appropriate productivity indicators (Oguz et al., 2010).

As seen GVA per person levels of regions in figure 5.5, FR10 has the highest GVA per person level although its growth rate is not so high, however, the increment is higher than other regions. German regions have relatively average numbers like EU 27 levels and they have relatively lower GVA growth rates. Turkish region TR41 has highest GVA growth rate nevertheless it has lower GVA per person than EU27 level. Other Turkish region TR42 (Kocaeli) has same structure but it has lower growth rate than TR41 (Bursa). Romanian region RO42 and Czech regions CZ02 and CZ08 have lower GVA per person numbers than EU level, like Turkish regions, in addition they also have higher growth rates than EU average. Thus, we can observe that relatively

less developed regions are growing faster than rich ones with regarding to the productivity.

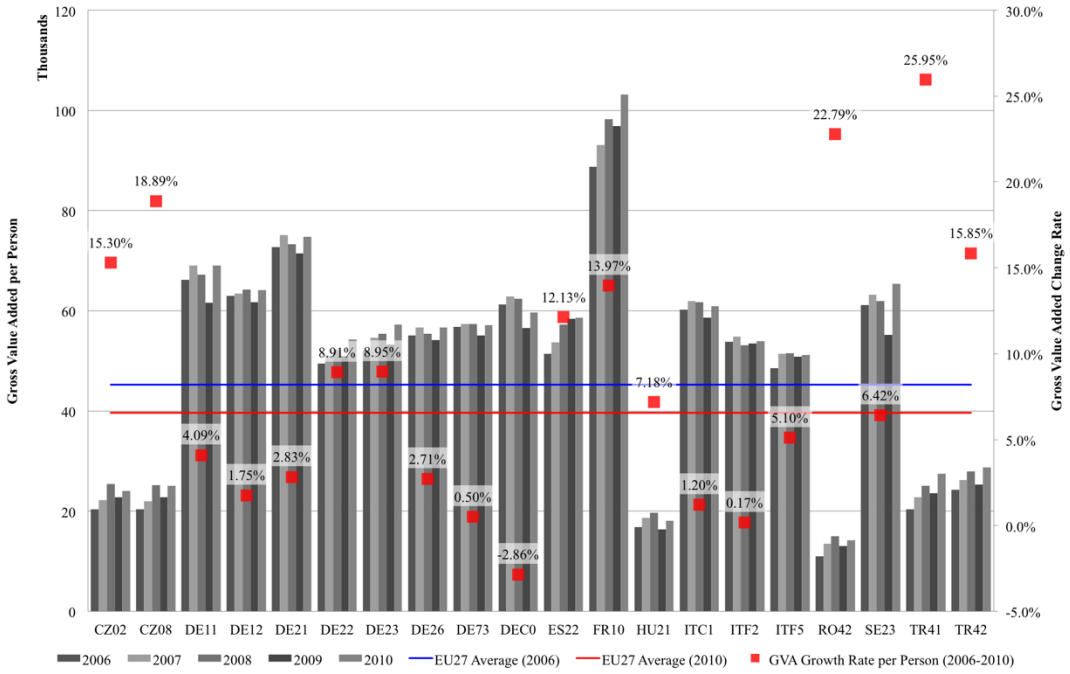

Figure 5.5: Gross value added per person and growth change.

Furthermore, GVA shows (in **Figure A.2** in appendix) regional capacity of total productivity. It reflects the regional population data more or less since it shows us cumulative number of GVA, produced by total employment in the region. FR10 has the highest GVA total numbers as one of the main metropolitan regions in the EU. However, the total GVA of two Turkish regions TR41 and TR42 are quite low although the populations of these two regions are higher than most of other regions (**Figure 5.4**). Although the high population of the country, output is relatively less compare to population. On the other hand TR41 and TR42 have highest GVA growth rate.

5.2.2. Working hours

Working time is the period of time that an individual spends at paid occupational. Working time may vary from person to person often depending on location, culture, and lifestyle choice, the profitability of the individual's livelihood but most of the time cost of living. The industrial revolution made it possible for a larger segment of the population to work year-round, because this labor was not tied to the season and artificial lightning made it possible to work longer each day, and working time during the year increased significantly.

This increment in working hours and machinery caused maximizing returns. Ambition of maximizing returns increased working hours more. Over the 20th century, work hours declined by almost half, mostly due to rising wages with a supporting role from trade unions, collective bargaining, and legislation. Understanding of negative effect of long working hours on productivity helped shortening working hours. The integration of machinery in production replaced most of the extra working time.

In 21st century, most countries in the developed world have seen average hours worked decrease significantly. Today the average hours worked in total declared employment in Germany with 35 and France with 37,5 hours, Italy with 38, Hungary with 40, Czech Republic with 41 and Turkey with 49 hours. On the other hand, for lowest average weekly work hours is the Netherlands with 30 hours (OECD, 2014).

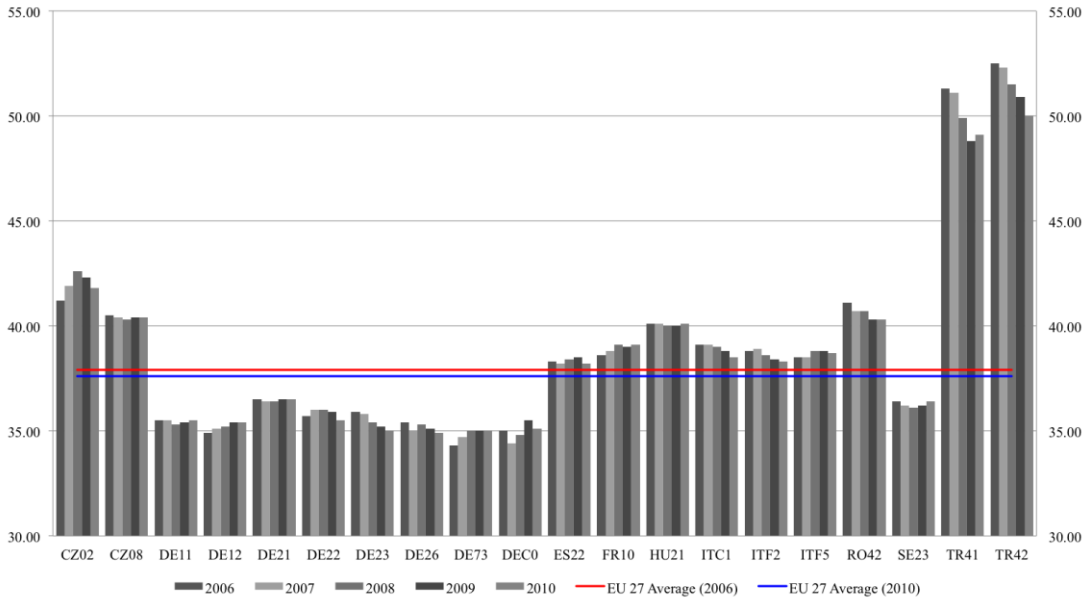

Figure 5.6: Change of weekly working hours in main job (Eurostat, 2014a).

In figure 5.6, the change of weekly working hours in main job is seen. European Union member regions have close numbers and different trends. The average weekly working hours in EU level has decreased from 37,9 to 37,6. However, weekly working hours in Turkish regions TR41 and TR42 are about 50 hours per week level. Comparing GVA per person, GVA total and working hours, it can be said Turkish regions are not very productive although people in these regions work harder.

5.3. Sectorial Structure

In literature, one of the key factors of economic resilience has been defined a diversified economy although it consists of some specialized industries. It is also important to have a flexible structure to reform into new appearance in case of need.

5.3.1. Sectorial Diversity

Hirshman-Herfindahl index is a measure tool to analyze specialization of the economy. To calculate diversification, it is a common measure to inverse of a Hirshman-Herfindahl index. The Herfindahl index of spatial concentration is a measure of absolute concentration. If economic activity in the city under consideration is fully concentrated in a sector, equation gives DI =1, and this index increases as activities in this city become more diverse (Duranton et al., 2000). Diversified economies tend to adapt external shocks more easily (Boschma, 2014; Martin, 2012; Martin et al., 2013). In addition, Porter (2003) claims that higher specialized regions have less innovative powers. He claims lower size of concentration has positive relation with worker wages.

$DIj \equiv 1 / \Delta i \ (Eij / E)2$

Eij = the employment of sector i from the region j

Ej = the total employment of the region j.

The results of inverse Hirshman-Herfindahl Index could be seen in table 5.1. This analysis has been done with major sectors (mining, manufacturing, energy, construction, wholesale, transportation and communication, accommodation, and total business).

FR10, SE23 (Västsverige), DE21 (Oberbayern) have highest diversification level. FR10 (Ile de France), in which the capital of France is located, is diversified, which is the highest in this table in the end of the analyzed period. In addition, almost all the regions increased their diversification levels until the beginning of the external shock, except Czech region CZ08 and Italian regions ITC1, ITF2 and ITF5. In CZ08 region, automotive share employment increase 30% end of analysis period (see 7.15) more than total employment. This is the main reason of decrease in inverse Hirshman-Herfindahl index in CZ08. On the other hand, both total and automotive industry employment in Italian regions decrease (**Table A.4**)

Table 5.1: Inverse Hirshman-Herfindahl index of automotive-industry-specialized regions between 2006-2010.

Region/Time	2006	2007	2008	2009	2010
CZ02	3,805	3,919	3,947	4,222	4,318
CZ08	4,514	4,374	3,999	4,271	4,270
DE11	3,532	3,560	3,847	4,271	4,114
DE12	3,868	3,869	4,299	4,714	4,578
DE21	4,290	4,312	4,723	5,095	5,040
DE22	3,826	3,836	4,019	4,548	4,274
DE23	3,847	3,776	4,012	4,470	4,265
DE26	3,800	3,757	3,980	4,263	4,166
DE73	4,318	4,338	4,468	4,983	4,833
DEC0	4,117	4,057	4,208	4,517	4,421
ES22	4,204	4,392	4,718	4,843	4,805
FR10	4,742	4,682	No Data	No Data	5,162
HU21	3,948	3,894	3,983	4,099	4,138
ITC1	4,424	4,584	5,386	4,945	4,167
ITF2	4,928	5,263	6,271	5,396	4,366
ITF5	5,362	5,345	6,150	5,522	4,551
RO42	3,952	4,077	4,476	4,525	4,336
SE23	4,627	4,727	5,058	5,146	5,264
TR41	3,177	3,221	3,483	3,369	3,312
TR42	3,674	3,618	3,591	3,551	3,737

5.3.2. Innovation

Innovation means generating new ideas. Innovation can be an application of better solutions that meet new requirements, or existing market needs. Innovation, in economics, management and other fields is generally considered as a process that brings new ideas that they have an impact on society. In business and economics, innovation is the catalyst to growth. This kind of resilience depends on existing of innovation in the region and flexibility. In case of crisis, the salvation depends on region' innovative capacity. Martin (2012) mentioned "…resilience is a dynamic process, not just a characteristic or property, and it resonates closely with the Schumpeterian notion of 'gales of creative destruction'". In resilience theory this occurs in a systems, which has complex adaptive organizing behavior. It leads them to rearrange their path, which they will follow.

Innovation is a necessary, although not sufficient, condition for economic success and is therefore recognized as an important driver of productivity. Research and

development (R&D) represents one of the determinants to the innovation process and is defined by the OECD (2006) 'creative work to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to create new applications'. High technology employment ratio represents not directly region' innovation power but innovation capacity. It gives sectors number of person who works in high technology sectors on innovation to increase sectors or firms productivity, which increase regions' value added products (Toner, 2011). Boschma (2014) states "that industrial variety will work better as a shock-absorber when the local industries are skill-related, that is, when industries require similar skills, as this enhances regional labor matching". Porter (2003) states highly concentrated regions have more relation with patent production. Higher innovation brings more advanced products and higher productivity. However, he claims that there is no direct and meaningful relation between high-tech share and employment growth. On the other hand, higher R&D spending does not guarantee "more creativity, higher profit or a greater market share.

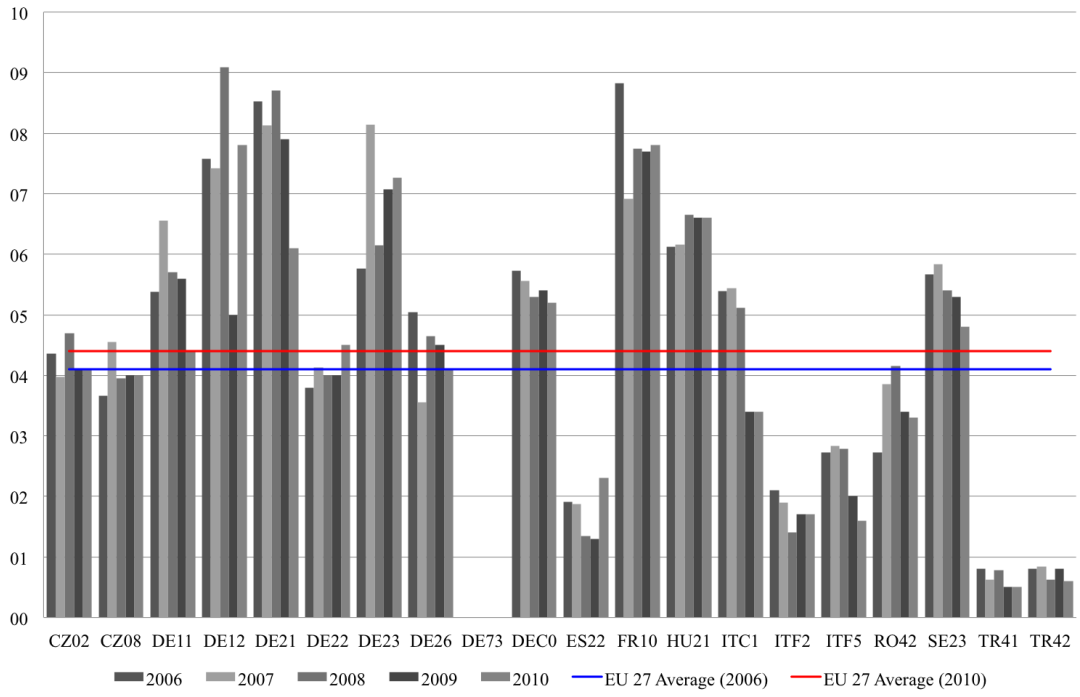

Figure 5.7: Ratio of R&D employment in total employment (Eurostat, 2014b).

R&D employment ratio in total employment, as can be seen in figure 5.7, in automotive industry specialized regions are generally higher than EU27 average. Turkish regions TR41 and TR42 have the lowest R&D employment ratio and it is decreasing. Lower R&D employment is one of the results of low R&D investments

and expenditure. In addition, lower R&D expenditure cause lower innovation capacity. Low innovation capacity is one of results of low GVA per person and total GVA in Turkish regions TR41 and TR42. However, lowest GVA per person productive region RO42 have higher R&D employment ratio than TR41 and TR42, its R&D employment ratio close to the EU27 average. On the other hand, the regions ES22, ITF2 and ITF5 have quite lower levels in R&D employment than EU27 average, but their GVA per person remain same (**Figure 5.4**).

5.4. Labor Market

Human capital is the basis of labor force. The necessity of a well-trained human capital lies behind many economic theories. To reach a high-skilled labor, first human capital must be educated. (Benhabib et al., 1994)

5.4.1. Tertiary Level of Education Rate

Tertiary education is the educational level following the completion of a school providing a secondary education. World-Bank (2014b) defines tertiary education as including universities as well as institutions that teach specific capacities of higher learning such as colleges, technical training institutes, and distance learning centers. Tertiary education includes undergraduate and post-graduate education.

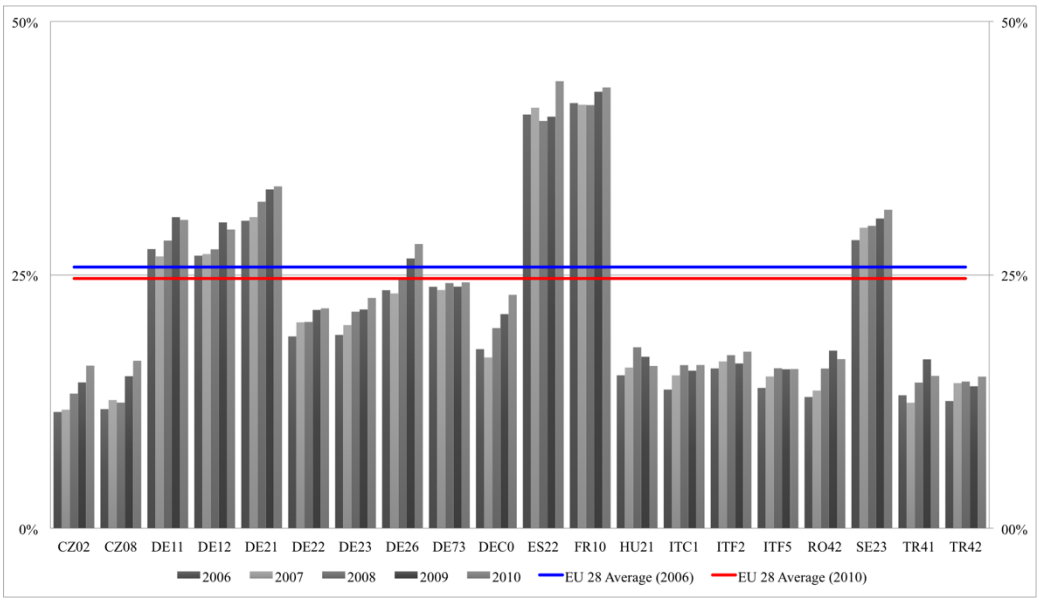

Figure 5.8: Tertiary level of education rate in economically active population (Eurostat, 2014c).

Tertiary education broadly refers to all post-secondary education, including but not limited to universities. Universities are clearly a key part of all tertiary systems that support the production of the higher-order capacity necessary for development. They educate high-skilled personal to labor market who would work and produce advance production. There is concrete connection between universities and industries besides partnerships. Considering R&D and productivity, universities are useful resource as human capital for high-tech sectors rather than low-tech sectors.

Tertiary level of education rate in economically active population of automotive specialized regions can be seen in figure 5.8. German regions DE11, DE12 and DE21, Spanish region ES22, French region FR10 and Swedish region SE23 have higher tertiary level than EU27 average. Their tertiary level is also related to their R&D employment numbers, expect Spanish region ES22. Czech regions CZ02 and CZ08 and Turkish regions TR41 and TR42 have relatively lower tertiary levels than other automotive specialized and EU level but all regions are increasing their tertiary level rate.

5.4.2. Personal costs

Personnel costs are defined as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during the reference period. Personnel costs also include taxes and employees' social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions (OECD, 2001).

The sum of all wages paid to employees, as well as the cost of employee benefits and payroll taxes paid by an employer. Many pension schemes are based on wage levels and dynamics. Firms pay wages to employees usually depending on working time and/or on results. Individual wage often depends on occupied position in the organization as well as on education, cumulated experience and seniority. The unemployed may be created by a much lower wage expectation than the employees and they are prone to more flexible working conditions, but they lack competence and are often characterized by lower productivity. It might increase the cost on governments' shoulders.

High-skilled labor force creates more productivity and outcomes. Therefore the wages and cost of high skilled staffs are higher. The personal costs of a high innovative region would be higher.

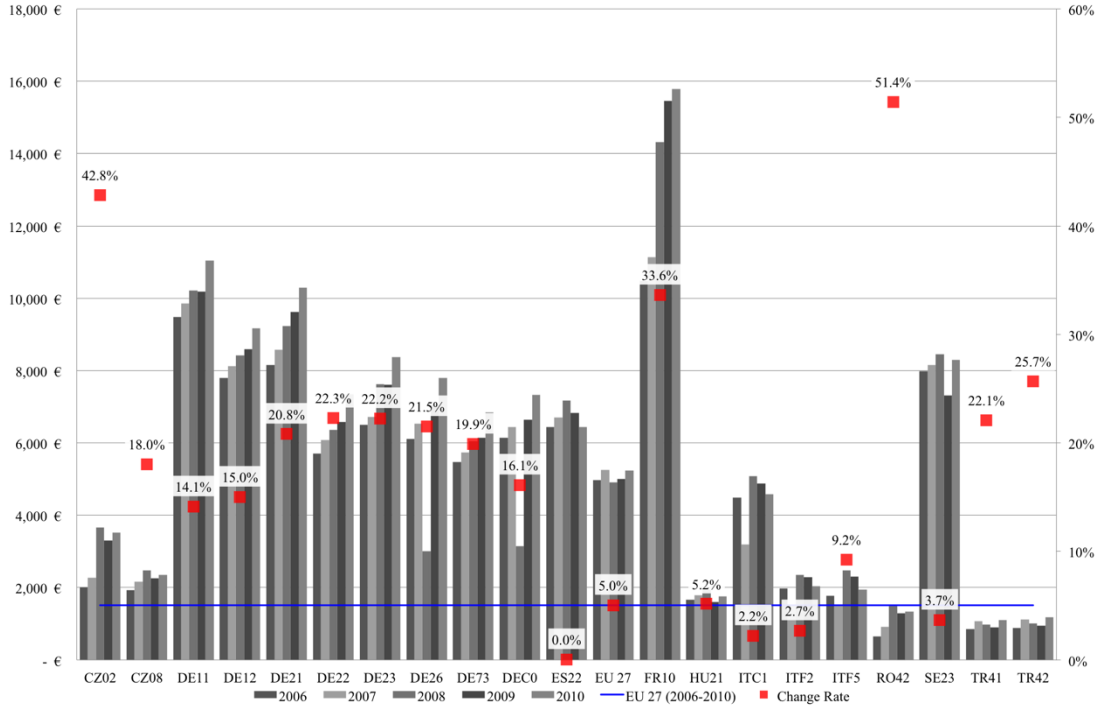

Figure 5.9: Personal cost per year 2006-2010 (Eurostat, 2014f).

Figure 5.9 shows the personal costs of automotive specialized regions per year. Northern European regions pay more as personal costs than rest. Turkish regions TR41 and TR42 have lowest personal costs. On the other hand FR10 French capital has the highest personal costs. It is a metropolitan area and the reason of paying highly personal costs might be several.

5.4.3. Long term unemployment

Long-term unemployment refers to the number of people with continuous periods of unemployment extending for a year or longer, expressed as a percentage of the total unemployed. It is defined in European Union Statistics, as unemployment lasting for longer than one year. Long-term unemployment is one of the main concerns of policymakers. Apart from its financial and social effects on personal life, long-term unemployment negatively affects social cohesion and, ultimately, may hinder economic growth.

OECD (2011) states that, “in comparing rates of long-term unemployment, it is important to bear in mind differences in institutional arrangements between

countries. Rates of long-term unemployment will generally be higher in countries where unemployment benefits are relatively generous and are available for long periods of unemployment. In countries where benefits are low and of limited duration, unemployed persons will more quickly lower their wage expectations or consider taking jobs that are in other ways less attractive than those which they formerly held".

Long-term unemployment in developing countries triggers employment increment in sub-contractor companies. The general contractor hires sub-contractor either to reduce to costs or to mitigate risks. The general contractor receives the same or better service than the general contractor could have provided by itself, at lower overall risk. This keeps the economies alive although it does not have same security and insurance levels, especially in developing countries.

In figure 5.10, long-term unemployment trend has been shown in years between 2006 and 2010. Long-term unemployment rate by Eurostat shows number of unemployed people in total employment. General trend during this period is decline until 2008, the year that global crisis happened, then increase again. It can be said that people prefer low paid jobs or small jobs rather than being unemployed. Italian regions ITF2 and ITF5 have highest long-term unemployment rates in all years. The dramatic increase in Spanish region ES22 and Italian region ITC1 in year 2009 and 2010 show the high number of job loss, although they have lowest.

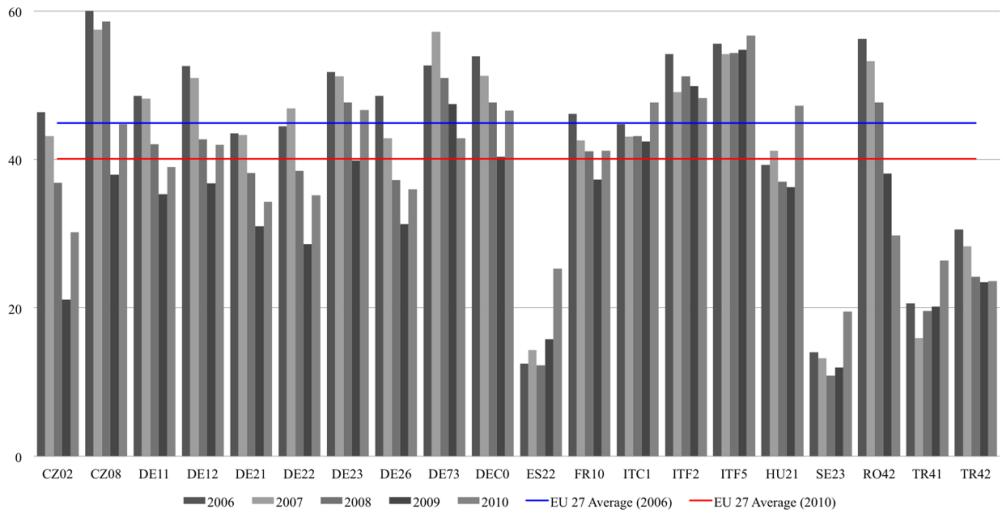

Figure 5.10: Long-term unemployment rate (Eurostat, 2014d).

In figure A.5, the ratio between long-term unemployment and unemployment has been shown in years between 2006 and 2010. This figure shows the percentage of

long-term unemployed people in total unemployment. Automotive industry specialized regions have same pattern trough crisis period. Turkish regions TR41 and TR42 (two neighbor regions) and ES22 have lowest long-term unemployment/unemployment rate.

5.5. Summary

To sum up, the indicators, which have been explained in this section, help to identify the missing background information of regional competitive advantages, which shift-share analysis cannot explain. As in the figure 5.1 has been shown these factors, which build resilience, have strong relations. This figure has been generated due to the numbers of bonds of explanatory data of resilience in the "Resilience Components' Relations' Matrix". In a weighted matrix gross value added per person, diversification and innovation are the strongest keystones of the regional economic resilience capacity.

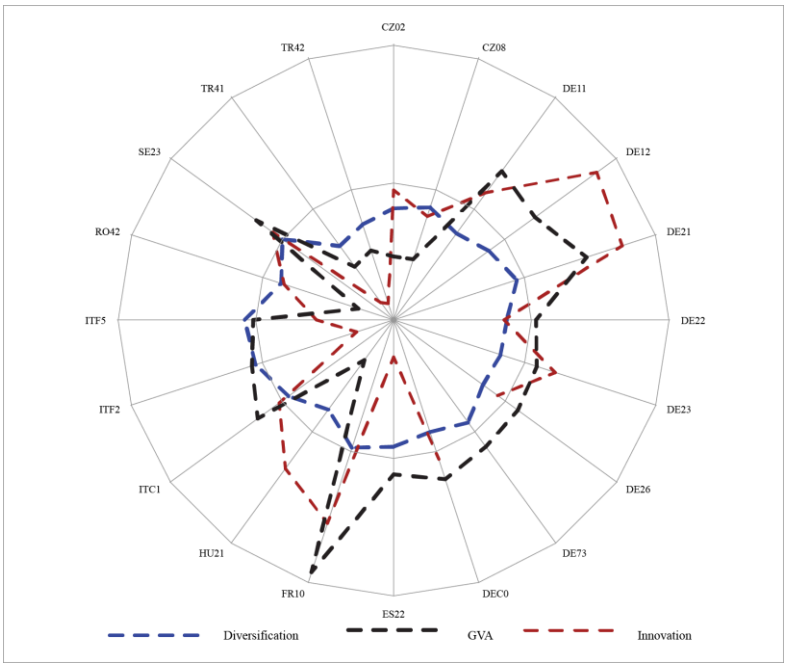

Figure 5.11: Current primary resilience factors relations of automotive industry specialized regions (2010 data).

In figure 5.11, automotive industry specialized regions primary components have been shown. This diagram has been produced according to resilience components' relations' matrix. Most important three components GVA, diversity of region' economic structure and innovation capacity of the regions have been shown. These indicators are related to regions prepared resilience; it is called intentional resilience

according to Foster's Regional Resilience Matrix. Comparing the results of the shift-share analysis in tables 4.3 and 4.7, these three components explain the regions success. FR10 has the highest GVA, region's productivity, and higher diversity in economy than average. FR10 could manage to survive from crisis with these factors. However, FR10 is of the biggest metropolitan area in Europe and capital of France; therefore it is an unique and exceptional example, it could be also examined as an only example. In addition, German regions' (DE12 and DE21) innovative capacity also plays a crucial role during crisis. On the contrary, Italian regions and Turkish Regions are less innovative and they suffer more than other regions.

On the other hand, as seen in the results of two different scenarios, some of other regions without having high GVA levels, high innovative capacity and diversified economies, have shown high performances. Although TR41 and RO 42 have not very high key features (GVA, innovation, diversification), they could have been able them to show good performances. However, other factors, which also build the regional resilience capacity, play a vital role during the crisis period. Perhaps they were not well prepared, but they performed well resilient.

6. CONCLUSION

World have become much more connected. Global production networks build the base of the current economic system. This structure make economies much more connected before, complex and fragile. Any external disturbance to an economic system would have the butterfly effect. The whole economic system should be considered as a uni-body. In the global world, crises occur more frequently. Economies are facing new difficulties every day. In order to get rid of any external disturbances, economies must be resilient.

Resilience concept has become popular in last decade. Although its notion consists of a broad level, environmental, social and economic, usage of the concept has been adapted to regional economic level. It has been perceived the main notion of an economy's crisis overcome capacity.

Many researches interpret different aspect of the resilience. Most common aspect is that resilience is a time-based notion. There are three different stages of resilience; pre-shock period, shock period and post-shock period. Pre-shock period can be interpreted as the preparation time. Last stage is the post-shock period. Re-orientation and recover abilities of an economy are decisive factors for regional economies resilience. These abilities play the main role during shock period and determine economies performances.

In literature, resilience has been related to the region's economic diversification and innovation. Diversified economies have the possibility to have relation with different sectors. Therefore, if an industry-base crisis would occur, economy would keep continuing its other production networks. A specialized economy could not have the same possibility. However, all the specialized economies are not diversified, but specialized regions could also include diversification with related sectors. Another important indicator is innovation. Inventing and producing something new would bring the economy extra added value. In addition, innovation capacity is related to a regions high-skilled employment, this factor increases the know-how capacity, it is a tacit knowledge and difficult to transfer, hence the regions, which have this capacity,

would learn from past event and adjust themselves for new ones. These two factors would construct “Preparation Resilience.

On the other hand, “Performed Resilience” has also significant effect. This research focuses on the specialized regions on automotive industry to show how a specialized region on a sector, which has lots of connection to different industries, would act during the crisis period in terms of resilience. Location quotient is an old but main tool to define these regions. In addition, the performance of those economies during shock period is vital. To calculate it, shift-share analysis is a common and useful tool. In this research, employment numbers of the regions have been taken into account as common usage in literature. It gives the effects of national trend, compare of industrial structure within the nation and regions competitive capacity. Second scenario, which assumed 27 European Union members and Turkey as one country, has been applied to compare regions’ economic resilience with each other. It is important that dealing one region without taking global network chains makes nonsense; dealing just European Union members and Turkey give just as simple example of the conditions of automotive industry, investigating global productions chain all around the world would show the conditions of automotive industry during the crisis period hence the automotive industry in different countries cannot be examined as individual. Because of the time and data limits, this survey could not have inspect all the automotive industry specialized regions in the world.

In addition, a dynamic shift-share analysis gives the regions’ annual performance during crisis. As mentioned before, resilience is a time-based notion; therefore it is significant to clarify performance to see the regional trends. As a benefit of annual results of shift-share analysis, it is easy to interpret the year of the crisis; there is a significant decrease in the employment numbers. On contrary, the results of two different scenario point different assumption. First scenario, referenced European Union plus Turkey as one, has high national share numbers as a result of assuming one common growth rate for all nations in EU. However, in second scenario all regions has different national share as expected. In addition, second scenario gives the possibility to see industrial trends in different countries of the automotive industry, while first scenario has the possibility to compare the industrial dynamics of the industry in Europe on regions. Finally, regional shift changes in first scenario

makes possible to compare, which region has more competitive advantage then others.

On the other hand, a shift-share analysis does not give the background information of regions' resilience capacity. To explain the reasons of regions economic resilience, some further indicators must be examined. As mentions before diversification of economies and their innovation capacities play very significant roles. The results of shift-share analyses show that the regions with diversified industrial structure and high innovation have positive performances. This type of resilience is called "Intentional Resilience". On the contrary, some regions without these advantages have positive performances; therefore they have performed "Ephemeral Resilience". Some of those regions have long working hours; some of them have low long-term employment numbers and low personal costs. However, it is difficult to know, which indicator has more important role in ephemeral resilience.

Moreover, decentralizing effect of crisis pushed automotive industry to the peripheral areas of Europe. Once biggest automotive producer regions of Europe have more diversified economies right now. The competitive capacity of Eastern European region takes more investment to build more assembly plants. Turkey is one of new investment attractive center. At this point regional policies are the key factors to attract new industrial investments. Decentralized industry flow would sustain. Turkey and Eastern European countries could be a new automotive production center within the Europe. However, becoming more specialized on a sector without innovative ability and added value, it would not be so easy to get rid of new coming crisis, although some of automotive industry specialized regions in Europe without these two key factors could have shown good performances.

Finally, the performance in this research, which has been shown by Turkish regions, gives a brief overview about Turkish regions during crisis period. Although they performed well and have not been affected from global crisis, the inspected indicators show; there is high risk of not showing the same performance too long. In general, Turkish regions show the opposite way of economic structure of European regions. It is based relatively on human power to keep the competitive advantage, hence long working hours, low personal costs, low R&D employment ratio and low long-term unemployment show quantitative production rather than qualitative production, which consist of high innovation and added value.

In a nutshell, resilience will become more important hence crisis would occur more frequently and with a big radius. Countries and regions have to learn lessons from previous crisis and produce new development policies to improve their weaknesses. Although some main indicators have been highlighted in literature, a common resilient index must be generated, which show the weights of the indicators, which is significant to build resilience.

REFERENCE

Amin, A. (2013). Surviving the turbulent future. *Environment and Planning D: Society and Space, 31*, 140-156.

Bakshi, G. S., and **Chen**, Z. (1994). Baby boom, population aging, and capital markets. *Journal of Business*, 165-202.

Barff, R A., and **Prentice** III, L. K.. (1988). Dynamic Shift-Share Analysis. *Growth and change, 19*(2), 1-10.

Benhabib, J., and **Spiegel**, M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary economics, 34*(2), 143-173.

Boschma, R.. (2014). Towards an evolutionary perspective on regional resilience: Utrecht University, Section of Economic Geography.

Briguglio, L., **Cordina**, G., **Farrugia**, N., and **Vella**, S.. (2009). Economic vulnerability and resilience: concepts and measurements. *Oxford Development Studies, 37*(3), 229-247.

Bruneau, M., **Chang**, S. E., **Eguchi**, R. T., **Lee**, G. C., **O'Rourke**, T. D., **Reinhorn**, A. M., **Shinozuka**, M., **Tierney**, K., **Wallace**, W. A., and **von Winterfeldt**, D.. (2003). A framework to quantitatively assess and enhance the seismic resilience of communities. *Earthquake spectra, 19*(4), 733-752.

Christopherson, S., **Michie**, J., and **Tyler**, P.. (2010). Regional resilience: theoretical and empirical perspectives. *Cambridge Journal of Regions, Economy and Society, 3*(1), 3-10.

ChunYun, S., and **Yang**, Y.. (2008). A review of shift-share analysis and its application in tourism. *International Journal of Management Perspectives, 1*(1), 21-30.

Coe, N. M, **Hess**, M., **Yeung**, H. W., **Dicken**, P., and **Henderson**, J.. (2004). 'Globalizing Regional development: a global production networks perspective. *Transactions of the Institute of British Geographers, 29*(4), 468-484.

Coe, N. M., **Dicken**, P., and **Hess**, M.. (2008). Global production networks: realizing the potential. *Journal of economic geography, 8*(3), 271-295.

Dinc, M.. (2002). Regional and local economic analysis tools. *The World Bank, Washington DC*.

Doner, R. F. (1991). *Driving a bargain: automotive industrialization and Japanese firms in Southeast Asia* (Vol. 23): University of California Press.

DPT. (1962). Birinci Beş Yıllık Kalkınma Planı, 1963-1967 *Ankara: Devlet Planlama Teşkilatı Yayınları*.

DPT. (1967). İkinci Beş Yıllık Kalkınma Planı, 1967-1972: DPT.

DPT. (1973). Üçüncü beş yıllık kalkınma planı, 1973-1977 *Ankara, DPT*.

DPT. (1979). Dördüncü Beş Yıllık Kalkınma Planı, 1979-1983: TC, Başbakanlık, Devlet Planlama Teşkilâtı.

DPT. (1985). Beşinci Beş Yıllık Kalkınma Planı, 1985-1989: TC Başbakanlık, Devlet Planlama Teşkilatı.

DPT. (1990). Altıncı Beş Yıllık Kalkınma Planı, 1990-1994: TC Başbakanlık, Devlet Planlama Teşkilatı.

DPT. (2007). Dokuzuncu beş yıllık kalkınma planı, 2007-2013: TC Başbakanlık, Devlet Planlama Teşkilatı.

Duranton, G., and **Puga**, D.. (2000). Diversity and specialization in cities: why, where and when does it matter? *Urban studies, 37*(3), 533-555.

Elburz, Z., and **Gezici**, F.. (2012). *Regional Development Policies And Industrial Employment Change In Turkey: A Shift Share Analysis (1992-2008)*. Paper presented at the ERSA conference papers.

Esteban M., and **Maria**, J.. (1972). I. A reinterpretation of shift-share analysis. *Regional and Urban Economics, 2*(3), 249-255.

European-Commission. (2008). *NACE Rev. 2, Statistical classification of economic activities in the European Community*. Luxembourg: European Commission.

European-Commission. (2011). Labour market statistics. In E. Commission (Ed.), *Population and social conditions* (pp. 109). Belgium: European Commission.

Eurostat. (2014a). Average Number of Usual Weekly Hours of Work in Main Job by NUTS 2 Regions. Retrieved 15 November 2014, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_r_lfe2ehour&lang=en

Eurostat. (2014b). Employment in Technology and Knowledge-Intensive Sectors by NUTS 2 Regions. *Regional Science and Technology Statistics*. Retrieved 15 November 2014, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=htec_emp_reg2&lang=en

Eurostat. (2014c). Labor Market Statistics Retrieved 07/03/2014, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_r_lfp2acedu&lang=en

Eurostat. (2014d). Long-term unemployment (12 months and more) by NUTS 2 regions. *Regional labour market statistics.* Retrieved 17 November 2014

Eurostat. (2014e). Population on 1 January by Broad Age Group, Sex and NUTS 3 Region. *Regional Demographic Statistics.* Retrieved 30 November 2014, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_pjanaggr3&lang=en

Eurostat. (2014f). Structural Business Statistics (NACE Rev 2). Retrieved 07/05/2014, from http://epp.eurostat.ec.europa.eu/portal/page/portal/european_business/data/database

Florida, R., and **Kenney**, M.. (1991). Transplanted organizations: The transfer of Japanese industrial Organization to the US. *American Sociological Review*, 381-398.

Foster, K. A. (2007). A Case Study Approach to Understanding Regional Resilience.

Gereffi, G.. (1994). The organization of buyer-driven global commodity chains: how US retailers shape overseas production networks. *Contributions in Economics and Economic History*, 95-95.

Gereffi, G.. (2006). The new offshoring of jobs and global development: International labour Organization.

Gereffi, G., **Humphrey**, J., and **Sturgeon**, T.. (2005). The governance of global value chains. *Review of international political economy*, *12*(1), 78-104.

Gereffi, G., and **Korzeniewicz**, M.. (1994). *Commodity chains and global capitalism*: ABC-CLIO.

Gibbon, P., **Bair**, J., and **Ponte**, S.. (2008). Governing global value chains: an introduction. *Economy and Society*, *37*(3), 315-338.

Goktas, G., (2013) "*Industrial Polict for the Automotive Sector: A Comparison of Brazil and Turkey"*, (Master Thesis), Hochschule für Technik und Wirtschaft Berlin

Guiheux, G., and **Lecler**, Y.. (2000). Japanese Car Manufacturers and Component Makers in the ASEAN Region: A case of expatriation under duress-or a strategy of regionally integrated production? *Global Strategies and Local Realities: The Auto Industry in Emerging Markets, London: Macmillan Press Ltd*, 207-233.

Hill, E., **Wial**, H., and **Wolman**, H.. (2008). Exploring regional economic resilience: Working Paper, Institute of Urban and Regional Development.

Hill, R. C., and **Lee**, Y. F.. (1994). Japanese Muntinationals and East Asian Development: The Case of the Automotive Industry. In L. Sklair (Ed.), *Capitalism and Development* (pp. 289-313).

Jenkins, R. O. (1984). Divisions over the international division of labour. *Capital & Class, 8*(1), 28-57.

Jenkins, R. O. (1987). *Transnational corporations and the Latin American automotive industry*: Macmillan Hampshire and London.

Karoulia, S., and **Gaki**, E.. (2013). *The impact of economic crisis on Greek regions and the importance of regional resilience.* Paper presented at the ERSA conference papers.

Kiroglu, M. M.. (2010). *"Global Production Networks" in Automotive Industry: The Case of Turkey.* (PhD), Marmara University.

Knudsen, D. C. (2000). Shift-share analysis: further examination of models for the description of economic change. *Socio-Economic Planning Sciences, 34*(3), 177-198. doi: 10.1016/s0038-0121(99)00016-6

Kumral, N., **Güçlü**, M., and **Dogan**, G. U.. (2012). Bölgesel Dayaniklilik (Resilience): Türkiye Düzey 2 Bölgeleri Üzerine Bir Uygulama.

Lagravinese, R.. (2014). Regional Resilience and rising gaps North% South: the case of Italy.

Lautier, M.. (2004). "Avoiding the Neighbours": The National/Global Development Strategy of the Korean Automotive Industry. *Cars, Carriers of Regionalism*, 296.

Leigh, R.. (1970). The use of location quotients in urban economic base studies. *Land Economics*, 202-205.

Mancini, A., **Salvati**, L., **Sateriano**, A., **Mancino**, G., and **Ferrara**, A.. (2012). Conceptualizing and Measuring the 'Economy'Dimension in the Evaluation of Socio-Ecological Resilience: A Brief Commentary. *International Journal of Latest Trends in Finance and Economic Sciences, 2*(3), 190-196.

Martin, R.. (2012). Regional economic resilience, hysteresis and recessionary shocks. *Journal of Economic Geography, 12*(1), 1-32.

Martin, R., and **Sunley**, P.. (2013). On the Notion of Regional Economic Resilience: Conceptualisation and Explanation. *Utrecht.= Papers in Evolutionary Economic Geography*, 13-20.

McNulty, J. E. (1977). A test of the time dimension in economic base analysis. *Land Economics*, 359-368.

Miller, M. M., Gibson, Lay James, and Wright, N. Gene. (1991). Location quotient: A basic tool for economic development analysis. *Economic Development Review*.

OECD. (2001, 12 November 2001). Glossary of Statistical Terms. Retrieved 28 November 2014, from http://stats.oecd.org/glossary/detail.asp?ID=1184

OECD. (2006). *Innovation and knowledge-intensive service activities*: OECD Publishing.

OECD. (2011). Labour Force Statistics 2010 %U /content/book/lfs-2010-en-fr %U http://dx.doi.org/10.1787/lfs-2010-en-fr: OECD Publishing.

OECD. (2014). Average Annual Hours Actually Worked per Worker. *StatExtracts.* Retrieved 20 November 2014, from http://stats.oecd.org/Index.aspx?DatasetCode=ANHRS

Oguz, S., and **Knight**, J.. (2010). Regional economic indicators: A focus on regional gross value added using shift-share analysis. *Economic and Labour Market Review, 4*(8), 74-87.

OICA. (2014a). 2010 Production Statistics. from http://www.oica.net/category/production-statistics/2010-statistics/

OICA. (2014b). Auto Jobs: Employment. Retrieved 28 November 2014, from http://www.oica.net/category/economic-contributions/auto-jobs/

OICA. (2014c). Economic Growth: A Growth Industry. Retrieved 28 November 2014, from http://www.oica.net/category/economic-contributions/

Porter, M.. (2003). The economic performance of regions. *Regional studies, 37*(6-7), 545-546.

Psycharis, Y., **Artelaris**, P., **Kallioras**, D., **Pantazis**, P., and **Tsiapa**, M.. (2012). *The Spatial Footprint Of The Ongoing Economic Crisis (2009-…) In Greece: Assessing The Resilience And Development Of The Greek Regions.* Paper presented at the ERSA conference papers.

Quintero, J. P.. (2007). *Regional economic development: An economic base study and shift-share analysis of Hays County, Texas.* Texas State University.

Radosevic, S., and **Rozeik**, A.. (2005). *Foreign direct investment and restructuring in the automotive industry in Central and East Europe*. Working Paper.

Setterfield, M.. (2010). Hysteresis. Hartford, CT: Trinity College, Department of Economics.

Simmie, J., and **Martin**, R.. (2010). The economic resilience of regions: towards an evolutionary approach. *Cambridge journal of regions, economy and society, 3*(1), 27-43.

Sturgeon, T., and **Florida**, R.. (2000). Globalisation and jobs in the automotive industry. *Final report to the Alfred P. Sloan Foundation. International Motor Vehicle Program, Center for Technology, Policy, and Industrial Development, Massachusetts Institute of Technology*.

Sturgeon, T. J. (2008). From commodity chains to value chains: interdisciplinary theory building in an age of globalization.

Sturgeon, T., and **Lester**, R. K. (2004). The new global supply-base: new challenges for local suppliers in East Asia. *Global production networking and technological change in East Asia*, 35-87.

Sturgeon, T., **Van Biesebroeck**, J., and **Gereffi**, G.. (2008). Value chains, networks and clusters: reframing the global automotive industry. *Journal of economic geography*, lbn007.

Taymaz, E., and **Yilmaz**, K.. (2008). Integration with the global economy: The case of Turkish automotive and consumer electronics industries. *Available at SSRN 1274804*.

Toner, P. (2011). *Workforce Skills and Innovation*: OECD Publishing.

Van Egeraat, C.. (2014). *Regional Economic Resilience in Ireland - The Role of Industrial Structure and Inward Investment*. Maynooth University, Department of Geography and NIRSA. Regional Studies Association Irish Branch. NIRSA/ESPON Conference: Creating the Regions of Tomorrow.

Welfens, P. JJ. (2012). *Clusters in Automotive and Information & Communication Technology: Innovation, Multi-nationalization and Networking Dynamics*: Springer.

Womack, J. P., **Jones**, D. T., and **Roos**, D.. (1992). *The Machine That Changed the World*. New York: Macmillan.

World-Bank. (2014a). GDP Growth (Annual %). *World Development Indicators.* Retrieved 29 November 2014, from http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries?display=default

World-Bank. (2014b). Tertiary Education (Higher Education). *Human Development Network.* 29 November 2014, from http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20298183~isCURL:Y~menuPK:617592~pagePK:148956~piPK:216618~theSitePK:282386~isCURL:Y~isCURL:Y,00.html

WTO. (2011). International Trade Statistics 2011: World Trade Organization.

APPENDIX

Figure A. 1: Location quotient results of automotive industry at NUTS2 level (Ref:EU).
Figure A. 2: Basic sector employment results of automotive industry at NUTS2 level (Ref: EU-27).
Figure A. 3: 2006 age structure (Eurostat, 2014e).
Figure A. 4: Total gross value added and growth change.
Figure A. 5: Long-term unemployment percentage in unemployment (Eurostat, 2014d).
Table A. 1: NUTS codes of regions (European-Commission, 2011).
Table A. 2: Location quotient data and results of European NUTS2 level regions.
Table A. 3: Shift-share data of automotive industry specialized regions .
Table A. 4: Automotive industry employment and portion of automotive industry specialized regions between 2006-2010.

Table A. 1: NUTS codes of regions (European-Commission, 2011)

NUTS Code	Region
CZ02	Stredni Cechy
CZ08	Moravskoslezsko
DE11	Stuttgart
DE12	Karlsruhe
DE21	Oberbayern
DE22	Niederbayern
DE23	Oberpfalz
DE26	Unterfranken
DE73	Kassel
DEC0	Saarland
DED4	Chemnitz
ES22	Comunidad Foral de Navarra
FR10	Ile de France
HU21	Közép-Dunántúl
ITC1	Piemonte
ITF2	Molise
ITF5	Basilicata
RO42	Vest
SE23	Västsverige
TR41	Bursa
TR42	Kocaeli

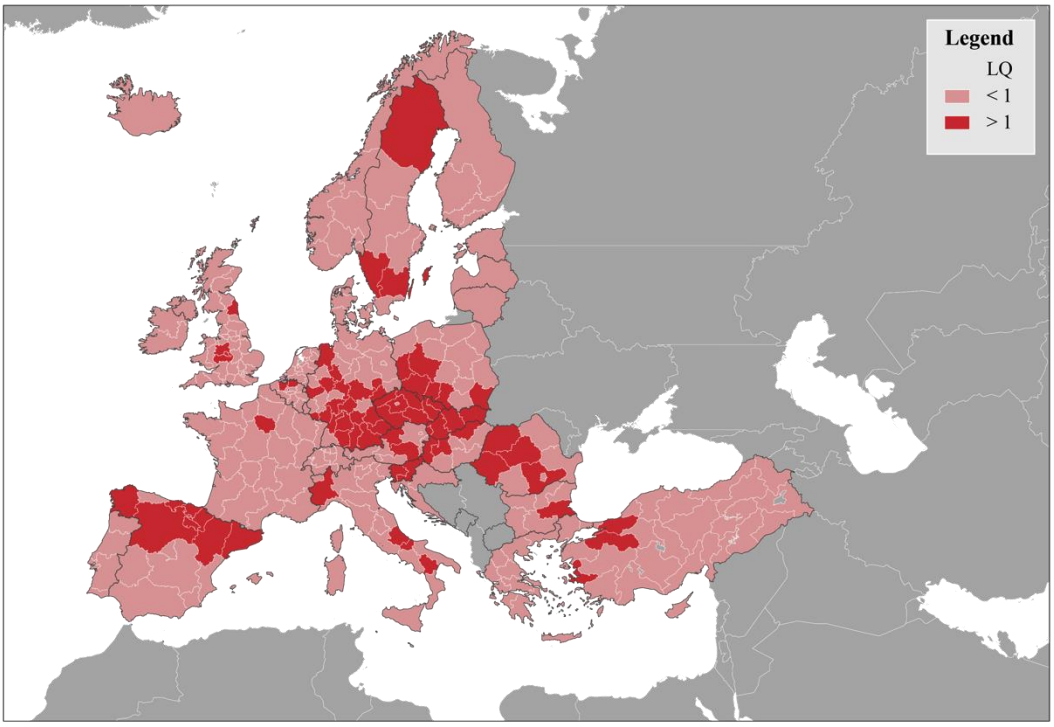

Figure A. 1: Location quotient results of automotive industry at NUTS2 level (Ref:EU).

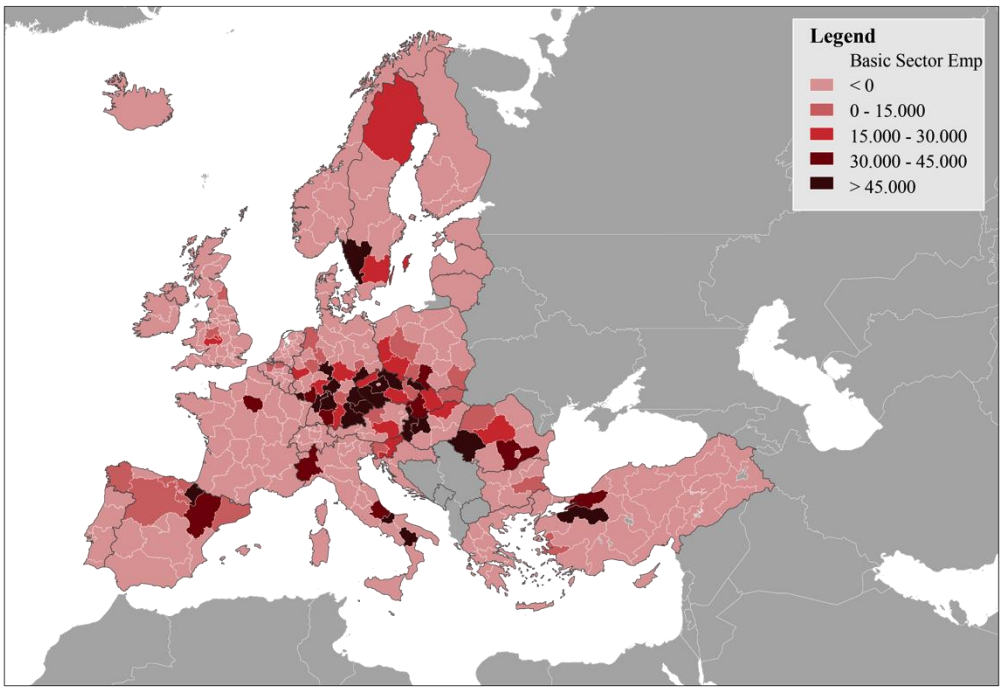

Figure A. 2: Basic sector employment results of automotive industry at NUTS2 level (Ref: EU-27).

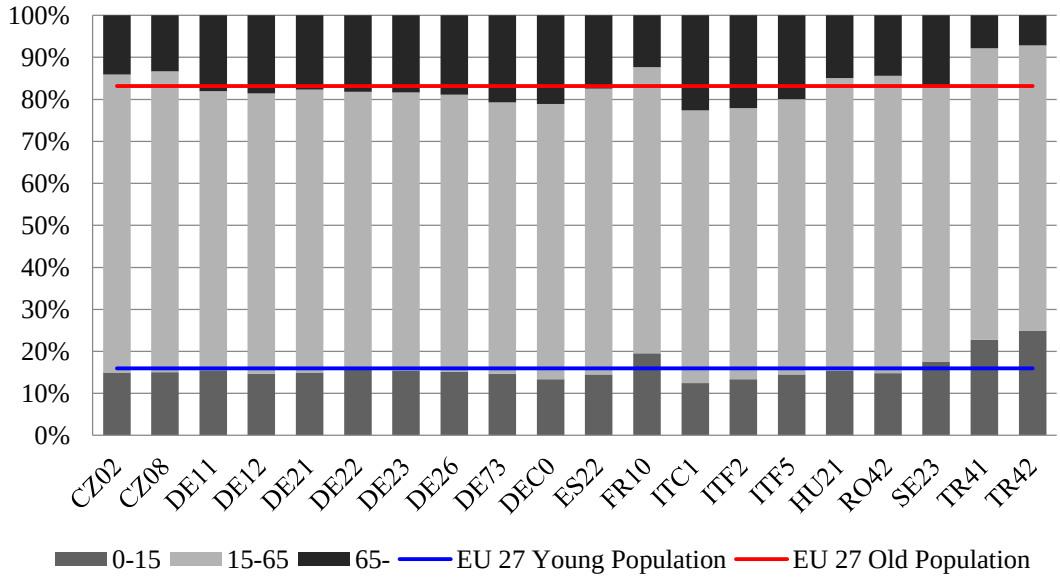

Figure A. 3: 2006 age structure (Eurostat, 2014e).

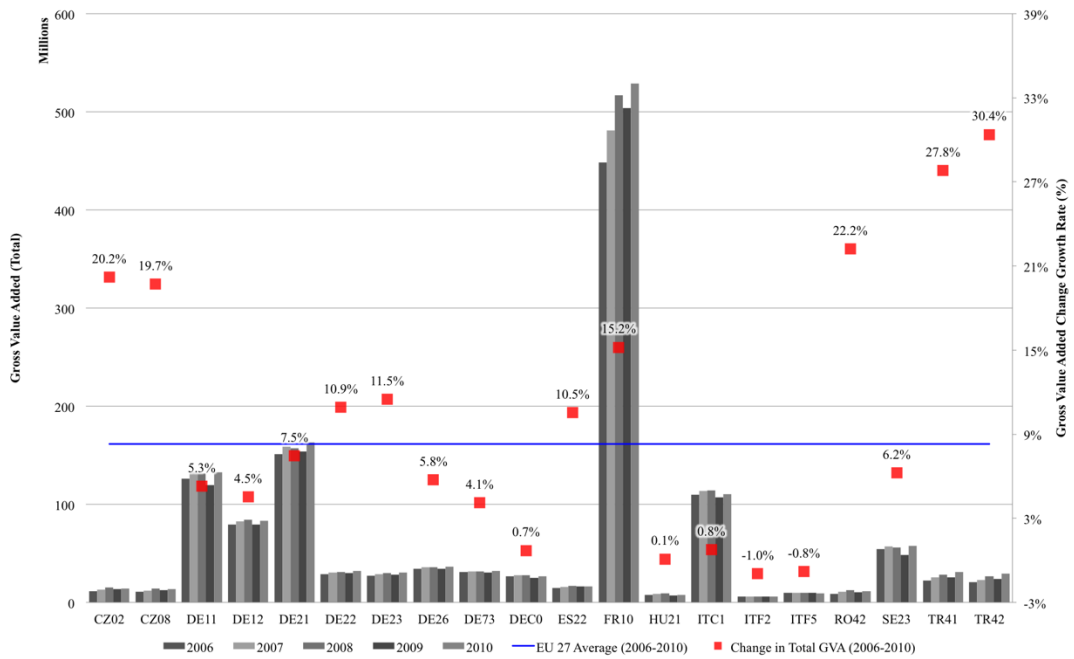

Figure A. 4: Total gross value added and growth change.

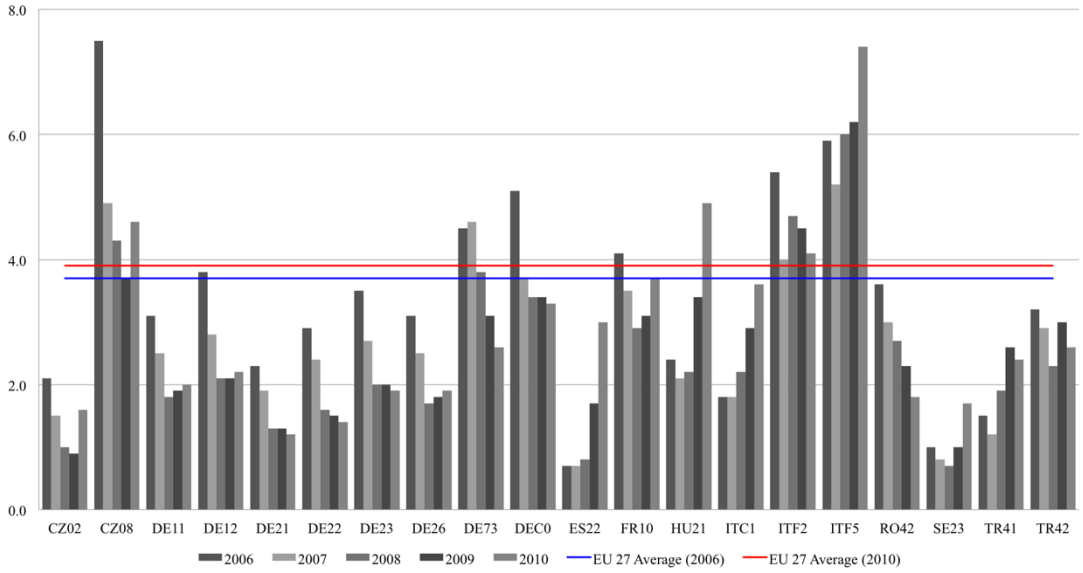

Figure A. 5: Long-term unemployment percentage in unemployment (Eurostat, 2014d).

Table A. 2: Location quotient data and results of European NUTS2 level regions.

Regions	2010 C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
AT11	29158	500	0,51	-103	1,06	1
AT12	29158	2339	0,42	-122	0,87	-1
AT13	29158	2669	0,47	-112	0,97	0
AT21	29158	257	0,14	-182	0,28	-7
AT22	29158	9242	2,20	254	4,54	33
AT31	29158	10120	2,00	212	4,13	29
AT32	29158	1617	0,84	-34	1,73	7
AT33	29158	1167	0,45	-116	0,93	-1
AT34	29158	1247	0,94	-14	1,93	9
BE10	34965	3734	1,17	47	2,61	15
BE21	34965	8162	1,40	109	3,12	20
BE22	34965	no data	no data	no data	no data	no data
BE23	34965	8713	1,73	201	3,87	27
BE24	34965	no data	no data	no data	no data	no data
BE25	34965	1997	0,51	-136	1,13	1
BE31	34965	no data	no data	no data	no data	no data
BE32	34965	no data	no data	no data	no data	no data
BE33	34965	no data	no data	no data	no data	no data
BE34	34965	no data	no data	no data	no data	no data
BE35	34965	75	0,05	-261	0,11	-8
BG31	10164	28	0,03	-33	0,03	-9
BG32	10164	639	0,57	-15	0,55	-4
BG33	10164	366	0,28	-25	0,27	-7
BG34	10164	6692	4,69	127	4,50	33
BG41	10164	2004	0,61	-13	0,59	-4
BG42	10164	435	0,22	-27	0,21	-7
CY00	214	214	1,00	0	0,16	-8
CZ01	140365	1845	0,10	-3.691	0,82	-2
CZ02	140365	37942	2,19	4.872	18,16	161
CZ03	140365	17971	1,09	363	9,03	75
CZ04	140365	10162	0,70	-1.243	5,78	45
CZ05	140365	32730	1,65	2.662	13,69	119
CZ06	140365	13168	0,60	-1.655	4,94	37
CZ07	140365	6201	0,40	-2.473	3,29	21
CZ08	140365	20345	1,29	1.206	10,74	91
DE11	833660	145162	3,44	44.618	21,44	192
DE12	833660	45597	1,60	11.011	9,98	84
DE13	833660	9592	0,40	-11.002	2,47	14
DE14	833660	22588	1,16	2.920	7,22	58
DE21	833660	89721	1,88	16.075	11,71	100
DE22	833660	36831	2,84	33.542	17,66	156
DE23	833660	17685	1,51	9.391	9,43	79

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
DE24	833660	3606	0,33	-12.263	2,04	10
DE25	833660	10920	0,58	-7.625	3,62	25
DE26	833660	20244	1,44	8.111	8,99	75
DE27	833660	16222	0,84	-2.900	5,24	40
DE30	833660	4444	0,13	-15.845	0,82	-2
DE40	833660	no data	no data	no data	no data	no data
DE50	833660	no data	no data	no data	no data	no data
DE60	833660	no data	no data	no data	no data	no data
DE71	833660	29228	0,74	-4.735	4,61	34
DE72	833660	2756	0,26	-13.474	1,63	6
DE73	833660	22181	1,81	14.790	11,27	96
DE80	833660	2519	0,15	-15.529	0,93	-1
DE91	833660	no data	no data	no data	no data	no data
DE92	833660	no data	no data	no data	no data	no data
DE93	833660	no data	no data	no data	no data	no data
DE94	833660	17590	0,71	-5.351	4,40	32
DEA1	833660	19045	0,38	-11.253	2,39	13
DEA2	833660	32154	0,75	-4.645	4,64	34
DEA3	833660	7983	0,31	-12.526	1,95	9
DEA4	833660	13750	0,69	-5.636	4,30	31
DEA5	833660	24097	0,70	-5.461	4,36	32
DEB1	833660	6047	0,40	-11.002	2,47	14
DEB2	833660	1839	0,33	-12.221	2,06	10
DEB3	833660	22750	1,12	2.218	6,98	56
DEC0	833660	18607	1,90	16.401	11,82	101
DED2	833660	2953	0,18	-14.984	1,12	1
DED4	833660	22202	1,47	8.637	9,17	77
DED5	833660	5897	0,58	-7.675	3,61	24
DEE0	833660	3622	0,15	-15.431	0,96	0
DEF0	833660	4581	0,16	-15.296	1,01	0
DEG0	833660	18768	0,79	-3.787	4,93	37
DK01	4507	128	0,09	-7	0,04	-9
DK02	4507	287	0,44	-4	0,21	-7
DK03	4507	1626	1,74	6	0,84	-2
DK04	4507	1868	1,81	6	0,88	-1
DK05	4507	598	1,31	2	0,63	-3
EE00	3013	3013	1,00	0	1,55	5
EL11	no data	no data	no data	no data	no data	no data
EL12	no data	no data	no data	no data	no data	no data
EL13	no data	no data	no data	no data	no data	no data
EL14	no data	no data	no data	no data	no data	no data
EL21	no data	no data	no data	no data	no data	no data

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
EL22	no data	no data	no data	no data	no data	no data
EL23	no data	no data	no data	no data	no data	no data
EL24	no data	no data	no data	no data	no data	no data
EL25	no data	no data	no data	no data	no data	no data
EL30	no data	no data	no data	no data	no data	no data
EL41	no data	no data	no data	no data	no data	no data
EL42	no data	no data	no data	no data	no data	no data
EL43	no data	no data	no data	no data	no data	no data
ES11	141426	15374	1,83	903	4,01	28
ES12	141426	1037	0,33	-728	0,73	-2
ES13	141426	2511	1,37	408	3,02	19
ES21	141426	12903	1,79	865	3,94	28
ES22	141426	11908	5,69	5.129	12,51	108
ES23	141426	1237	1,20	217	2,63	15
ES24	141426	15130	3,58	2.822	7,87	64
ES30	141426	11174	0,51	-538	1,11	1
ES41	141426	14170	1,86	936	4,08	29
ES42	141426	2287	0,38	-674	0,84	-1
ES43	141426	148	0,05	-1.037	0,11	-8
ES51	141426	36383	1,52	565	3,33	22
ES52	141426	no data	no data	no data	no data	no data
ES53	141426	no data	no data	no data	no data	no data
ES61	141426	4466	0,20	-870	0,45	-5
ES62	141426	513	0,12	-964	0,26	-7
ES63	141426	no data	no data	no data	no data	no data
ES64	141426	no data	no data	no data	no data	no data
ES70	141426	158	0,03	-1.063	0,06	-9
FI19	6957	3086	1,81	16	1,49	5
FI1B	6957	412	0,18	-16	0,15	-8
FI1C	6957	2345	1,62	13	1,33	3
FI1D	6957	1115	0,73	-5	0,60	-4
FI20	6957	no data	no data	no data	no data	no data
FR10	224618	142423	3,16	4.275	7,91	65
FR21	224618	2944	0,61	-780	1,51	5
FR22	224618	3360	0,51	-965	1,28	3
FR23	224618	690	0,11	-1.758	0,28	-7
FR24	224618	4195	0,44	-1.098	1,11	1
FR25	224618	2956	0,59	-804	1,48	5
FR26	224618	4652	0,82	-360	2,04	10
FR30	224618	12925	0,98	-31	2,46	14
FR41	224618	5925	0,71	-578	1,77	7
FR42	224618	5365	0,75	-503	1,86	8

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
FR43	224618	2282	0,54	-902	1,36	3
FR51	224618	7795	0,60	-798	1,49	5
FR52	224618	1878	0,17	-1.645	0,42	-5
FR53	224618	2471	0,40	-1.188	1,00	0
FR61	224618	2657	0,23	-1.524	0,57	-4
FR62	224618	873	0,08	-1.815	0,20	-7
FR63	224618	729	0,28	-1.414	0,71	-3
FR71	224618	17569	0,77	-457	1,92	9
FR72	224618	599	0,12	-1.730	0,31	-6
FR81	224618	540	0,07	-1.845	0,17	-8
FR82	224618	768	0,05	-1.885	0,11	-8
FR83	224618	no data	no data	no data	no data	no data
FR91	224618	17	0,02	-1.945	0,04	-9
FR92	224618	no data	no data	no data	no data	no data
FR93	224618	no data	no data	no data	no data	no data
FR94	224618	118	0,06	-1.865	0,14	-8
HR03	no data	no data	no data	no data	no data	no data
HR04	no data	no data	no data	no data	no data	no data
HU10	65119	6845	0,32	-764	1,60	6
HU21	65119	21988	2,94	2.193	14,51	127
HU22	65119	19892	2,85	2.087	14,05	122
HU23	65119	1905	0,32	-765	1,60	6
HU31	65119	8003	1,18	206	5,83	45
HU32	65119	2402	0,28	-815	1,38	4
HU33	65119	4084	0,49	-575	2,43	13
IE01	2656	690	1,04	0	0,43	-5
IE02	2656	1966	1,01	0	0,42	-5
IS00	no data	no data	no data	no data	no data	no data
ITC1	164849	51228	3,86	3.451	8,03	66
ITC2	164849	no data	no data	no data	no data	no data
ITC3	164849	no data	no data	no data	no data	no data
ITC4	164849	25252	0,82	-217	1,71	7
ITF1	164849	11410	3,19	2.651	6,65	53
ITF2	164849	3272	4,17	3.833	8,69	72
ITF3	164849	11850	1,03	40	2,15	11
ITF4	164849	5110	0,58	-511	1,20	2
ITF5	164849	7924	5,89	5.907	12,27	106
ITF6	164849	163	0,04	-1.160	0,08	-9
ITG1	164849	2470	0,24	-922	0,49	-5
ITG2	164849	84	0,02	-1.184	0,04	-9
ITH1	164849	1543	0,90	-119	1,88	8
ITH2	164849	1214	0,73	-322	1,53	5

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
ITH3	164849	7026	0,46	-652	0,96	0
ITH4	164849	1415	0,39	-742	0,80	-2
ITH5	164849	16793	1,20	246	2,51	14
ITI1	164849	6672	0,60	-485	1,25	2
ITI2	164849	1219	0,46	-651	0,96	0
ITI3	164849	1259	0,27	-882	0,56	-4
ITI4	164849	7742	0,48	-631	0,99	0
LT00	1295	1295	1,00	0	0,28	-7
LU00	no data	no data	no data	no data	no data	no data
LV00	989	989	1,00	0	0,31	-7
NL11	19972	222	0,33	-33	0,23	-7
NL12	19972	560	0,75	-12	0,51	-5
NL13	19972	619	1,11	6	0,77	-2
NL21	19972	2078	1,53	26	1,06	1
NL22	19972	1582	0,66	-17	0,45	-5
NL23	19972	506	1,06	3	0,73	-2
NL31	19972	897	0,58	-20	0,40	-6
NL32	19972	765	0,23	-37	0,16	-8
NL33	19972	1641	0,39	-29	0,27	-7
NL34	19972	121	0,27	-35	0,19	-8
NL41	19972	7903	2,63	79	1,82	8
NL42	19972	3076	2,39	68	1,65	6
NO01	3141	205	0,27	-3	0,10	-8
NO02	3141	1128	4,94	16	1,81	8
NO03	3141	898	1,54	2	0,57	-4
NO04	3141	369	0,80	-1	0,29	-7
NO05	3141	339	0,62	-2	0,23	-7
NO06	3141	171	0,64	-1	0,23	-7
NO07	3141	31	0,11	-4	0,04	-9
PL11	154723	5504	0,44	-887	1,26	2
PL12	154723	7980	0,33	-1.049	0,96	0
PL21	154723	7756	0,60	-623	1,74	7
PL22	154723	50574	2,70	2.673	7,80	64
PL31	154723	1455	0,14	-1.344	0,42	-5
PL32	154723	10502	1,25	399	3,62	25
PL33	154723	5037	0,81	-302	2,33	12
PL34	154723	754	0,15	-1.329	0,45	-5
PL41	154723	21047	1,51	807	4,37	32
PL42	154723	2610	0,45	-870	1,29	3
PL43	154723	9874	2,22	1.924	6,42	51
PL51	154723	19386	1,65	1.020	4,76	35
PL52	154723	5344	1,43	673	4,12	29

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
PL61	154723	2105	0,26	-1.162	0,75	-2
PL62	154723	1215	0,21	-1.238	0,61	-4
PL63	154723	3580	0,43	-900	1,23	2
PT11	30037	13855	1,32	62	2,42	13
PT15	30037	no data	no data	no data	no data	no data
PT16	30037	8268	1,18	34	2,15	11
PT17	30037	6461	0,82	-34	1,51	5
PT18	30037	1405	0,69	-59	1,27	3
PT20	30037		0,00	-193	0,00	-9
PT30	30037		0,00	-193	0,00	-9
RO11	115012	13283	0,92	-112	3,43	23
RO12	115012	19237	1,56	833	5,77	45
RO21	115012	2020	0,10	-1.351	0,37	-6
RO22	115012	403	0,03	-1.457	0,10	-8
RO31	115012	30824	1,76	1.143	6,53	52
RO32	115012	1536	0,11	-1.331	0,42	-5
RO41	115012	4964	0,41	-882	1,53	5
RO42	115012	42745	4,14	4.714	15,36	135
SE11	66455	no data	no data	no data	no data	no data
SE12	66455	no data	no data	no data	no data	no data
SE21	66455	6535	1,15	149	4,93	37
SE22	66455	5382	0,55	-452	2,36	13
SE23	66455	34065	2,54	1.545	10,90	93
SE31	66455	1694	0,30	-702	1,29	3
SE32	66455	108	0,04	-959	0,19	-8
SE33	66455	3884	1,12	116	4,79	35
SI01	12877	8724	1,30	53	5,07	38
SI02	12877	4153	0,67	-58	2,61	15
SK01	50569	11154	1,61	679	10,05	85
SK02	50569	20864	1,14	156	7,11	57
SK03	50569	10777	0,89	-117	5,57	43
SK04	50569	7774	0,58	-461	3,64	25
TR10	132414	21122	0,89	-84	1,53	5
TR21	132414	2754	0,81	-153	1,38	4
TR22	132414	411	0,12	-698	0,21	-7
TR31	132414	11925	1,54	430	2,63	15
TR32	132414	1054	0,18	-654	0,31	-6
TR33	132414	2170	0,39	-490	0,66	-3
TR41	132414	46647	6,92	4.719	11,84	102
TR42	132414	28913	4,71	2.955	8,06	66
TR51	132414	3784	0,44	-446	0,75	-2
TR52	132414	5979	1,38	301	2,36	13

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
TR62	132414	1779	0,26	-591	0,44	-5
TR63	132414	357	0,07	-739	0,12	-8
TR71	132414	2554	0,96	-28	1,65	6
TR72	132414	500	0,13	-690	0,23	-7
TR81	132414	242	0,11	-708	0,19	-8
TR82	132414	7	0,00	-793	0,01	-9
TR83	132414	1140	0,21	-628	0,36	-6
TR90	132414	173	0,03	-773	0,05	-9
TRA1	132414	30	0,01	-785	0,03	-9
TRA2	132414	6	0,00	-794	0,01	-9
TRB1	132414	92	0,03	-771	0,06	-9
TRB2	132414	7	0,00	-795	0,00	-9
TRC1	132414	357	0,10	-718	0,17	-8
TRC2	132414	46	0,01	-786	0,02	-9
TRC3	132414	6	0,00	-795	0,00	-9
UKC1	136282	2871	1,10	66	1,52	5
UKC2	136282	8796	3,09	1.380	4,26	31
UKD1	136282	no data	no data	no data	no data	no data
UKD3	136282	2086	0,38	-409	0,52	-4
UKD4	136282	3915	1,21	137	1,66	6
UKD6	136282	no data	no data	no data	no data	no data
UKD7	136282	3923	1,36	239	1,88	8
UKE1	136282	3266	1,61	403	2,22	11
UKE2	136282	717	0,39	-401	0,54	-4
UKE3	136282	2237	0,84	-105	1,16	1
UKE4	136282	2599	0,54	-301	0,75	-2
UKF1	136282	5467	1,22	144	1,68	6
UKF2	136282	3943	1,03	20	1,42	4
UKF3	136282	834	0,53	-308	0,74	-2
UKG1	136282	9986	3,49	1.643	4,81	36
UKG2	136282	7388	2,27	840	3,13	20
UKG3	136282	22511	4,22	2.128	5,82	45
UKH1	136282	3301	0,63	-246	0,86	-1
UKH2	136282	no data	no data	no data	no data	no data
UKH3	136282	no data	no data	no data	no data	no data
UKI1	136282	260	0,04	-635	0,05	-9
UKI2	136282	4742	0,43	-378	0,59	-4

Table A.2 Cont'd

Regions	2010_C29_Nat_Emp	2010_C29_Emp	2010_C29_LQ	2010_C29_BSE	EU27_2010_C29_LQ	EU27_2010_C29_EMP
UKJ1	136282	4874	0,91	-58	1,26	2
UKJ2	136282	2869	0,46	-355	0,64	-3
UKJ4	136282	1246	0,35	-432	0,48	-5
UKK1	136282	6709	1,24	160	1,71	7
UKK2	136282	390	0,14	-566	0,20	-8
UKK3	136282	35	0,03	-640	0,04	-9
UKK4	136282	285	0,11	-585	0,16	-8
UKL1	136282	6700	1,80	531	2,49	14
UKL2	136282	1912	0,79	-140	1,09	1
UKM2	136282	no data	no data	no data	no data	no data
UKM3	136282	868	0,18	-543	0,25	-7
UKM5	136282	no data	no data	no data	no data	no data
UKM6	136282	11	0,01	-654	0,02	-9
UKN0	136282	2665	0,73	-181	1,00	0

Table A. 3: Shift-share data of automotive industry specialized regions.

	GEO(L)/TIME	Strední Cechy	Moravskoslezsko	Stuttgart	Karlsruhe	Oberbayern
	GEO	CZ02	CZ08	DE11	DE12	DE21
2006	C 29	41.069	12.765	154.287	41.193	92.065
	TOTAL	559.500	533.200	1.901.000	1.262.200	2.075.000
2007	C 29	40.529	15.188	152.646	41.488	92.687
	TOTAL	574.000	549.400	1.925.400	1.299.300	2.114.200
2008	C 29	41.774	19.609	135.146	45.954	80.611
	TOTAL	592.500	564.900	1.958.900	1.313.100	2.146.300
2009	C 29	38.567	18.339	129.101	39.719	76.966
	TOTAL	594.700	551.400	1.945.400	1.285.900	2.154.400
2010	C 29	37.942	18.575	145.162	45.597	89.721
	TOTAL	593.800	538.600	1.924.800	1.298.900	2.178.800
	GEO(L)/TIME	Niederbayern	Oberpfalz	Unterfranken	Kassel	Saarland
	GEO	DE22	DE23	DE26	DE73	DEC0
2006	C 29	33.422	15.220	17.386	23.505	23.709
	TOTAL	579.700	518.400	620.100	539.300	432.100
2007	C 29	33.874	14.743	18.195	23.879	23.173
	TOTAL	590.400	526.300	628.000	549.700	438.300
2008	C 29	33.224	17.163	17.942	22.873	24.332
	TOTAL	586.500	534.200	646.500	551.700	447.000
2009	C 29	31.760	16.193	17.278	21.124	22.733
	TOTAL	581.500	533.400	631.400	549.300	442.900
2010	C 29	36.831	17.685	20.244	22.181	18.607
	TOTAL	592.800	533.300	640.100	559.600	447.600
	GEO(L)/TIME	Comunidad Foral de	Île de France	Közép-Dunántúl	Piemonte	Molise
	GEO	ES22	FR10	HU21	ITC1	ITF2
2006	C 29	11.564	54.017	14.746	64.631	2.661
	TOTAL	284.200	5.051.200	463.700	1.820.500	108.200
2007	C 29	11.308	31.592	20.533	65.840	2.747
	TOTAL	293.200	5.168.300	464.100	1.830.100	111.000
2008	C 29	11.697		25.865	59.947	808
	TOTAL	292.500	5.262.100	456.900	1.851.000	112.900
2009	C 29	11.740		21.978	51.874	3.305
	TOTAL	281.200	5.202.900	433.000	1.825.500	109.400
2010	C 29	11.908	142.423	21.988	51.228	3.272
	TOTAL	279.100	5.124.400	430.800	1.812.500	107.000
	GEO(L)/TIME	Basilicata	Vest	Västsverige	Bursa, Eskisehir, Bilecik	Kocaeli, Sakarya, Düzce, Bolu, Yalova
	GEO	ITF5	RO42	SE23	TR41	TR42
2006	C 29	7.667	18.068	46.604	30.594	27.976
	TOTAL	195.000	797.100	885.100	1.091.500	844.100
2007	C 29	7.858	19.075	44.199	39.392	30.312
	TOTAL	192.300	813.300	898.500	1.119.200	867.200
2008	C 29	8.004	31.614	43.801	43.060	29.939
	TOTAL	192.900	810.300	902.100	1.130.400	942.700
2009	C 29	7.698	36.492	38.946	39.076	29.033
	TOTAL	188.900	801.300	871.900	1.087.000	951.400
2010	C 29	7.924	42.745	34.065	46.647	28.913
	TOTAL	183.600	791.200	883.400	1.119.800	1.020.300

Table A. 4: Automotive industry employment and portion of automotive industry specialized regions between 2006-2010.

	2006		2007		2008		2009		2010	
Region/Time	Employment	Share	Employment	Share	Employment	Share	Employment	Share	Employment	Share
CZ02	41.134	7,3%	40.529	7,1%	41.774	7,1%	38.567	6,5%	37.942	6,4%
CZ08	12.765	2,4%	15.188	2,8%	19.609	3,5%	18.339	3,3%	18.575	3,4%
CZ	134.229	2,8%	143.688	3,0%	159.267	3,2%	137.732	2,8%	140.365	2,9%
DE11	154.287	8,1%	152.646	7,9%	135.146	6,9%	129.101	6,6%	145.162	7,5%
DE12	41.193	3,3%	41.488	3,2%	45.954	3,5%	39.719	3,1%	45.597	3,5%
DE21	92.065	4,4%	92.687	4,4%	80.611	3,8%	76.966	3,6%	89.721	4,1%
DE22	33.422	5,8%	33.874	5,7%	33.224	5,7%	31.760	5,5%	36.831	6,2%
DE23	15.220	2,9%	14.743	2,8%	17.163	3,2%	16.193	3,0%	17.685	3,3%
DE26	17.386	2,8%	18.195	2,9%	17.942	2,8%	17.278	2,7%	20.244	3,2%
DE73	23.505	4,4%	23.879	4,3%	22.873	4,1%	21.124	3,8%	22.181	4,0%
DEC0	23.709	5,5%	23.173	5,3%	24.332	5,4%	22.733	5,1%	18.607	4,2%
DE	780.055	2,1%	778.037	2,1%	770.377	2,0%	730.167	1,9%	833.660	2,2%
ES22	11.564	4,1%	11.308	3,9%	11.697	4,0%	11.740	4,2%	11.908	4,3%
ES	157.332	0,8%	154.383	0,8%	164.407	0,8%	146.004	0,8%	141.426	0,8%
FR10	54.017	1,1%	31.592	0,6%	No Data	0,0%	No Data	0,0%	142.423	2,8%
FR	372.227	1,5%	277.792	1,1%	No Data	0,0%	No Data	0,0%	224.618	0,9%
HU21	14.746	3,2%	20.533	4,4%	25.865	5,7%	21.978	5,1%	21.988	5,1%
HU	46.945	1,2%	55.941	1,4%	77.228	2,0%	63.854	1,7%	65.119	1,7%
ITC1	64.631	3,6%	65.840	3,6%	59.947	3,2%	51.874	2,8%	51.228	2,8%
ITF2	2.661	2,5%	2.747	2,5%	808	0,7%	3.305	3,0%	3.272	3,1%
ITF5	7.667	3,9%	7.858	4,1%	8.004	4,1%	7.698	4,1%	7.924	4,3%
IT	272.060	1,2%	280.697	1,2%	177.190	0,8%	169.666	0,7%	164.849	0,7%
RO42	18.068	2,3%	19.075	2,3%	31.614	3,9%	36.492	4,6%	42.745	5,4%
RO	122.736	1,4%	124.249	1,4%	112.307	1,3%	107.881	1,2%	115.012	1,3%
SE23	46.604	5,3%	44.199	4,9%	43.801	4,9%	38.946	4,5%	34.065	3,9%
SE	85.830	2,0%	85.325	1,9%	83.616	1,9%	72.212	1,6%	66.455	1,5%
TR41	30.594	2,8%	39.392	3,5%	43.060	3,8%	39.076	3,6%	46.647	4,2%
TR42	27.976	3,3%	30.312	3,5%	29.939	3,2%	29.033	3,1%	28.913	2,8%
TR	127.148	0,6%	133.373	0,7%	136.459	0,7%	125.128	0,6%	132.414	0,6%

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