ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF ARTS AND SOCIAL SCIENCES

REGIONAL CONSUMPTION AND INCOME DYNAMICS IN TURKEY: A PANEL DATA ANALYSIS

Ph.D. THESIS

Murat GÜVEN

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ SOSYAL BİLİMLER ENSTİTÜSÜ

TÜRKİYEDE BÖLGESEL TÜKETİM VE GELİR DİNAMİKLERİ: PANEL VERİ ANALİZİ

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To my family,

FOREWORD

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TABLE OF CONTENTS

Page

ABBREVIATIONS

AIC : Akaike Information Criteria
AIDS : Almost Ideal Demand System
EU : European Union
GDP : Gross Domestic Product
GWPR : Geographically Weighted Panel Regression
GWR : Geographically Weighted Regression
ISTAT : Italian National Institute of Statistics
KPSS : Kwiatkowski–Phillips–Schmidt–Shin
LR : Likelihood ratio
NSS : Indian National Sample Survey
NSSO : National Sample Survey Organization
NUTS : Nomenclature of Territorial Units for Statistics
OECD : Organisation for Economic Co-operation and Development
QAI : Quadratic Almost Ideal Demand Model
TSI : Turkish Statistical Institute
TUBITAK : The Scientific and Technological Research Council of Turkey
USA : United States of America

SYMBOLS

$\mu_{(u, v)}$	**:** Time-invariant fixed effects
b	**:** Distance
D_{it}	**:** Demographic factors
$D_{(i,j)t}$	**:** Income differences between regions
$\hat{G}_t$	**:** Newey-West consistent estimator
h	**:** Bandwidth
H_{is}	**:** i. row and s. column elements of H matrix
K	**:** Kernel density function
η_t	**:** Time effect
P^*_{it}	**:** General price index for i^{th} region
$P_{it,l}$	**:** Price index for l^{th} goods & service
Q_1	**:** 1^{th} quartile
Q_3	**:** 3^{th} quartile
S	**:** Standard deviation
s_i	**:** Share of a group of expenditure in total expenditures in region i
$S_{it,l}$	**:** Share of the consumption expenditure (in total expenditure) of the l^{th} goods & service in the i^{th} region for the period t
s_j	**:** Share of a group of expenditure in total expenditures in region j
T	**:** Number of observations
u, v	**:** Coordinates
V_h	**:** First difference of at most N common stochastic trends
Wn	**:** Spatial weight matrix
$X_{(u,v)t}$	**:** Rate of total amount of the expenditure for goods to price index for the coordinates u and v in the year t
x_{it}	**:** Total amount of the expenditure for goods & service
$y_{(i,j)t}$	**:** Expenditure differences between regions
$Y_{(u,v)t}$	**:** Share of the consumption expenditure for the coordinates u and v in the year t
y_{i0}	**:** Initial income
y_{it}	**:** Per capita income

α_i : Element of α vector in Table 3.1 and Individual effect on the equation (3.2)

$\beta_{(u, v)}$: Coefficient for the coordinates u and v

β_i : Element of β vector

$\varepsilon_{(u,v)t}$: Residuals

θ_0 : Coefficient

LIST OF TABLES

Page

LIST OF FIGURES

Page

REGIONAL CONSUMPTION AND INCOME DYNAMICS IN TURKEY: A PANEL DATA ANALYSIS

SUMMARY

Examining regional consumption and income dynamics has become increasingly important in recent years. Regional income and consumption disparities are used to create regional economic policies because the reduction of these disparities is a crucial step for economic development. The rapid progress of the scientific and technological developments in communication technologies and the promotion of the air, land and marine transportation in recent years have increased the interactions among households at the regional level. Thus, the differences in consumption and income among households have been changing.

This thesis thus aims to test whether there are any differences in consumption and income among the 26 NUTS-2 regions in Turkey, then to identify the determinants of the differences and finally to examine the direction in which these differences evolve over time. For this purpose, demand elasticities are estimated at the regional level for each group of goods and service, then regional convergence analyzes is tested.

The price and income elasticities for 12 groups of goods and service for 26 NUTS-2 level regions covering the period 2005-2013 are estimated using the Almost Ideal Demand Model(Deaton & Muellbauer, 1980) in the linear form. Elasticities are obtained for the expenditures on food, alcohol, clothing, shelter, furniture, health, transportation, communication, recreation, education, restaurant and other goods and service using geographically weighted panel regression (Bruna & Yu, 2013; Yu, 2010) technique. The technique considers both time dependence (effect) and spatial dependence and is superior to other traditional regressions because it takes into account spatial autocorrelation, spatial heterogeneity, and individual heterogeneity.

Our findings show that the income elasticity of demand is inelastic for shelter expenditure, whereas transportation expenditure, furniture expenditure and health expenditure are quite elastic. The elasticities of food expenditure, clothing expenditure and communication expenditure differ between the east and the west of the country. Alcohol expenditure, restaurant expenditure, and recreation expenditure also vary from region to region. It should be noted, however, that elasticities of food expenditure, clothing expenditure and communication expenditure do not show a systematic pattern. Counterintuitively, the elasticity of education expenditure does not also show a systematic pattern among the regions.

The price elasticity of demand is similar for all regions in terms of shelter expenditure, furniture expenditure and health expenditure. The elasticities of all other remaining expenditures show significant differences among all regions. The price elasticities of food and clothing expenditure vary systematically between the eastern and western regions as income elasticities. However, the price elasticity of alcohol expenditure, recreation expenditure and restaurant expenditure do not differ systematically across all regions. Contrary to expectations, the price elasticities of education expenditure,

health expenditure, transportation expenditure and communication expenditure differ significantly among all regions.

The convergence in the expenditures on food, alcohol, clothing, shelter, furniture, health, transportation, communication, recreation, education, restaurant and other goods and service as well as income is tested using four different approaches. Firstly, the convergence of the 12 goods and service groups and income for 26 NUTS-2 level regions is tested by employing spatial dynamic panel regression model approach(Lee & Yu, 2010) and the dynamic panel quantile regression model(Galvao, 2011) based on the Neoclassical growth model(R. J. Barro & Sala-i-Martin, 2004). Then the presence of convergence clubs is examined by using the convergence clubs approach(Hobijn & Franses, 2000) applying the unit root test and clustering algorithms. Finally, convergence is tested by the distribution approach (Quah, 1996) based on the kernel density functions.

Our findings from these four convergence analyzes present that the differences in terms of food expenditure, clothing expenditure and health expenditure, which have low income and price elasticities and high share in budget, are gradually decreasing among all of the regions. However, neither convergence nor divergence are not found in furniture expenditure, shelter expenditure, recreation expenditure, restaurant expenditure and education expenditure, which have partly high income and price elasticities.

TÜRKİYE'DE BÖLGESEL TÜKETİM VE GELİR DİNAMİKLERİ: PANEL VERİ ANALİZİ

ÖZET

Bölgesel düzeyde tüketim ve gelir dinamiklerinin incelenmesi ülkemizde son yıllarda önemli hale gelmektir. Bölgesel gelir ve tüketim farklılıkları bölgesel ekonomik politikaların olusturulmasında kullanılmaktadır, çünkü bölgesel gelir ve tüketim farklılıklarının azaltılması ekonomik kalkınma açısından çok önemli bir aşamadır. Son yıllarda iletişim teknolojilerindeki bilimsel ve teknolojik gelişmeler ve hava, kara ve deniz ulaşımının teşvik edilmesi, bölgesel düzeyde hanehalkları arasındaki etkileşimi artırmaktadır. Böylece, hanehalkları arasında tüketim ve gelir farklılıları değişmektedir.

Bu tez Türkiye'deki 26 İBBS Düzey-2 bölgesi arası tüketim ve gelir farklılılarının olup olmadığını test etmeyi, daha sonra bu farklılıklarının belirleyicilerini tespit etmeyi ve son olarak da bu farklılıkların zamanla nasıl bir değişim gösterdiğini bulmayı amaçlamaktadır. Bu amaçla bölgesel düzeyde her bir mal ve hizmet grubu için esneklikler hesaplanmış, daha sonra bölgesel yakınsama analizleri yapılmıştır.

26 İBBS Düzey-2 bölgesi için 2005-2013 yılları arasında 12 mal ve hizmet grubu için fiyat ve gelir esneklikleri lineer formda mükemmele yakın talep modeli(Deaton & Muellbauer, 1980) kullanılarak hesaplanmıştır. Gıda, alkollü içecek, giyim, konut, mobilya, sağlık, ulaşım, haberleşme, eğlence, eğitim, lokanta ve diğer mal ve hizmet harcamaları için esneklikler coğrafik olarak ağırlıklandırılmış panel regresyon(Bruna & Yu, 2013;Yu, 2010) tekniği kullanılarak elde edilmiştir. Bu teknik yatay kesit bağımlılığını hem zamansal hem de mekansal açıdan dikkate almaktadır ve bireysel değişkenliği, bölgesel otokorelasyonu ve de bölgesel değişkenliği dikkate aldığı için diğer geleneksel regresyonlardan daha üstündür.

Bulgularımız talebin gelir esnekliğinin konut harcaması için inelastik, ulaşım harcaması, mobilya harcaması, ulaşım harcaması ve sağlık harcaması için oldukça elastik olduğunu göstermektedir. Gıda harcaması, giyim harcaması ve haberleşme harcamasının esneklikleri ülkenin doğusu ve batısı arasında farklılık göstermektedir. Alkollü içecek harcaması, lokanta harcaması, eğlence harcaması da bölgeden bölgeye farklılık göstermektedir. Fakat belirtmek gerekir ki, gıda harcaması, giyim harcaması ve haberleşme harcaması esneklikleri sistematik bir yapı göstermemektedir. Eğitim harcaması esnekliği de zannedilenin aksine bölgeler arasında sistematik bir yapı göstermemektedir.

Talebin fiyat esnekliğin konut harcaması, mobilya harcaması ve sağlık harcaması için tüm bölgelerde benzerdir. Kalan diğer tüm harcamaların esneklikleri ise bölgeler arasında ciddi farklılılar göstermektedir. Gıda harcamasının ve giyim harcamasının fiyat esneklikleri gelir esnekliklerinde olduğu gibi doğu batı bölgeleri arasında sistematik farklılık göstermektedir. Ama alkollü içecek harcaması, eğlence harcaması ve lokanta harcamasının esneklikleri bölgeler arasında farklılaşmamaktadır. Zannedilenin aksine, eğitim harcaması, sağlık harcaması, ulaşım harcaması ve

haberleşme harcamasının fiyat esneklikleri bölgeler arasında önemli oranda farklılaşmaktadır.

Gıda, alkollü içecek, giyim, konut, mobilya, sağlık, ulaşım, haberleşme, eğlence, eğitim, lokanta ve diğer mal ve hizmet harcamaları için ve de gelir için yakınsama 4 farklı yaklaşım kullanılarak test edilmiştir. İlk olarak mekansal dinamik panel regresyon model yaklaşımı(Lee & Yu, 2010) ve dinamik panel kantil regresyon yaklaşımı(Galvao, 2011) ile Neoklasik büyüme modelini((R. J. Barro & Sala-i-Martin, 2004) baz alarak 26 İBBS Düzey-2 bölgesinde 12 mal ve hizmet grubu ve gelir için yakınsama test edilmiştir. Daha sonra yakınsama kulüpleri yaklaşımı(Hobijn & Franses, 2000) ile birim kök testi ve kümeleme algoritmaları uygulanarak yakınsama klüplerinin varlığı incelenmiştir. Son olarak dağılım yaklaşımı(Quah, 1996) ile çekirdek yoğunluk fonksiyonları temel alınarak yakınsama test edilmiştir.

Kantil regresyon analizinde, yakınsama/ıraksama mal ve hizmet gruplarına göre farklılık göstermektedir. Toplam harcamalar içinde pay olarak ölçülen gıda harcaması, giyim harcaması ve sağlık harcaması için zayıf yakınsama gözlenmektedir. Diğer mal ve hizmet grupları için, istatistiksel olarak anlamlı yakınsama veya ıraksama tespit edilememektedir.

Harcama gruplarına göre bölgeler arasında koşulsuz yakınsama analizleri, eğitim ve istihdam gibi kontrol değişkenlerinin eklenmesiyle tekrarlanmaktadır. Bu faktörler, yakınsama/ ıraksama süreçlerini etkileyip etkilemediklerini görmek için test edilmiştir. Analiz sonuçlarından kontrol değişkenlerinin sonuçlarda anlamlı bir değişiklik yapmadığı görülmektedir. Aynı zamanda neredeyse bu değişkenlerin hiçbiri, tek başına veya birlikte modellerde istatistiksel olarak anlamlı değildir.

Mobilya harcaması, konut harcaması, eğlence harcaması, lokanta harcaması ve eğitim harcaması gibi nispeten elastik mal ve hizmet gruplarında yakınsama ya da ıraksama bulunmamıştır. Bu durum, elastik olmayan bu harcama gruplarının payında, kısa vadede önemli bir değişiklik olmaması ve bütçe paylarının nispeten sabit kalması gibi nedenlerle açıklanabilmektedir. Ayrıca, eğitim ve istihdam gibi sosyal faktörlerdeki değişiklikler bu paylarda önemli değişiklikler yaratmamaktadır.

Mal ve hizmet grupları açısından bölgeler arasındaki tüketim farklılıklarındaki yakınsama analizleri, alternatif bir tahmin yöntemi olarak mekansal dinamik panel regresyon yöntemiyle tekrarlanmaktadır. Koşulsuz yakınsama analizinin sonuçlarına göre, alkollü içecek harcaması, sağlık harcaması, eğitim harcaması ve gelirde yakınsama ya da ıraksama bulunamazken diğer tüm mal ve hizmet gruplarında ıraksama bulunmaktadır. Koşullu yakınsama analizi sonuçlarına göre, gelir, sağlık harcaması ve diğer mal ve hizmet harcaması için yakınsama ya da ıraksama bulunmazken, diğer tüm mal ve hizmet gruplarında ıraksama bulunmaktadır.

Mekansal dinamik panel regresyon modellerinin, istihdam oranı modele dahil edildiğinde ıraksamayı hızlandırdığı gözlemlenmektedir.

Yakınsama kulüpleri yaklaşımı analizine göre, içsel olarak birçok küçük bölge oluşmaktadır. Tüketim davranışları, ortak özelliklere sahip daha küçük bölgelerde zaman içinde benzerlik göstermektedir. Ek olarak, çekirdek yoğunluk grafiklerinin çarpık, basık ve görsel olarak eşit olmaması, farklı yöntemlerle yapılan ekonometrik tahminlerin bulgularını desteklemektedir.

Dört yakınsama analizden elde edilen ortak bulgular gelir ve fiyat esneklikleri düşük ve bütçedeki payları yüksek olan gıda harcaması, giyim harcaması ve sağlık harcamalarında bölgeler arasında farklar yavaş yavaş azalmakta olduğunu göstermektedir. Fakat, gelir ve fiyat esneklikleri kısmen yüksek olan mobilya harcaması, konut harcaması, eğlence harcaması, lokanta harcaması ve eğitim harcamalarında yakınsama ya da ıraksama bulunamamıştır.

Tezde tüketimin göstergesi olarak ilgili harcamaların toplam hanehalkı bütçesindeki payı kullanılmaktadır. Bu payların zaman içinde çok az değişiklik göstermesi ve hatta bazı tüketim gruplarında neredeyse hiç değişiklik görülmemesi yakınsama analizinde anlamlı sonuçlara ulaşmayı ciddi şekilde zorlaştırmaktadır.

Geniş bir coğrafyaya sahip olan Türkiye'de her bölgenin kendi sosyal, kültürel, ekonomik ve coğrafi yapısı bulunmaktadir. Bu nedenle tüketim alışkanlıkları farklılık göstermektedir. Böylece, geniş bir coğrafi bölgeye yayılan bölgeler arasındaki tüketim davranışlarının kısa dönemde yakınsaması beklenmemektedir. Ayrıca, burada tanımlanan İBBS Düzey-2 bölgeleri eksojen olarak tanımlanan bölgelerdir.

1. INTRODUCTION

This dissertation investigates two different but interrelated economic issues on the elasticities and convergence of goods and service groups as well as income for the regions of Turkey. The first one estimates the price and income elasticities of 12 goods and service groups for the 26 Nomenclature of Territorial Units for Statistics (NUTS)-2 regions in Turkey whereas the second one analyses the convergence for 12 goods and service groups with income among the 26 NUTS-2 regions in Turkey. These regions consist of provinces in Turkey. Table 1.1 presents the provinces included in the regions.

Table 1. 1 : NUT-2 regions in Turkey.

TR10 : İstanbul
TR21 : Tekirdağ, Edirne, Kırklareli
TR22 : Balıkesir, Çanakkale
TR31 : İzmir
TR32 : Aydın, Denizli, Muğla
TR33 : Manisa, Afyon, Kütahya, Uşak
TR41 : Bursa, Eskişehir, Bilecik
TR42 : Kocaeli, Sakarya, Düzce, Bolu, Yalova
TR51 : Ankara
TR52 : Konya, Karaman
TR61 : Antalya, Isparta, Burdur
TR62 : Adana, Mersin
TR63 : Hatay, K.Maraş, Osmaniye
TR71 : Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir
TR72 : Kayseri, Sivas, Yozgat
TR81 : Zonguldak, Karabük, Bartın
TR82 : Kastamonu, Çankırı, Sinop
TR83 : Samsun, Tokat, Çorum, Amasya
TR90 : Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane
TRA1 : Erzurum, Erzincan, Bayburt
TRA2 : Ağrı, Kars, Iğdır, Ardahan
TRB1 : Malatya, Elazığ, Bingöl, Tunceli
TRB2 : Van, Muş, Bitlis, Hakkari

Source : TSI (2016)

Table 1.2 also presents the details of the 12 goods and service groups in the consumption expenditures.

Table 1. 2 : Consumption expenditures.

Food : Food and non-alcoholic beverages
Alcohol : Alcoholic beverages, cigarette and tobacco
Clothing : Clothing and footwear
Shelter : Housing and rent
Furniture : Furniture, houses appliances and home care services
Health : Health
Transportation : Transportation
Communication : Communication
Recreation : Entertainment and culture
Education : Education services
Restaurant : Restaurants and hotels
Other Goods and Service : Various good and services

Source : TSI (2016)

Since reducing regional income and consumption disparities is one of the main objectives of regional economic development policies, inter-regional income and consumption dynamics constitutes the basis for the regional economic policies. Therefore, this study purposes to investigate the regional differences among the 26 NUTS-2 regions of Turkey for both income and 12 groups of goods and service. In addition, it also purposes to identify the key determinants of the differences across the regions and to investigate the change in these differences over time.

There is a rich literature on regional differences in income in Turkey and most of the studies deal with supply side of the regional differences. Some examples of these studies are Tosun, Timothy, & Öztürk (2003), Gezici & Hewings (2007), Önder, Deliktaş, & Karadağ (2010), Aslan & Kula (2011) and Gezici & Hewings (2004). However, there is almost no study on the consumption pattern. Thus this thesis aims to fill the gap by analyzing both supply and demand side of the regional differences.

The first part of the thesis examines the regional differences in Turkey by means of elasticities. Thus in the first part, price and income elasticities are estimated on food, alcohol, clothing, shelter, furniture, health, transportation, communication, recreation expenditure, education, restaurant, and other goods and service for the period 2005-

2013 by employing Almost Ideal Demand Model developed by Deaton & Muellbauer(1980) in the linear form.

Geographically Weighted Panel Regression (GWPR) developed by Yu(2010) and Bruna & Yu(2013) is used to estimate and map the elasticities for 26 NUTS-2 regions in Turkey. This technique has some advantages over the traditional regression techniques. It takes into account geographic information and considers the spatial autocorrelation and spatial heterogeneity with individual heterogeneity in the regression.

According to the results, the income elasticity of demand for shelter expenditure is inelastic. However, it is quite elastic for transportation expenditure, furniture expenditure, transportation expenditure and health expenditure. The elasticities for food expenditure, clothing expenditure and communication expenditure are different in the east and west of the Turkey. Similarly, the elasticities for alcohol expenditure, restaurant expenditure, and recreation expenditure are different among the regions and do not present a systematic pattern. It is not as expected that the elasticity for education expenditure does not present a systematic pattern across the regions as well.

The price elasticity of demand for shelter expenditure, furniture expenditure and health expenditure elasticities show similarity for all of the regions. However, expenditures of the rest of the goods and service present differences for all the regions. The price elasticity of demand for food expenditure and clothing expenditure present a systematic pattern between east and west of the Turkey as the elasticities of income. However, the price elasticity of demand for alcohol expenditure, recreation expenditure, restaurant expenditure does not present a systematic pattern among all the regions. Lastly, it is not as expected that the price elasticity of demand for education expenditure, health expenditure, transportation expenditure and communication expenditure show differences across these regions. In addition, the price elasticity of demand is found positive in some of the regions of Turkey. The price elasticities of demand for health expenditure are 0,322 and 0,139 in region TR31(İzmir) and TR82(Kastamonu, Çankırı, Sinop), respectively.

The second part of thesis is devoted to the analysis of the convergence of the 12 goods and service groups and income for 26 NUTS-2 level regions. Four different techniques are used to analyze convergence. More precisely, the convergence of these goods and

service is tested using spatial dynamic panel regression model developed by Lee & Yu(2010), dynamic panel quantile regression approach developed by Galvao(2011), convergence clubs approach proposed by Hobijn & Franses(2000) and the distribution approach developed by Quah(1996). The first two techniques are based on Neoclassical growth model by R. J. Barro & Sala-i-Martin (2004). The primary reason for using the spatial dynamic panel regression model is to take into account the spatial effects resulting from the regional interactions. Accordingly, more reliable estimates can be obtained. The use of the quantile regression technique in growth models has two fundamental advantages. First it is robust to the outliers in the dependent variable. For example, this feature is often used in modeling variables such as growth, where the unconditional distribution is characterized by a long right tail. Second and the most important advantage is that a single solution is obtained for each quantile of quantile regression. With this advantage, the effects of the explanatory variables can be seen according to the position on the unconditional distribution of the the regions(Mello & Perrelli, 2003). The third technique, which is convergence clubs approach, investigates presence of convergence clubs. This technique is based on unit root test and clustering algorithms. This technique is preferred to test the convergence because it enables us to make endogenous selection of the converging regions. The last technique is based on the kernel density functions. The reason for the use of the distribution approach is to determine if there is polarization in the regional distribution of the variables used in the model.

According to the estimation results of the convergence in both income and consumption by employing spatial dynamic panel regression model approach introduced by Lee & Yu(2010), there is no clear evidence of convergence in income and consumption of 12 goods and service group. The results obtained by using the dynamic panel quantile regression approach also show that there is generally no evidence for convergence in income and consumption of 12 goods and service group without some of the exceptions. These exceptions are listed as following:

1. There is an evidence of convergence in the 75th quantile of the food expenditure
2. There is an evidence of convergence at 25th, 50th and 75th quantiles of the clothing expenditure.

3. There is an evidence of convergence at in the 75th quantile of the Health expenditure.

Using convergence clubs approach, it is found that regional neighbours do not affect the convergence of consumption of these goods and service groups. Additionally, each convergence club consists of geographically different regions. The results also show that there is an evidence for divergence in income among all 26 NUTS-2 Turkish regions. Lastly, the results from distribution approach show that the number of the differences across the 26 NUTS-2 regions are more than the number of the similarities among the the 26 NUTS-2 regions for income and consumption of the 12 goods and service group. Therefore, the estimation results obtained from this approach are in line with the estimation results of the spatial dynamic panel regression model approach, dynamic panel quantile regression approach as well as convergence clubs approach.

According to the common estimation results of these four different analyzes of the convergence, it is found that there is a gradually decreasing differences in food expenditure, clothing expenditure and health expenditure, which have low elasticity of income and low elasticity of price as well as high share in the budget. However, there is no clear evidence of both convergence and divergence in the furniture expenditure, shelter expenditure, recreation expenditure, restaurant expenditure and education expenditure which have partly high elasticity of income and high elasticity of price.

The contribution of thesis comes from several points: Firstly, to the author's knowledge, this is the first study that employ the GWPR technique to analyze the regions of Turkey, which is superior to traditional regression techniques since it takes into account spatial autocorrelation and heterogeneity of data as well as individual heterogeneity. Secondly, this is also the first study that examines the disparities in consumption and income across the regions in Turkey employing four different approaches and comparing the consistency of the results of all four approaches at the same time. Thirdly, we use a disaggregated data set for 12 groups of goods and services together.

2. A SPATIAL ECONOMETRIC ANALYSIS OF REGIONAL CONSUMPTION DISPARITIES IN TURKEY

2.1 Introduction

There is a considerable amount of studies on regional income differences but relatively limited amount of studies on consumption differences. If there are remarkable differences in consumption patterns across the regions of a country, that might also convey information about regional income disparities. For example, if the income elasticity of a good or a service is measured to be a necessity (inelastic) for a region but a luxury (elastic) for another region, it is highly likely that the latter region is a low income region, whereas the former is an high income one. That is why studies on differences among consumption patterns across regions might produce supportive evidences about regional income disparities in a country in designing development policies.

There is a variety of research on regional income differences on the Turkish regions, which explain the supply side of the regional disparities. Some examples are Gezici & Hewings (2007), Gezici & Hewings (2004), Tosun, Timothy & Öztürk (2003), Aslan & Kula (2011) and Önder, Deliktaş, & Karadağ (2010). Concerning the consumption patterns, there is almost none. The existing studies analyze only the food consumption without considering regional disparities and they do not cover all regions. Thus, there is a significant gap in the literature about consumption patterns to explain demand side of the regional disparities.

This essay aims to investigate if there are significant differences in consumption patterns among the Turkish regions. We employ one of the most recently developed techniques, GWPR, proposed by Yu(2010) and Bruna & Yu(2013). We estimate and map the price and income elasticities for 12 different groups of goods and services in 26 NUTS-2 regions of Turkey for the period from 2005 to 2013. Different from the traditional global regression analysis in regional studies, GWPR is used to get locally

different parameter estimates while investigating the spatial variations in the relationships (Ocal & Yildirim, 2010). This technique is superior to traditional regression techniques since it takes into account spatial autocorrelation and heterogeneity of data as well as individual heterogeneity.

The novelty of the essay comes from several points: Firstly, this is the first study ,to the authors' knowledge, on consumption disparities among the Turkish regions using GWPR model. Secondly, We include 12 groups of goods and services in our analyses. Thirdly, this is also first study that employs GWPR technique which has advantage over the traditional regressions since it takes into account spatial autocorrelation, heterogeneity in the data and individual heterogeneity.

We find out that there is a great variation in the consumption patterns among regions by the groups. Demand elasticity for alcohol expenditure, shelter expenditure, furniture expenditure and other goods and service expenditure are found to be similar whereas demand elasticity for food expenditure, clothing expenditure, communication expenditure and education expenditure are varied between east and west regions. Particularly, We find a clear disparity between east and west regions in food expenditure and clothing expenditure and negligible differences across the regions in terms of expenditure on shelter expenditure and furniture expenditure.

This part is structured as follows: section 2.2 reviews some of the relevant literature. Description of the data and methodology are presented in section 2.3. Empirical results are illustrated in Section 2.4 and we conclude the this part in section 2.5

2.2 Literature Review

There are several studies on expenditure elasticities though they rarely focus on regional differences.

Bhattacharya & Mahalanobis (1967) examines the distribution of per capita household consumer expenditures for all items. The data are obtained from the Indian National Sample Survey (NSS) between September 1957 and May 1958 not only for rural but also for urban sector of different states in India. The disparities in consumption are investigated in between and within states for rural, urban and all India.

Muellbauer (1977) analyzes the expenditure elasticities and own-price elasticities for households by applying the pooled and non-pooled panel data techniques. The data

used in the study is obtained from the annual reports of the family expenditure survey for the period form 1968 to 1973 by considering the PIGL-PIGLOG demand system. The expenditures in the survey are categorized into 10 groups. These are the expenditures on clothing, food, public transportation, tobacco, fuel & light, miscellaneous goods, private transportation, durables, services and alcohol. He finds that the public transportation expenditure, tobacco expenditure, fuel & light expenditure and food expenditure are necessities and they are complementary, whereas the other goods and service are found to be luxury goods and are substitutes.

Deaton & Muellbauer (1980) presents a new system of demand equations called Almost Ideal Demand System (AIDS). Budget shares of the different commodities, in this system, are associated with the logarithms of real total expenditures and relative prices. They estimate the budget shares of the various goods and services in the United Kingdom for annual data from 1954 to 1974. They include eight types of expenditures; housing services, fuel, drink and tobacco, transportation, clothing, food and communication services, other goods, and other services.

Pollak & Wales (1981) contributes to the existing demand systems literature by including the demographic variables like the number of children. They describe five general procedures (Gorman procedure, demographic scaling, reverse Gorman procedure, demographic translating and modified Prais-Houthakker procedure) to include these demographic variables into complete demand system. Then they estimate the system using the household budget data in United Kingdom from the year between 1966 and 1972 and compare these procedures. Only demographic translating method among the five others rejects the hypothesis of the unpooled specification, showing that the number of the children has an effect on the consumption pattern. Thus, the rest of the procedures suggests that there is a similarity in responses to the changes in prices, total expenditure and the number of the children.

Similarly, Jorgenson & Slesnick (1987) assesses demographic characteristics in their study. They estimate the household equivalence scales for households living in the United States by employing translog indirect utility function. They apply the procedure to the each of demographic characteristics, namely, race, region, age of head, family size, and urban versus rural residence one by one. Five different commodity groups of the commodity-specific scales used in the model are energy, food, consumer goods, capital services and other services. They employ the combination of the aggregate time

series and individual cross section data in the estimation of the parameters in this model.

Nelson (1988) uses a utility theoretic model to analyse the household demands in the United States. Individuals are assumed to be both identical and symmetrically treated across the households in the model so that effects of economies of scale are separated from the effects of the other influences on demand. The parameters in this model are estimated for five groups, namely, clothing, shelter, household furnishings and operations, food and transportation. He employs the demand system specification by obtaining data from the Consumer Expenditure Survey for all-adult households in the United States of America (USA). This study finds that there is a significant economies of scale effect in the consumption of these goods.

Chatterjee, Michelini and Ray (1994) examine expenditure patterns of Australia and New Zealand and contributes mainly to the literature by estimating preference consistent demographic system demand system based on pooled cross section data. They conduct tests of linear Engel curves and separable preferences based on budget data of these countries. The data for Australia is obtained from the Australian household expenditure surveys for the years 1984 and 1988-1989 and for New Zealand from New Zealand household expenditure and income surveys for the years between 1984 and 1991. They find better estimates of the price and expenditure elasticities. They also find that the estimation of the cost of a child can be done in a successful way by information about relevant prices.

Meenakshi & Ray (1999) investigates the food expenditure in India taking into account differences in regions for preferences and prices. They employ the quadratic almost ideal demand model (QAI) that is the extension of the Deaton & Muellbauer (1980)'s AIDS and consider the translation approach proposed by Pollak & Wales (1981). This is the first study that uses the (QAI) demand system for a developing country. They obtain the data for 16 states from the national sample survey organization (NSSO) for both rural and urban India covering the period 1972-1973 and 1987-1988 and include nine types of the consumer expenditures; pulses, edible oils, egg and fish, milk and milk products, clothing and footwear, meat, fuel and light, cereals and cereal substitutes, other food and other non-food. They find that the nutrient enhancing programs have to consider the large regional differences in the pattern of expenditures.

They also find that household size and composition are very important determinants of the allocations of the expenditure by the households across food products.

Bono, Cuffaro & Giaimo (2007) highlights the disparities in different regions of Italy on the demand side. Specifically, this study investigates that whether there are differences in the consumption behaviors of Italian households. They employ multilevel model for this study as households and regions are taken into account as units and all households are nested in the regions implying hierarchical structure as well as taking into account the heterogeneity among the different regions. They use the budget data of the Italian National Institute of Statistics(ISTAT) collected for 20 regions of Italy, including information about nearly 23,000 Italian households. They find wide fragmentation of behavior of the consumption and a variety of differentiated behavioral types in different Italian regions. They also find there are territorial differentials in income class and consumption items.

Armagan & Akbay (2008) employs the Almost Ideal Demand System introduced by Deaton & Muellbauer(1980) to investigate the consumption pattern of animal products for households in the urban areas of Turkey by using households' survey data. They find inelastic price elasticities for milk, yogurt, cheese poultry and fish and elastic price elasticities only for meat. They also find a very low impact of socio-demographic factors over the animal products' demand.

Güven, Güloğlu, & Erdal(2017) investigate whether consumption behaviors convergence among the Turkish regions. Having found a high number of convergence clubs, they conclude that both income and consumption convergences are low among the regions.

Çağlayan & Astar (2012) examines the determinants of the consumption expenditures of households for rural and urban areas in Turkey. They employ quantile regression to make estimations for rural and urban areas. The household budget survey data, containing 5658 households in Turkey, including the period of 1 January-31 December in 2009 is used for this estimation. They find that the age lowers the consumption expenditures in the rural area. It, however, increases in urban area and general. They also find that only marital status, age, insurance, size of the household and income in rural areas have statistically significant coefficients.

There are only a few studies that investigate the differences in consumption. Most of them analyze the food consumption. However, very few of them consider regional disparities. There is no study –to the authors' knowledge- regarding consumptions with GWPR model for all regions in Turkey.

2.3 Methodology and Data Analysis

This essay uses NUTS-2 level annual data for 26 regions in Turkey, covering the period 2005 to 2013. The data are obtained from online database of Turkish Statistical Institute(TSI) (TSI, 2016). We collect data for 12 different item groups which are food, alcohol, clothing, shelter, furniture, health, transportation, communication, recreation, education, restaurants and other goods and service.

We use a different version of Almost Ideal Demand Model (AID), proposed by Deaton & Muellbauer (1980). This model can be shown as follows:

$$S_{it,l} = \alpha_i + \beta_i(\ln(x_{it}) - \ln(p^*_{it})) + \delta_{il}\sum_{l=1}^{12}\ln(p_{it,l}) + \gamma_i D_{it} + u_{it} \qquad (2.1)$$

Where i(regions) =1.2… 26, t=2005,…2013 and l : goods & service.

In equation (2.1), $S_{it,l}$ denotes the share of the consumption expenditure (in total expenditure) of the l^{th} goods & service in the i^{th} region for the period t and x_{it} denotes total amount of the expenditure for goods & service.

p^*_{it} denotes the general price index for i^{th} region and $p_{it,l}$ shows price index for l^{th} goods & service.

Lastly , D_{it} : demographic factors (population, employment, education etc.)

Taking into account the demographic factors in the original model helps us to obtain better estimation of the coefficients (Dhar, Chavas, & Gould, 2003; Mazzocchi, 2003).

However, we use regional gross value added instead of total amount of the expenditure and we do not include the demographic factors into the model since it decreases the degrees of freedom.

we also do not consider endogeneity problem which is very common in demand models because there is no bidirectional interaction from dependent($S_{it,l}$) to independent (price) variables.

Income and price elasticities, respectively, for AID model by Blanciforti & Green(1983a), Blanciforti & Green(1983b) and Zhou(2015) can be seen as follows :

$$\eta_i = 1 + \frac{\beta_i}{w_i} \tag{2.2}$$

In equation (2.2), w_i is positive so that if β_i is negative then $\eta_i \prec 1$ otherwise $\eta_i \succ 1$

$$e_{ij} = -\delta_{ij} + \frac{\left[\gamma_{ij} - \beta_i(\alpha_j + \sum_{j=1}^{n} \gamma_{ij} \ln p_j)\right]}{w_i} \tag{2.3}$$

In equation (2.3), if $i = j$ then $\delta_{ij} = 1$ otherwise $\delta_{ij} = 0$

We employ GWPR technique proposed by Bruna & Yu(2013) and Yu(2010). This technique is one of the most recently developed techniques and is employed to estimate both price and income elasticities for 12 groups of goods and services for 26 regions. As we mentioned above the GWPR technique is better than other regression analysis with geographic information as it considers spatial autocorrelation and heterogeneity of data as well as individual heterogeneity.

The GWPR model used in the study is the extention of the cross-sectional Geographically Weighted Regression(GWR) which includes the reduction of semitemporal process to spatial process. It is also temporally invariant for the reason of short time period and can enable to apply spatial process to all temporal observations coincidently(Yu, 2010).

we construct our model by following Cai, Yu and Oppenheimer (2014), Yu(2010) and Bruna & Yu(2013) as follows:

$$Y_{(u,v)t} = \beta_{(u,v)} X_{(u,v)t} + \mu_{(u,v)} + \varepsilon_{(u,v)t} \tag{2.4}$$

In equation (2.4), u and v indicates geographic coordinates of latitude and longtitude and t shows the time. The dependent variable $Y_{(u,v)t}$ indicates the share of the consumption expenditure for the coordinates u and v in the year t. $\mu_{(u,v)}$ indicates

the time-invariant fixed effects. $\beta_{(u,v)}$ denotes the coefficient for the coordinates u and v. $X_{(u,v)t}$ represents the matrix of explanatory variables which are the ratio of total amount of the expenditure for goods to general price index and other price index for the coordinates u and v in the year t. Finally , $\varepsilon_{(u,v)t}$ indicates the residuals. Adaptive bandwith kernel functions as seen in detail in the studies of Bruna & Yu(2013), Yu(2010) and Fotheringham, Brunsdon, & Charlton(2002) are used to weight the observations in neighbouring regions because of its apparent advantage that each of the regression point can get identical amount of local data points to estimate the local coefficient in the model(Bruna & Yu, 2013). The spatial weights in the regression are considered as time-invariant in the estimation of the model(Cai et al., 2014). Akaike Information Criteria(AIC)(Parzen et al., 1998) is also adopted with these functions. The coefficients of the independent variables for a specific region are obtained employing the weighted least squares.

2.4 Empirical Results

This section presents and discusses the empirical estimation results obtained from the GWPR method for both price and income elasticities.

2.4.1 Income elasticity of demand

In microeconomic theory, any good or service is classified as “inferior” if its income elasticity of demand is negative; “necessity” if the elasticity is positive but less than 1; and finally “luxury” if the elasticity is greater than 1. Figure 2.1 shows the income elasticity of demand for food, alcohol, clothing and shelter in 26 regions of Turkey. In the Figures, 1, 2 and 3 denote inferior, necessity and luxury goods respectively. The numbers in the parenthesis denote the number of the regions in each classified groups.

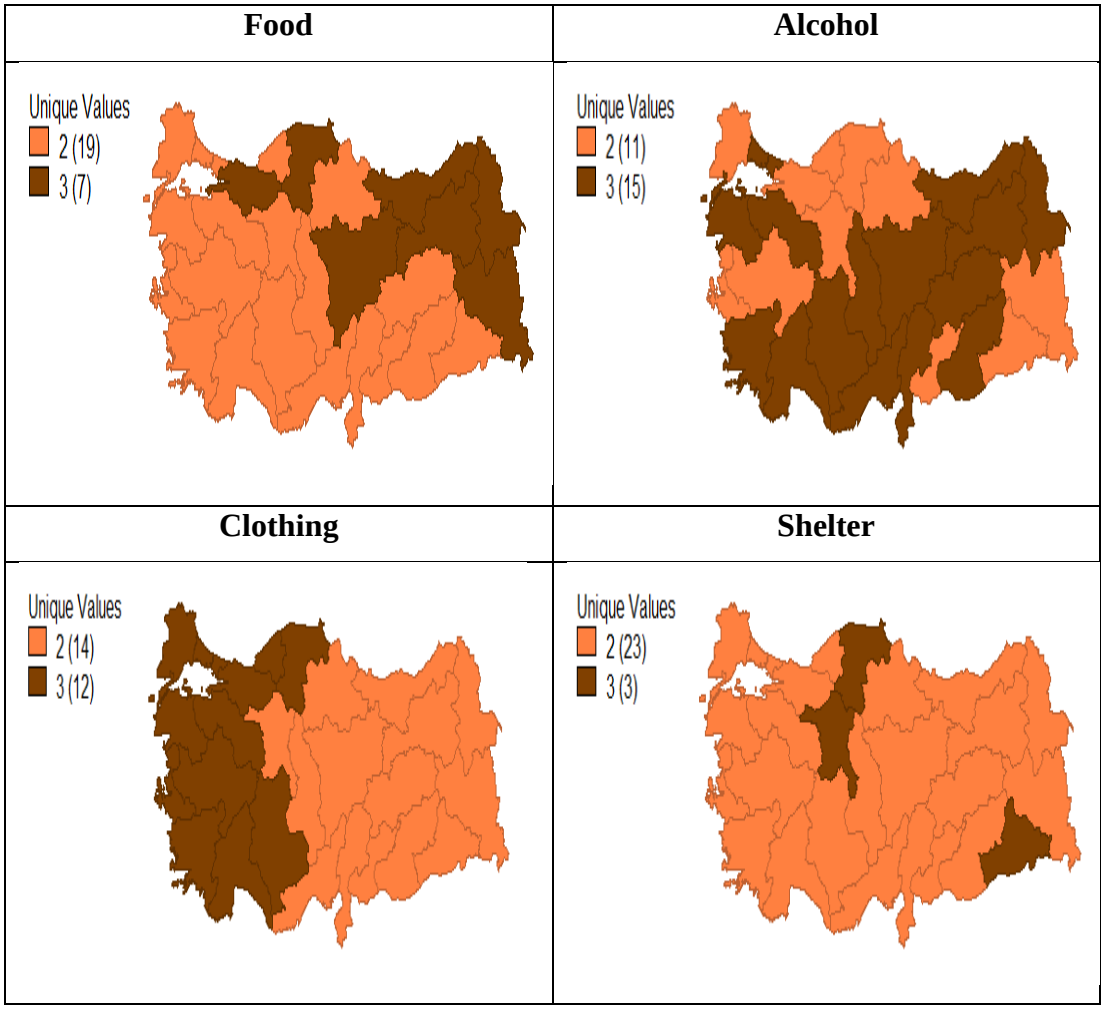

Figure 2.1 : Income elasticity of demand for food, alcohol, clothing and shelter.

Income elasticity for food presents that food is a necessity good for the most of the regions whereas it is considered to be a luxury good (higher elasticity) for the east and north part of Turkey, namely the regions of TR42, TR72, TR82, TR90, TRA1, TRA2, and TRB2, whose per capita income is relatively lower and expenditures on food still constitute a significant share in their budgets. The income elasticity for alcohol illustrates that they are luxury goods for the most of the regions except the regions TR21, TR31, TR 33, TR42, TR51, TR81, TR82, TR83, TRB2, TRC1 and TRC3. This clearly reflects the regional cultural behaviors of the households. Demand for alcohol is more elastic in relatively more conservative regions whereas it is relatively less elastic in relatively more liberal regions. With respect to the income elasticity of clothing, the country is interestingly divided into the east and the west. Although clothing is found to be a necessity good for the east regions, it is a luxury good for the west. That can be interpreted as that income disparities are reflected in the

consumption behaviors of the households. Finally, the income elasticity of shelter is inelastic as expected for almost all regions with a few exceptions, namely, TR51, TR82 and TRC3.

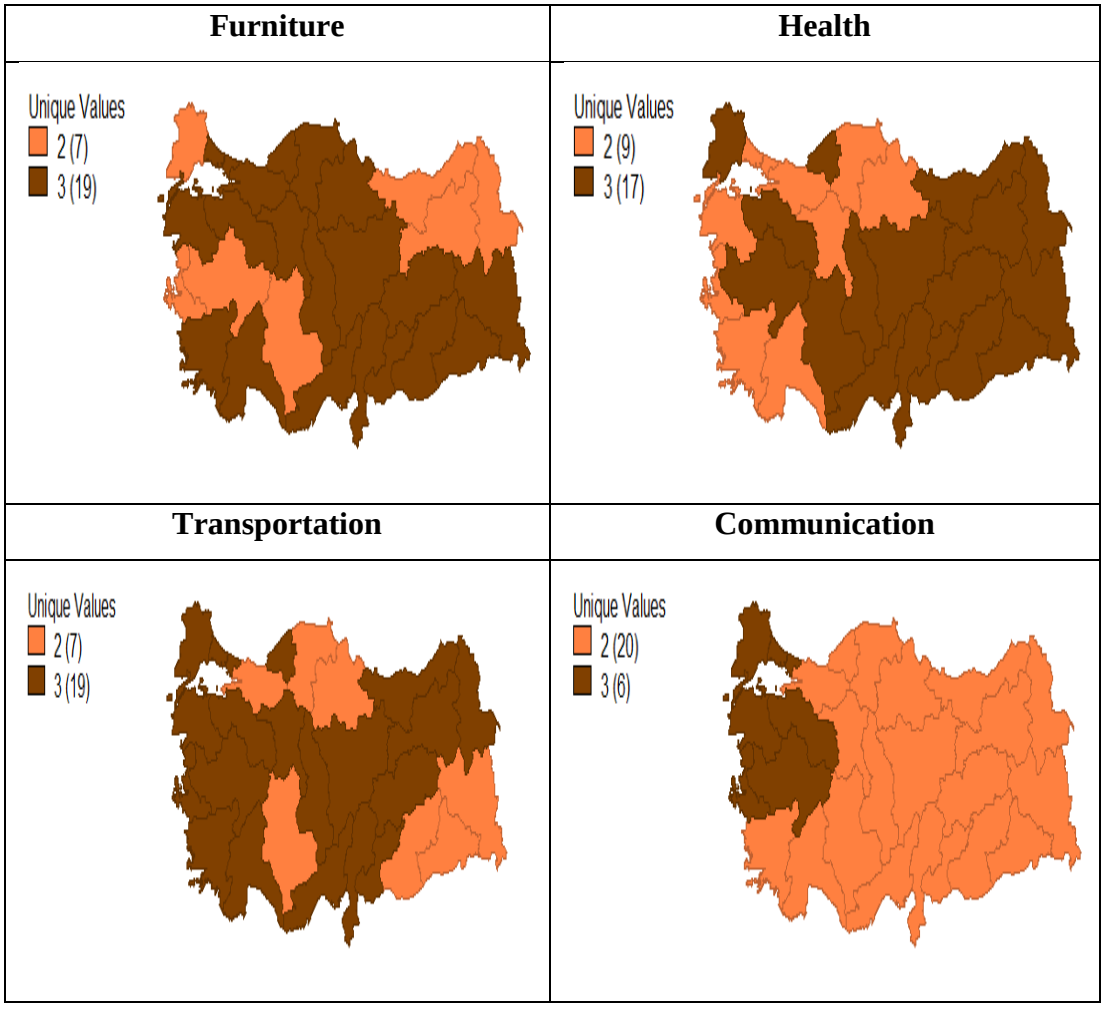

Figure 2.2 : Income elasticity of demand for furniture, health, transportation, communication.

Figure 2.2 present the income elasticity of demand for furniture, health, transportation and communication services in 26 regions of Turkey. The income elasticity for furniture and other household appliances is measured as having higher elasticity for most of the regions apart from TR21, TR31, TR33, TR52, TR90, TRA1 and TRA2 regions. Health services are found to be necessity for particularly relatively wealthier regions such as the Aegean and Mediterranean regions but luxury for the rest of the country. Demand for transportation services has lower elasticity value for especially relatively poorer regions such as the southeastern part, a quite mountainous region where transportation across the cities is rather difficult and the means of transportation are limited. Income elasticity of demand for communication services is considered to

be a necessity good for most of the regions except TR10, TR21, TR22, TR31, TR33 and TR41 regions, whose income per capita are relatively higher and thus have more easily access to alternative means of communication.

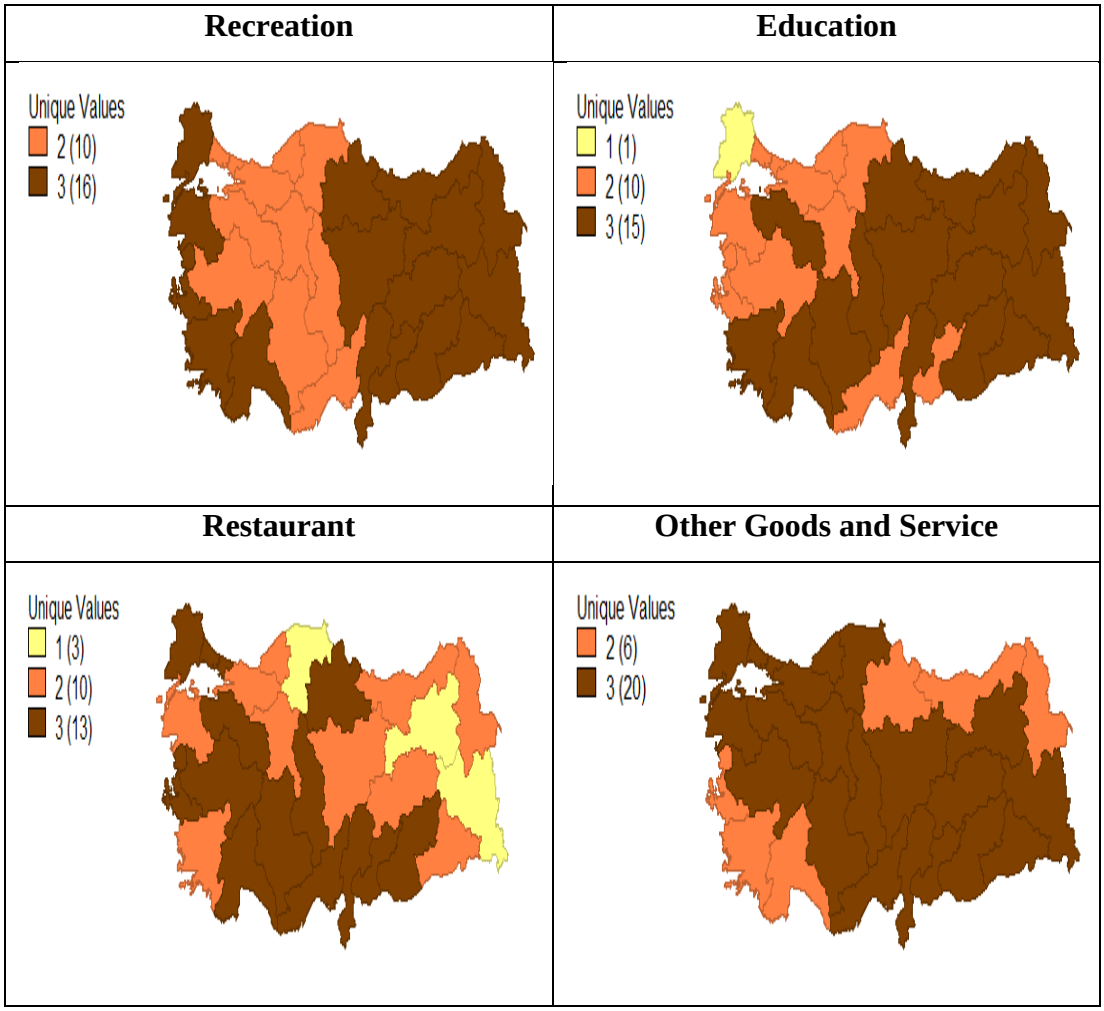

Figure 2.3 : Income elasticity of demand for recreation, education, restaurants and other goods and service.

Figure 2.3 illustrates the income elasticity of demand for recreation, education, hotels and restaurants and other goods and service(not classified under any of the eleven groups and include personal care and beauty products, insurance, social security, financial services etc.) in 26 region of Turkey. Income elasticity for recreation and cultural expenditures is found to be relatively more elastic in the east part of the country and is expected to be less elastic for the central and the western parts. However, the relatively wealthier western regions are found to be more elastic, which is a surprising finding. Education is found to be a luxury service (higher income elasticity) for the most of the country, except some regions in the west and in the south where income per capita is relatively higher, urbanization level is relatively higher

(including big metropolitans such as Istanbul, Ankara and Izmir) and literacy rate is quite high. Demand for education is found to be even inferior for TR21 where the literacy rate is almost 100 percent. Similarly, demand for hotels and restaurants is found to be income elastic for most of the regions especially in the central and in the west. As expected, We obtain a lower elasticity (even inelastic) for the eastern part of the country as eating out is not a general habit for many households. Surprisingly, income elasticity is found to be less elastic for TR22 and TR32. This finding is not suprising since these coastal regions are mostly touristic regions where there are a lot of hotels and restaurants. Income elasticity of demand for personal care and beauty products, insurance, social security, financial services is mostly elastic for most of the regions.

2.4.2 Price elasticity of demand

In microeconomic theory, any good or service is classified as “elastic” if its price elasticity of demand is greater than 1 (in absolute value); “inelastic” if the elasticity is between 1 (in absolute value) and zero; and finally and very rarely “Giffen good” if the elasticity is positive. Figure 2.4 shows the price elasticity of demand for food, alcohol, clothing and shelter in 26 region of Turkey where 1, 2 and 3 denote elastic, inelastic and Giffen goods, respectively. The numbers in the parenthesis denote the number of the regions in the respective group.

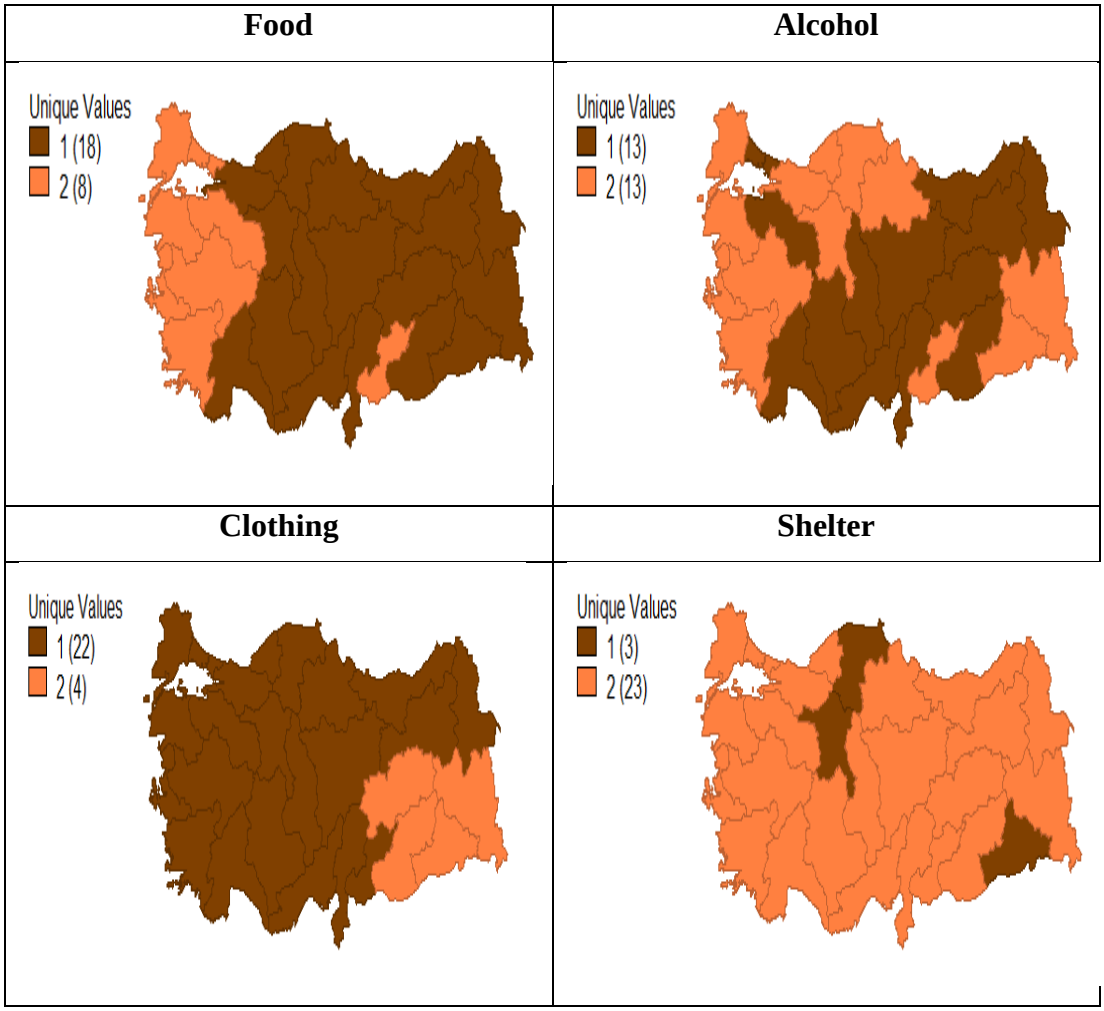

Figure 2.4 : Price elasticity of demand for food, alcohol, clothing and shelter.

The GWPR estimation results produce mostly negative elasticities for most of the regions which is consistent with the microeconomic theory. The estimated coefficients indicate that the demand for food and clothing are elastic for most of the regions. For over 15 years, the numbers of shopping malls and markets have increased substantially and the households have had access to a large variety of food and clothes. That is why they become more sensitive to the price changes. The demand for clothing is estimated to be relatively inelastic in the regions TRB1, TRB2, TRC2 and TRC3 regions where the shopping options are relatively limited. As expected, demand for shelter is inelastic for almost all regions except for TR51, TR82 and TRC3 regions. The demand for alcohol is estimated to be elastic for the central and northeastern regions and inelastic for the western and northwestern regions where consumption of alcohol is relatively higher.

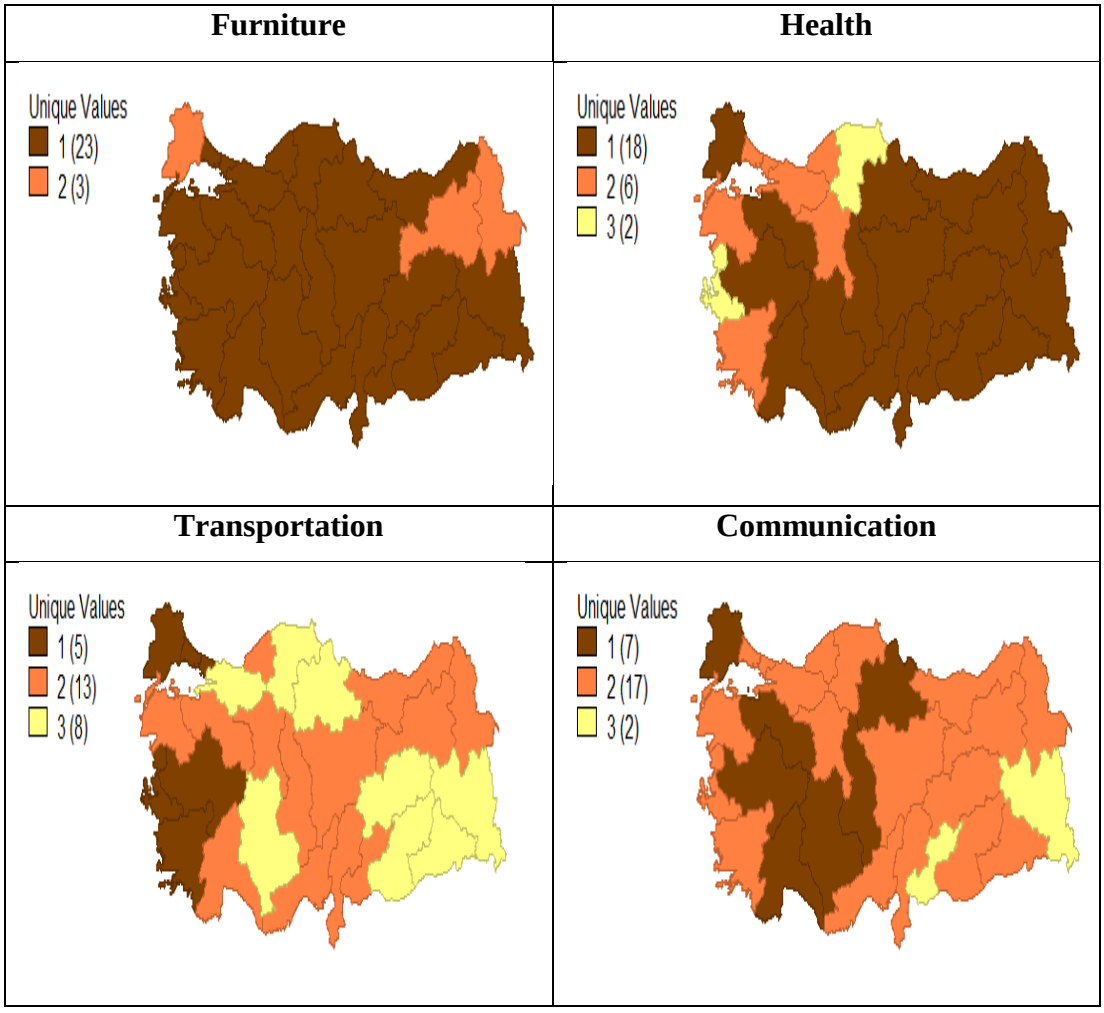

Figure 2.5 : Price elasticity of demand for furniture, health, transportation, communication.

Figure 2.5 presents the price elasticity for furniture, health, transportation, and communication services in 26 regions of Turkey. Price elasticity for furniture and household appliances seems to be highly elastic for almost all regions as the households have many options to buy their furniture and household appliances of national brands as well as international brands. The price elasticity of demand for health products and services seems to be inelastic for most of the country as we expected. It is measured to be elastic for relatively wealthier regions (TR10, TR22, TR32, TR42, TR51 and TR81) where there are big cities such as Istanbul, Ankara, Aydın and Çanakkale and also there are many private hospitals and health clinics in addition to many public hospitals. Surprisingly the elasticity is measured as positive for TR31 (0,322) and TR82 (0,139). However, They are close to zero. Similar results are obtained in the study of Feldstein(1970). Feldstein(1970) explains these results

either by weblenesque terms or by patients' assessment of the quality according to price. The price elasticity for transportation services seems to be mixed across the regions. It is found to be inelastic for the half of the regions (13) but elastic for five regions. Surprisingly, We obtain a positive elasticity for eights regions particularly for the southeastern regions where alternative ways of transportation is relatively limited. It seems that the households continue to use transportation services even if their prices are rising. Again the demand for communication services is estimated to be inelastic for most of the regions.

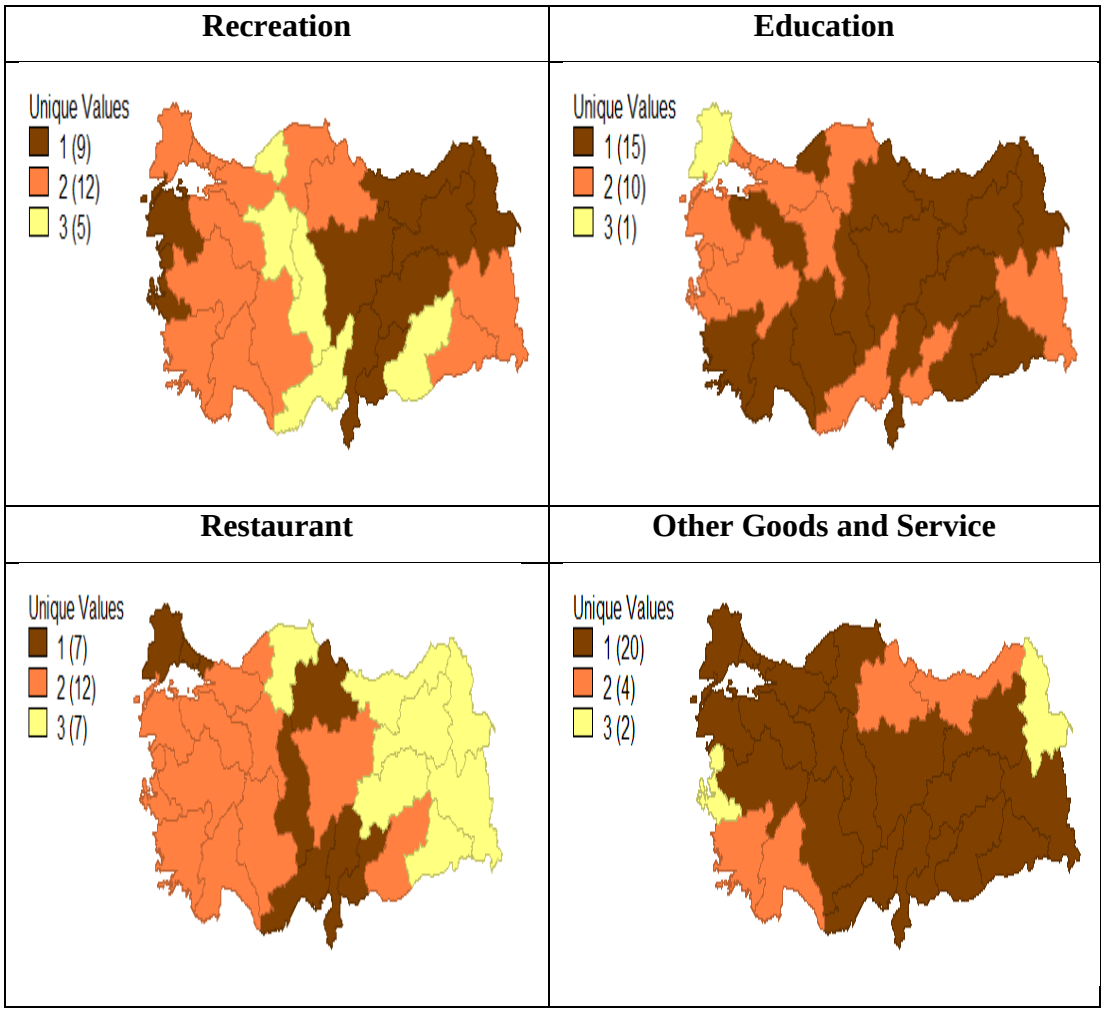

Figure 2.6 : Price elasticity of demand for recreation, education, restaurant and other goods and service.

Figure 2.6 illustrates the price elasticity for recreation, education, restaurants and other goods and service(including personal care and beauty products, insurance, social security, financial services etc) in 26 region of Turkey. Behaviors of the households seem to be highly varied in terms of recreational and cultural expenses, the coefficients being from -1,934 to 0,355. They reflect the cultural differences across the regions.

The same argument is valid for hotels and restaurants. Their price elasticities are mostly inelastic in the west, elastic in the central and Giffen in the east, reflecting the regional variety. The demand for education services is estimated to be mostly elastic across the country. We find inelastic coefficients for relatively more developed regions such as the Aegean, Marmara and partly central Anatolia regions. Interestingly, price elasticity of demand for education is measured to be a Giffen good for TR21 where we find a negative income elasticity (inferior good), which is consistent result for this region. The demand for personal care, financial and insurance services seems to be elastic for almost the whole country with a few exceptions.

2.5 Concluding Remarks

This study aims to analyze the consumption patterns of the Turkish Households by using the income and price elasticities of demand for 12 different goods and service groups for 26 NUTS-2 classified regions. We estimate the elasticity coefficients by using the GWPR method for the period from 2005 to 2013.

The results of the study reveal that there are similarities as well as disparities in terms of household consumption behaviors. They vary across the regions and across the groups of goods and services. Turkish households react similarly to the changes in their income independent of their regions. Their demands for shelter are usually inelastic, whereas their demands for furniture, transportation, health and personal care products are mostly elastic. However, there are significant differences across the regions in their demands for seven groups. There is a clear difference between the east and west parts of the country in terms of demand for food, clothing and communication services, which implies that the consumption patterns for basic goods and services are still varied between the east and the west. The demands for alcohol, restaurants and hotels and recreational activities are also varied across the regions but not in a systematic way as in the case of the previous groups of products. The income elasticity of demand for education is surprisingly and randomly is differed across the regions. We expect an inelastic demand for education without any significant regional disparities.

As for the price elasticity of demand; households' reactions to the changes in the prices are almost similar for demand for shelter, furniture and personal care products throughout the country. However, there are considerable amounts of differences across

the regions for the rest of the product groups. There is again a systematic difference between the east and west part of the country in terms of food and cloth consumption as in the case of income elasticities. However, regional consumption disparities are randomly distributed for alcohol, recreation, hotels and restaurants as their demands are heavily influenced from the cultural patterns. We expect relatively less disparities for basic services such as education, health, transportation and communication though our findings indicate the opposite.

Additionally, we find positive price elasticity of demand for some goods and service such as transportation in some regions in the southeast of Turkey, We also find positive price elasticity of demand for health, transportation, and communication services in, such as TR31(0,322) and TR82(0,139), regions with very low value. These results for positive price elasticities are parallel to the results of the studies by Kamerschen & Porter(2004), Brons, Pels, Nijkamp, & Rietveld(2002), Feldstein(1970) and Ricketts & Westfafl(1993) for all over the world.

There may be several reasons that create differences across the regions. Population may be the most important factor that increase the difference in consumption among these 26 regions. In general, the population growth in the eastern regions is higher than the western regions. This makes a difference in many consumption expenditure elasticities. Income may also affect the difference in consumption expenditure elasticities. The income of the eastern regions is generally lower than the western regions. For this reason, especially demand elasticity of food, clothing, communication and education differ between regions. Finally, consumption pattern is the most likely reason that create differences in the elasticity of consumption good. For example, people in eastern regions prefer to consume more meat, whereas people in the western region prefer to consume vegetables. So that the elasticity of food consumption differs between the eastern and western regions.

The results of the study provide a better understanding of the regional differences in Turkey. The findings are expected to guide for policy makers to make policies for regional development. They also provide insights for investors who are planning to invest in different groups of products and in various regions.

Regional development agencies can play an important role to decrease the difference across the regions by investigating the main reason that increases the difference and

informing the government. These regional development agencies for each region are established after the establishment of 26 NUTS-2 regions within Turkey to mobilize the support and to fund the projects for regional development(Lagendijk, Kayasu, & Yasar, 2009).

However, we should take into account some limitation. For example, we use disaggregate data to calculate the elasticities, so some of the results are ambiguous. Hence, This ambiguity can be removed by using aggregate data in future studies

3. NEOCLASSICAL GROWTH MODEL AND CONVERGENCE ANALYSIS[1]

3.1 Introduction

In recent years, information and communication technologies have developed very rapidly. This is coupled with the remarkable improvements in transportation. Not only the labor but also the other factors of production have become very mobile, facilitating the increases in incomes in all regions. At the same time, the interactions among households in different regions have increased over time, leading to the convergence of the consumption habits. The concept of convergence indicates the reduction of the disparities among the regions. There are a large number of studies on income convergence whereas relatively less studies on the interactions among the households. Few of them to cite are Baumol (1986), Hobijn & Franses (2000), Carlino & Mills (1993) and Durlauf & Johnson (1995).

Most of the existing studies test whether or not the poorer regions converge to relatively richer regions in terms of per capita income (production). In other words, they mainly focus on the supply side of the convergence. This leads to a huge gap in the literature in terms of demand side analyses.

In this part, we test the convergence among the Turkish regions. Demand side of the convergence is tested by using the expenditure data whereas supply side of the convergence is tested by income data. Annual data are compiled for the expenditures on 12 groups of goods and services and income for 26 NUTS-2 regions, covering the period from 2004 to 2011 and the period from 2005 to 2013, respectively.

we employ four different econometric techniques to test the convergence for these groups and service groups as well as income during this period. These econometric techniques are spatial dynamic panel regression model approach by Lee & Yu(2010),

[1] A version of this part is published in "Eurasian Academy of Sciences Eurasian Business Economics" which is titled "Do Consumption Behaviors Converge ? A Regional Demand Side Analysis of Convergence Clubs"

quantile regression technique by Galvao(2011), convergence clubs approach by Hobijn & Franses(2000) and distribution approach by Quah(1996). We obtain the results of convergence for each of the groups and service and income.

we find that the differences across the 26 regions of Turkey in food expenditure, clothing expenditure and health expenditure gradually decrease in this period. We also find that not only convergence but also divergence does not exist in furniture expenditure, shelter expenditure, recreation expenditure, restaurant expenditure and education expenditure at the same period.

Novelty of the essay is threefold. Firstly, it takes into account not only the supply side of the convergence but also the demand side of them, whereas existing studies consider only the supply side of the convergence. Secondly, this is the most current study on Turkish regions covering the period 2005 to 2013[2]. Thirdly, This is the first study –to the authors' knowledge- that uses four different approach in one essay and the first study that use quantile regression technique by Galvao(2011) to test convergence across regions in Turkey.[3]

A brief review of the relevant literature is presented in Section 3.2. This is followed by the model and the data in Section 3.3 and 3.4. Empirical results is discussed in Section 3.5. Section 3.6 concludes the essay with concluding remarks

3.2 Literature Review

Initially a brief review of the literature on income convergence is given, then we will present a few empirical study on consumption convergence.

3.2.1 Income convergence

Studies on convergence test whether regional income differences decrease over time and regions convergence to each other by using growth models. Neoclassical growth models are based on the work of Solow (1956). According to these models, economies with similar preferences and technological characteristics converge to the same level (Bernard & Durlauf, 1996). After the work of Baumol (1986), testing of the convergence hypothesis has become widespread (Durlauf & Johnson, 1995). In most

[2] Abdioğlu & Uysal (2013a) and Abdioğlu & Uysal (2013b) cover the period from 2004 to 2008.
[3] Temel et al.(2005) studied convergence in productivity but not in income or expenditure and they covered the period 1975 to 1990.

studies, cross-sectional regressions are used to test the convergence of per capita income in countries and the growth rate of GDP is regressed on the initial income level. The negative and statistically significant coefficient obtained from this regression is accepted as proof of unconditional convergence. An addition of some explanatory variables to the growth regression is considered as conditional convergence when the income coefficient is negative and significant(see, for example, Carlino & Mills, 1993; Hofer & Wörgötter, 1997; Islam, 1995; Yamanoğlu, 2008).

Islam (1995) analyzes the convergence of countries' incomes using a dynamic panel regression model and finds convergence across countries. Durlauf & Johnson (1995) do not prefer to employ the widely used linear models. They use multiple regimes instead of the linear models. Bernard & Durlauf (1995) employ two new convergence definitions and common trends and test them on 15 Organisation for Economic Co-operation and Development (OECD) countries. Having initially employed a technique proposed by Phillips & Ouliaris (1988) to find out the number of the linearly independent stochastic trends, they use a second technique proposed by Johansen (1988, 1991) to obtain the rank in the cointegration matrix. They do not find convergence among countries.

Unlike these studies, Carlino & Mills (1993) test both the stochastic convergence and the β-convergence in the U. S. regions for nearly 60 years. They find stochastic convergence in regional per-capita incomes among 8 regions of the USA over the period from 1929 to 1990. They also find β-convergence across these regions.

Barro & Sala-i-Martin (1991) test the convergence among the 73 different regions of 7 Western European countries from the period 1950 to 1985. They find the convergence in the regions of Germany, Belgium, Denmark, France, Netherlands and United Kingdom. Barro & Sala-i-Martin (1992) investigate the convergence for both 47 prefectures of the Japan and 48 states of the USA. They find not only intra-regional convergence but also inter-regional convergence in these two countries. Bernard & Jones (1996) conduct the convergence in technology at both the aggregate and sectoral level for 14 OECD countries and find interesting results. Evans & Karras (1996) show that conventional approaches are invalid in different structure of data sets. They propose an alternative approach for different types of data sets. They also test this alternative approach for 48 states in the U.S. and a group of 54 countries and find

strong conditional convergence. Hofer & Wörgötter(1997) assess the dispersion and growth of per capita income for 9 regions of Austria and 84 different districts using time series techniques and find very slow convergence. Barro & Sala-i-Martin (2004) investigate the disparities in the USA, in Japanese prefectures and in 8 different countries across Europe together over the period from 1880, 1930 and 1950, respectively and find absolute convergence for all of them. Cuaresma et al. (2011) study the robustness of the determinants of the growth in the regions in the European Union(EU) by employing the Bayesian averaging model in the context of quantile regression and present that each quantile has different robust growth determinants.

Concerning the studies on Turkey, there are many studies that analyze the regional differences in per capita income for various regions and provinces. Both Filiztekin (1998) and Tansel & Güngör (1999) focus on the convergence for the period between 1975 and 1995. While Filiztekin (1998) analyzes not only convergence among the provinces of the Turkey employing fixed effect model but also its main sources by using the convergence pattern of the sector, Tansel & Güngör (1999) investigate both labor productivity level and labor productivity growth rates to test the convergence between less developed and richer Turkish provinces for this period. Both of them find convergence among the provinces. Moreover, Filiztekin (1998) finds that productivity levels and productivity growth differ among the sectors as well as the provinces of Turkey. Temel et al. (2005) analyze the convergence in labor productivity among the Turkish provinces using Markov chain model for the period from 1975 to 1990 and find a convergence club for agricultural provinces and a convergence club for a highly industrialized provinces. Erk et al. (2000) assess the convergence for 67 Turkish provinces for the year between 1979 and 1997 by employing beta and sigma convergence and find that provinces of Turkey do not convergence. Berber et al. (2000) also find that regions of Turkey do not converge after examining the Turkish regions using both cross-section and panel data covering the period between 1975 and 1997. Similarly, Karaca (2004) investigates the convergence in provinces of the Turkey over the period between 1975 and 2000 by using beta and sigma convergence and finds that Turkish provinces do no converge each other. Yamanoğlu (2008) finds weak convergence across the provinces of the Turkey using cross-section data for the period of 1990 and 2001. Moreover, he finds stronger convergence among these provinces for the sub-period of 1995 and 2001. Karaalp & Erdal (2012) assess the

convergence across both 73 provinces and the provinces of the seven regions in Turkey using panel data during the period between 1993 and 2001 and find convergence across the provinces. Erlat (2012) studies the convergence among both regions and provinces of the regions of Turkey for the period between 1975 and 2001 and finds convergence across some of the provinces and regions.

Unlike previous studies, there are only two studies on convergence in per capita income that include post-2001 period (2004-2008). Abdioğlu & Uysal (2013a) analyze the convergence for the 26 NUTS-2 regions for the period between 2004 and 2008 using panel unit roots and find that these 26 NUTS-2 regions do not converge in gross value added. Abdioğlu & Uysal (2013b) also examine the convergence in both sectoral and aggregate level for the 26 NUTS-2 regions using nonlinear panel regression during the period between 2004 and 2008 and find convergence in gross value added as well as agriculture, industry and service sectors.

3.2.2 Consumption convergence

Almost all of the convergence studies mentioned above are concerned with convergence in per capita income. However, there is also expenditure dimension of the convergence. Mankiw et al. (1992) assess both the consistency of the Solow growth model with international variations in living standards and the standard of living converges and find that countries convergences. Similar arguments regarding the quality of life are expressed by Sen (1987, 1999), Khan(1991) and Dasgupta (1990, 1993). Moreover, Hobijn & Franses (2001) examine the convergence in the indicators of the standard of livings as an alternative to per capita income. They test the convergence for life expectancy at birth, daily protein supply, daily calorie supply, infant mortality rates as measures of standard of living by employing the cluster analysis, distributional dynamics and cross-section regressions and find that the convergence in per capita Gross Domestic Product (GDP) does not necessitate that other measures converge. Angulo et al. (2001) also investigate the convergence in the elasticities of calorie intake as well as the elasticities of income for EU countries and find very weak convergence across the products. Larson (2005) analyzes the stability of patterns of the regional food consumption for United States for 15 years and finds that the patterns of the food consumption in the northwest are not the same as in southwest. Novotny (2011) studies the convergence of the regions in the standards of

living for 264 regions of EU-27 for the period between 1992 and 2006. He mainly focuses on the convergence and divergence, mobility in the regions, switching, international component's role and polarization of per capita GDP and per capita expenditure of household using different techniques and find ambigious results for the convergence of all of the regions of the Europe.

3.3 Model

In this study, four approaches are employed to analyze convergence in regional income and consumption disparities. From these approaches, regression and quantile regression approaches are based on the equation (3.1) developed by Barro & Sala-i-Martin (2004).

The original model developed by Barro & Sala-i-Martin(2004) is as follows:

$$T^{-1}\log(y_{it-}y_{i0}) = a - T^{-1}\left(1-e^{-\beta T}\right)\log\left(y_{i0}\right) + u_{i0,T} \qquad (3.1)$$

In equation (3.1), y_{it} denotes per capita income and y_{i0} denotes initial income. Per capita income is tested for cross-region β convergence and the share of consumption expenditure obtained for 12 groups of goods and service instead of income is used to test for cross-region β convergence in each group of goods and service. Unlike Barro & Sala-i-Martin (2004), regional control variables is added to the right side of the equation (3.1). In this case, if the coefficient of $\log\left(y_{i0}\right)$ is negative or the coefficient of β is positive, it shows conditional convergence instead of absolute (unconditional) convergence.

3.3.1 Spatial panel dynamic regression

The first method to test for regional consumption and income convergence is spatial dynamic panel regression model. The spatial dynamic panel regression model developed by Lee & Yu (2010) is constructed by adding the regional variables to equation (3.1) proposed by Barro & Sala-i-Martin (2004) and can be written as follows:

$$\log(y_{it-}y_{i0}) = \lambda_0 W_n y_{it} + \theta_0 \log\left(y_{i0}\right) + \rho_0 W_n \log\left(y_{i0}\right) + \delta D_{it} + \alpha_i + \eta_t + u_{it} \qquad (3.2)$$

$$u_{it} = \phi M_n u_{it} + v_{it}$$

In equation (3.2), W_n is the spatial weight matrix, α_i is the individual effect and η_t is the time effect. The reason for using the spatial dynamic panel regression model is to take into account the spatial effects resulting from the regional interactions. Thus, more reliable estimates are obtained.

This study assumes that individual and time effects are fixed because it covers the whole of 26 NUTS-2 regions in Turkey. On the other hand, it should be noted that the spatial weight matrix can be defined in various ways.

In this study, the definition used in many spatial applications is utilized and the spatial weight matrix W_n based on Fotheringham, Brunsdon, & Charlton (2002) can be defined as follows:

$$w_{ij} = 1 \text{ for } 0 \le d_{ij} < b$$
$$w_{ij} = 0 \text{ others}$$

b(distance) is a certain threshold value and represents the lowest distance considering that there is at least one neighbor of each region. In this model β convergence requires that the θ_0 coefficient be negative.

The equation (3.2) to be used to test for β convergence across the regions and to account for income differences is a dynamic model. Lee & Yu (2010) develop the maximum likelihood estimator to estimate this model. Hence, the model is estimated using the maximum likelihood estimator.

3.3.2 Dynamic panel quantile regression

The second technique that can be used to estimate the demand model in the study and to test the convergence in consumption and income across the regions is quantile regression technique. The standard regression model estimates the conditional mean of the dependent variable by explanatory variables whereas the quantile regression technique estimates the entire conditional distribution of the dependent variable by explanatory variables. Thus, the current relationship between dependent and explanatory variables is depicted as a whole. The quantile regression technique developed by Koenker & Bassett (1978) is extended to the panel data over time. Mello & Perrelli (2003) show that there are two basic advantages of using the quantile

regression technique in growth models. First, it is robust against the outlying observations of the dependent variable in the model. This feature benefits when the unconditional distribution of growth is shaped by the long right tail. Second, and most importantly, there is only one solution for each quantile in the quantile regression model. Thus, looking at the conditional distribution of growth, the effect of policy variables on countries can be clearly seen. They also show that in growth theories, there is no evidence that human capital has the same effect on growth. The effect of human capital varies according to specific factors such as the growth rate of each region (country) or level of development. Similarly, through quantile regression, the convergence rates of fast-growing and slow-growing countries (regions) can be compared.

The studies investigating the convergence with quantile regression technique are performed using cross-section data. So, they do not include the effect of changes in the variables over time since they do not include the time dimension. Furthermore, it is assumed that the units (household, firm, province, region, country, etc.) are homogeneous in the cross-section models. However, these units may not be homogeneous due to individual differences in ability, management differences, cultural and geographical differences, and so on. Failing to incorporate these unobserved differences into the model can lead to biased estimates. Such problems in the cross-section data can be overcome by panel data models. Therefore, in this study, a dynamic panel quantile regression technique, which is a panel version of quantile regression, is used.

The dynamic panel quantile regression model developed by Galvao (2011) can be written as follows:

$$Q_{\log(y_{it}-y_{i0})}\left(\tau \left| \alpha_i, \eta_t, y_{i0}, D_{it} \right.\right) = \theta_0(\tau)\log\left(y_{i0}\right) + \delta(\tau)D_{it} + \alpha_i + \eta_t + u_{it} \qquad (3.3)$$

In equation (3.3), α_i and η_t denote fixed individual and time effects, respectively. However, there is one important point to note here. This model used in the analysis of convergence for income and consumption is dynamic. As T is small in this model, the results of the estimates employing the fixed effect or within estimator are biased and inconsistent and so that it is not correct to use the fixed effect estimator. Galvao (2011) suggests that dynamic panel quantile regression model can be estimated by fixed effect

instrumental variables. The method developed by Galvao (2011) is based on the Chernozhukov & Hansen (2006)'s instrumental quantile regression and employs the lagged of the regressors in the model as instruments.

3.3.3 Unit root test, clustering analysis and convergence clubs

In this study, the third approach that is used for convergence analysis can be used to determine the presence of convergence clubs through panel unit root and clustering algorithms. Convergence and clustering analysis, which is framed by Hobijn & Franses (2000), is also used by Hobijn & Franses (2001) to examine the convergence in living standards of different country groups (OECD countries, low-income countries, middle-income countries, etc.) according to World Bank classification. This analysis is chosen because it is appropriate to reach the objectives of their study. In their original work, Hobijn & Franses (2000) examine the processes in which countries are converged with each other in terms of per capita income in a convergence clubs consisting of different type of countries groups. The existence of convergence clubs leads to the question of how many of these clubs and which countries they are. In this case, clustering analysis is required. The advantage of the methodology is that it enables us to make endogenous selection of the converging regions.

Hobijn & Franses (2000) focus on three types of convergence: Asymptotically perfect convergence, asymptotically relative convergence and convergence of growth rates. The asymptotically perfect convergence, pioneered by Bernard & Durlauf (1995), suggests that the logarithms of per capita income levels of countries are similar, regardless of the current period income level. The asymptotically relative convergence, extension of Bernard & Durlauf (1995), suggests that the difference between countries' logarithms of per capita income levels converges to a certain fixed level, regardless of the current income situation of the countries. Finally, the convergence of growth rates suggests that countries converge to the same per capita productivity's growth rates, regardless of current period and past levels of per capita income.

The equations for expenditure and income in the analysis, based on Hobijn & Franses (2000), can be constructed as follows:

$$y_{(i,j)t} = s_{it} - s_{jt} \tag{3.4}$$

In equation (3.4), where s_i and s_j represent the shares of a group of expenditure in total expenditures in region i and region j, and $y_{(i,j)t}$ indicates the expenditure differences between regions. The equation for income can also be constructed in a similar way[4].

If $y_{(i,j)t}$ is stationary with a mean of zero, then i. and j. regions are asymptotically perfect convergent. If $y_{(i,j)t}$ is stationary at the level, then i. and j. regions are asymptotically relative convergent. Lastly, if the difference in $y_{(i,j)t}$ $\left(\Delta y_{(i,j)t,l}\right)$ is stationary with a mean of zero, then growth rates are convergent.

The panel unit root test can be applied to test the null hypothesis of convergence. For this purpose, the unit root equation for N regions in the analysis, also based on Hobijn & Franses (2000), can be written in intensive form as follows:

$$y_t = \alpha + \beta t + H\sum_{h=0}^{t-1} v_h + u_t$$

$$y_t = \left[y_{1t}, y_{2t} \ldots . y_{Nt}\right] \qquad (3.5)$$

In equation (3.5), v_h denotes the first difference of at most N common stochastic trends in $y_{(i,j)t}$.

According to the above equations, asymptotically perfect convergence suggests asymptotically relative convergence and convergence of growth rates. This situation can be seen with the restrictions on the coefficient in the Table.3.1 as follows:

Table 3.1 : Restrictions of coefficients for different types of convergence.

Type	*Restrictions of parameters*
Asymptotically perfect convergence	$\alpha_i=\alpha_j$, $H_{is}=H_{js}$ $\forall s=1,2,\ldots m$, $\beta_i = \beta_j$
Asymptotically relative convergence	$H_{is}=H_{js}$ $\forall s=1,2,\ldots m$, $\beta_i = \beta_j$
Convergence of growth rates	$\beta_i = \beta_j$

This Table is constructed by taking into account Hobijn & Franses (2000).

[4] $D_{(i,j)t} = s_{it} - s_{jt}$ where s_i and s_j represent gross value added in regions i and region j and $D_{(i,j)t}$ indicates the income differences between regions.

In Table 3.1, α_i and β_i are respectively the element of α and β vectors, whereas H_{is} is i. row and s. column elements of H matrix. Hobijn & Franses (2000) illustrate that the logarithm of the income ($y_{(i,j)t}$) per capita level's variance of the cross-section is infinity when, for i and j regions, $H_{is} \neq H_{js}$ for some s or $\beta_i \neq \beta_j$.

This suggests that variance goes to infinity if levels of $y_{(i,j)t}$ have different stochastic and deterministic trends and removes the possibility of a common stochastic trend. So that convergence of growth rates is a sufficient condition and not a necessary condition. However, asymptotically perfect convergence and asymptotically relative convergence suggests constraints on the stochastic trend. In both types of convergence, i and j regions converge if $y_{(i,j)t}$ levels are cointegrated each other with cointegrating vector [1 -1]. This is only possible if the constraint $H_{is} = H_{js}$ is valid. Thus, $y_{(i,j)t}$ has non-degenerate distribution. For this reason, We, in this study, focus on more realistic asymptotically perfect convergence and asymptotically relative convergence similar to the study of Hobijn & Franses (2000).

3.3.3.1 Multivariate analysis of unit root tests for convergence

Two unit roots tests are used to test for Asymptotically perfect and Asymptotically relative convergence. Unit root tests with asymptotic distributions, developed by Hobijn & Franses (2000), are multivariate version of the Kwiatkowski-Phillips-Schmidt-Shin(KPSS) unit root test and they are also the basis for clustering analysis because they are independent of the order of the data. The test procedure developed by Hobijn & Franses (2000) is briefly as follows:

A subsample with K regions is generated from the sample consisting of N Regions and y_{it} can be written under the constraints of Table.3.1 as follows:

$$L_K = \begin{bmatrix} 1 & -1 & 0 & \dots & \dots & 0 \\ 0 & . & & & & , \\ . & & . & & & . \\ . & & & . & & 0 \\ 0 & & & 0 & 1 & -1 \end{bmatrix}$$

Where $x_t = L_K y_t^*$ and $y_t^* = \left[y_{1t}, y_{2t}, \dots . y_{N^* t} \right]'$

Unit root tests are applied to series x_t after this transformation. This indicates that the representations of x_t and y_t are not different.

$$x_t = \alpha + \beta t + H\sum_{h=0}^{t-1} v_h + u_t$$

v_h comprises at most K-1 common trend in x_t.

For asymptotically perfect and relative convergence, multivariate version of the KPSS test is applied to the null hypotheses expressed in following Table 3.2

Table 3.2 : Null hypotheses of convergence.

Type of hypothesis	*Type of convergence*	*α*	*β*	*L*
H_1: stationarity of zero mean	Asymptotically perfect convergence	0	0	0
H_2: stationarity of level	Asymptotically relative convergence	Not restricted	0	0

Where $m \in \{1,2,.. K-1\}$.

The hypotheses of H_1 and H_2 above can be tested by the following test statistics, respectively:

$$\varpi_1 = \frac{\sum_{t=1}^{T} S_t' \frac{1}{\left[\hat{G}_l\right]} S_t}{T^2} \quad \text{and} \quad \varpi_2 = \frac{\sum_{t=1}^{T} \tilde{S}_t' \frac{1}{\left[\hat{G}_l\right]} \tilde{S}_t}{T^2}$$

Where $S_t \equiv \sum_{s=1}^{t} x_t$, $\tilde{S}_t = \sum_{s=1}^{t} z_t$ and $z_t \equiv x_t - \left(T^{-1}\sum_{s=1}^{t} x_t\right)$ and $\hat{G}_l$ denotes the Newey-West consistent estimator proposed by Newey & West(1987) in the model.

3.3.3.2 Clustering analysis

The convergence analysis is switched to the clustering analysis after the convergence hypothesis is tested. Since the test statistics mentioned above are not tied to the order of the data, they constitute a basis for clustering analysis The clustering analysis developed by Hobijn & Franses (2000) consists of two stages since asymptotically perfect convergence suggests asymptotically relative convergence. In the first stage, regions are clustered on the basis of stationarity with zero mean. Then in the second stage, asymptotically perfect convergence clubs are clustered by the level of

stationarity test results and asymptotically relative convergence clubs are obtained. The details of the clustering algorithm are given by Hobijn & Franses (2000).

3.3.4 The kernel density and the dispersion approach

Another technique for estimating convergence is to estimate kernel density functions within the framework of dispersion approach proposed by Quah (1996). In this context, Kernel density functions are obtained for consumption of each goods and service groups and per capita income. Thus, the distribution of the increase in consumption and per capita income is examined over time. These functions are used to determine if there is polarization in the regional distribution of variables such as consumption and income. Similarly, Novotny (2011) conducts a study of the convergence of living standards for 264 regions of 27 member states of the EU using kernel density functions and find that polarization declines over time and that the some poor regions of central and eastern European countries converges.

In this work, the Gaussian kernel density function is used and bandwith selection is chosen according to the rule of Silverman (1986) .

Estimation of kernel density based on Novotny (2011) can be written as follows:

$$\hat{f}(y) = rh^{-1}\sum_{j=1}^{r} K\left(h^{-1}(y - y_j)\right) \tag{3.6}$$

In equation (3.6), K denotes kernel density function and h denotes bandwidth. Bandwidth selection in kernel density functions is very important. For this study, the bandwidth is selected according to the rule of Silverman (1986) shown in page 48 and the rule can be expressed as follows:

$$h = \frac{9A}{10T^{0.2}}$$
$$A = \min(S, (Q_3 - Q_1)/1.34)$$

Where T denotes the number of observations and S denotes standard deviation. Q_3 and Q_1 denote 3^{th} quartile and 1^{th} quartile, respectively.

As can be seen, if Silverman (1986) is taken as a rule base, the numerical value of the bandwidth varies according to the data and there is no fixed value. For example, for TR10 and TR21 regions and for food consumption expenditure, this value is 0.935 and 0.76 respectively.

3.4 Data

This study covers the annual period 2005-2013 when analyzing regional consumption convergence and the period 2004-2011 when analyzing regional income convergence for 26 regions at NUTS-2 level.

For the analysis of convergence in expenditures, We use the share of each goods and services groups in total expenditures and regional price indexes (used as deflators). Gross value added at regional level is proxied for income for the analysis of convergence in income. All data are collected from the online database of the TSI (TSI, 2016).

3.5 Empirical Results

The results of the convergence analysis of consumption and income across the regions are presented according to standard and quantile regression, unit root and distribution approaches. To be more precise, the regional employment rate and the schooling rate in primary education are added as control variables in the equations where conditional convergence is tested. The estimation results of these equations are given in the appendix.

3.5.1 Estimation results of the spatial panel dynamic model

The following tables illustrate the results of the convergence analysis estimated by the spatial dynamic panel regression model for consumption expenditures and income. In these tables, model 1 is a spatial dynamic panel regression model taking into account individual effects, whereas model 2 is a spatial dynamic panel regression model taking into account both individual and time effects. However, likelihood ratio (LR) tests results show that time effects are not statistically significant. Therefore, convergence results are interpreted based on the model 1 results considering only individual effects.

If the coefficient of $Y_{n,t-1}$ is negative and significant for a goods and service groups and income, then it converges across the regions.

Table 3.3 : Estimation results of the spatial panel dynamic model for food expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y^*_{nt}$	-0.323324321	-6.0232	0.026849723	1.5439702
$Y_{n,t-1}$	0.314189549	5.22178	-0.0148887	-0.4434029
$W_n Y^*_{n,t-1}$	0.348971926	4.07343	0.304984001	2.8392262
Likelihood	404.558412		376.1350	
LR(prob)	0.145696182	0.99959		

According to the Table 3.3, there is no convergence in food expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.4 : Estimation results of the spatial panel dynamic model for alcohol expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y^*_{nt}$	-0.42900468	-6.7764	-0.046157456	-1.261904
$Y_{n,t-1}$	-0.092849742	-0.6399	0.121505035	1.6495865
$W_n Y^*_{n,t-1}$	6.61E+09	0.00064	5.71E+13	0.0004953
Likelihood	223.0573873		257.3125563	
LR(prob)	-0.285724875	0.9979		

According to the Table 3.4, there is no convergence in alcohol expenditure across the 26 NUTS-2 regions in Turkey

Table 3.5 : Estimation results of the spatial panel dynamic model for clothing expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y^*_{nt}$	-0.350285163	-6.1439	0.033709972	1.6271971
$Y_{n,t-1}$	0.315784316	4.67164	-0.009956844	-0.236916
$W_n Y^*_{n,t-1}$	0.371973141	4.40123	0.197969331	1.8551747
Likelihood	368.3102617		347.280329	
LR(prob)	0.117586734	0.99976		

According to the Table 3.5, there is no convergence in clothing expenditure across the 26 NUTS-2 regions in Turkey

Table 3.6 : Estimation results of the spatial panel dynamic model for shelter expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.408372226	-6.5726	0.051571205	1.8490766
$Y_{n,t-1}$	0.193184029	1.81652	0.096505791	1.9019887
$W_n Y_{n,t-1}^*$	0.356983138	4.14412	0.099012494	0.8977934
Likelihood	373.5094296		352.5557472	
LR(prob)	0.115468986	0.99977		

According to the Table 3.6, there is no convergence in shelter expenditure across the 26 NUTS-2 regions in Turkey

Table 3.7 : Estimation results of the spatial panel dynamic model for furniture expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.550425168	-8.288	0.073337283	1.4060358
$Y_{n,t-1}$	0.278264795	2.50186	-0.103573282	-1.0330763
$W_n Y_{n,t-1}^*$	0.238998389	2.56127	0.108010535	0.9633778
Likelihood	303.023969		271.672136	
LR(prob)	0.218431902	0.9989		

According to the Table 3.7, there is no convergence in furniture expenditure across the 26 NUTS-2 regions in Turkey

Table 3.8 : Estimation results of the spatial panel dynamic model for health expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.604266577	-8.2176	0.05650766	0.9818279
$Y_{n,t-1}$	-0.061346585	-0.351	-0.207604939	-1.8668453
$W_n Y_{n,t-1}^*$	6.61E+09	0.00064	0.002000509	0.0137039
Likelihood	130.2089612		98.36966991	
LR(prob)	0.56081606	0.98973		

According to the Table 3.8 , there is no convergence in health expenditure across the 26 NUTS-2 regions in Turkey

Table 3.9 : Estimation results of the spatial panel dynamic model for transportation expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y^*_{nt}$	-0.511877173	-7.7432	-0.023988919	-0.6690452
$Y_{n,t-1}$	0.422078827	5.36638	-0.045394661	-0.656165
$W_n Y^*_{n,t-1}$	0.187959528	1.9742	0.213988256	1.6176154
Likelihood	201.0890668		166.6479471	
LR(prob)	0.375728885	0.99597		

According to the Table 3.9, there is no convergence in transportation expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.10 : Estimation results of the spatial panel dynamic model for communication expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y^*_{nt}$	-0.348342762	-5.1128	0.060153995	1.2579918
$Y_{n,t-1}$	0.386170186	3.28423	-0.048947558	-0.5214957
$W_n Y^*_{n,t-1}$	0.124972863	1.27038	6.61E+09	0.0005122
Likelihood	335.7715736		319.0788169	
LR(prob)	0.101985882	0.99983		

According to the Table 3.10, there is no convergence in communication expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.11 : Estimation results of the spatial panel dynamic model for recreation expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y^*_{nt}$	-0.373472067	-5.714	-0.02068895	-0.5284646
$Y_{n,t-1}$	0.489713593	5.46476	0.139408083	1.6059141
$W_n Y^*_{n,t-1}$	0.319981254	3.66583	0.151020159	1.3644734
Likelihood	200.9672736		182.7358909	
LR(prob)	0.190200372	0.99922		

According to the Table 3.11, there is no convergence in recreation expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.12 : Estimation results of the spatial panel dynamic model for education expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.537697266	-8.7806	0.048852389	0.9824507
$Y_{n,t-1}$	0.105398764	0.78507	-0.168721601	-1.7425363
$W_n Y_{n,t-1}^*$	0.335988183	3.82939	0.359994964	3.0830353
Likelihood	92.72464232		63.03512515	
LR(prob)	0.7718		0.97879	

According to the Table 3. 12, there is no convergence in education expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.13 : Estimation results of the spatial panel dynamic model for restaurant expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.517559858	-12.18	-0.014560823	-0.5298599
$Y_{n,t-1}$	0.525564383	8.88854	0.077733245	1.3497838
$W_n Y_{n,t-1}^*$	0.38199935	4.62615	0.035013451	0.2925798
Likelihood	210.9062359		153.0774993	
LR(prob)	0.640939		0.986052	

According to the Table 3.13, there is no convergence in restaurant expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.14 : Estimation results of the spatial panel dynamic model for other goods and service expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.399275483	-6.6309	0.065606273	1.1788058
$Y_{n,t-1}$	0.134991139	1.42484	0.141241584	1.1200103
$W_n Y_{n,t-1}^*$	0.145960155	1.48673	0.105024249	0.8621162
Likelihood	190.4875805		165.0320854	
LR(prob)	0.2868		0.997	

According to the Table 3.14, there is no convergence in other goods and service expenditure across the 26 NUTS-2 regions in Turkey.

Table 3.15 : Estimation results of the spatial panel dynamic model for income in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	0.00617	-8.1187	0.00766	0.9541
$Y_{n,t-1}$	0.0045	4.8807	-0.0038	-0.2446
$W_n Y_{n,t-1}^*$	0.4379	14.2065	0.4380	4.6144
Likelihood	424.054		423.5652	
LR(prob)	0.002307	0.99		

According to the Table 3.15, there is no convergence in income across the 26 NUTS-2 regions in Turkey.

According to the estimates of spatial panel dynamics regression model for consumption expenditure and income, We do not find convergence in both regional income and regional consumption. On the contrary, divergence is found based on model 1 results. Additionally, similar results are also obtained in the conditional convergence models reported in the appendix. Details of the results can be seen on the tables in the appendix.

3.5.2 Estimation results of the dynamic panel quantile regression

After spatial dynamic panel regression, dynamic panel quantile regression results are estimated for convergence analysis. Additionally, spatial effects on the panel quantile regression are included to make the model consistent with the previous equation. Unlike the spatial dynamic panel quantile regression, the weight matrix W is obtained from a geographically weighted regression model. The results for consumption and income are presented in the following tables.

If the coefficient of Yn,2005 (Yn,2004 for income) is negative and significant for a goods and service groups and income, then this converges among the regions.

Table 3.16 : Estimation results of the dynamic panel quantile regression for food expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.23093***	0.207153***	0.232556***
Yn,2005	-0.0103	-0.012448*	-0.01275**
WnYn,2005	0.00228***	0.001936***	0.002315***
Constant	-0.0007	0.010305	0.011379
Pseudo R2	0.6649	0.725308	0.716967
LR	62.05715	69.64605	77.38564

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.16, there is convergence in food expenditure in all quantiles except for 25th quantile among the 26 NUTS-2 regions in Turkey.

Table 3.17 : Estimation results of the dynamic panel quantile regression for alcohol expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.1616*	0.175238***	0.180468***
Yn,2005	-0.018	-0.01667	-0.00838
WnYn,2005	0.0001	-8.45E-05	1.57E-05
Constant	0.0223	0.026773	0.016236
Pseudo R2	0.5865	0.695406	0.763642
LR	51.49161	64.69810	85.28579

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.17, there is no convergence in alcohol expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.18 : Estimation results of the dynamic panel quantile regression for clothing expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.2354***	0.2092***	0.2065***
Yn,2005	-0.015**	-0.014*	-0.023**
WnYn,2005	0.0031***	0.003***	0.0034***
Constant	0.0024	-1E-03	0.0169
Pseudo R2	0.7916	0.775893	0.7811
LR	101.7044	79.58873	71.80286

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.18, there is convergence in clothing expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.19 : Estimation results of the dynamic panel quantile regression for shelter expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.21867***	0.213006***	0.230681***
Yn,2005	0.00746	0.006744	0.005355
WnYn,2005	0.00015*	0.000117	5.36E-05
Constant	-0.0283	-0.024676	-0.01761
Pseudo R2	0.72277	0.749928	0.777441
LR	116.3516	100.0949	107.1692

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.19, there is no convergence in shelter expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.20 : Estimation results of the dynamic panel quantile regression for furniture expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.1837***	0.200133***	0.235589***
Yn,2005	-0.041	-0.03088	-0.01025
WnYn,2005	0.0012	0.000661	0.000656
Constant	0.0648	0.053364	0.019313
Pseudo R2	0.7291	0.727149	0.701537
LR	69.33378	73.79409	81.14134

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.20, there is no convergence in furniture expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.21 : Estimation results of the dynamic panel quantile regression for health expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.119**	0.2035***	0.2069***
Yn,2005	-0.062*	-0.055*	-0.071**
WnYn,2005	0.0061*	0.0056	0.0073
Constant	0.012	0.0193	0.0326
Pseudo R2	0.7016	0.722675	0.747593
LR	48.64069	73.51195	113.0148

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.21, there is convergence in health expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.22 : Estimation results of the dynamic panel quantile regression for transportation expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.18533**	0.202633***	0.181604**
Yn,2005	0.01472	0.037343	0.007563
WnYn,2005	-0.0068**	-0.008355***	-0.00777**
Constant	0.0439	0.008999	0.083403
Pseudo R2	0.68699	0.686153	0.712787
LR	55.14686	69.48303	94.53576

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.22, there is no convergence in transportation expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.23 : Estimation results of the dynamic panel quantile regression for communication expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.1423***	0.15609***	0.158803***
Yn,2005	-0.029***	-0.01676	-0.01902
WnYn,2005	0.0014***	0.00112*	0.000545
Constant	0.0266	0.014335	0.024913
Pseudo R2	0.7166	0.682104	0.629836
LR	68.84225	46.53003	41.42888

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.23, there is no convergence in communication expenditure in all quantiles except for 25th quantile among the 26 NUTS-2 regions in Turkey.

Table 3.24 : Estimation results of the dynamic panel quantile regression for recreation expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.1324***	0.1358***	0.1248***
Yn,2005	-0.021	-0.021	-0.008
WnYn,2005	-0.003	-0.003	-0.005
Constant	0.0328	0.0406	0.0462
Pseudo R2	0.7502	0.659605	0.6164
LR	72.90383	45.58725	40.97703

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.24, there is no convergence in recreation expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.25 : Estimation results of the dynamic panel quantile regression for education expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.20152***	0.195264***	0.229244***
Yn,2005	-0.0016	-0.013979	-0.02011
WnYn,2005	-0.0017	0.000645	0.00496
Constant	7.79E-05	0.007055	0.009421
Pseudo R2	0.68856	0.72136	0.77675
LR	52.98496	58.56559	74.11059

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.25, there is no convergence in education expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.26 : Estimation results of the dynamic panel quantile regression for restaurant expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.1364***	0.163962***	0.203572***
Yn,2005	-0.019	-0.02706	-0.00816
WnYn,2005	-0.004	-0.00591**	-0.00275
Constant	0.0543	0.077938	0.036513
Pseudo R2	0.6906	0.72506	0.78683
LR	49.41420	60.01143	79.35271

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.26, there is no convergence in restaurant expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.27 : Estimation results of the dynamic panel quantile regression for other goods and service expenditure in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.155***	0.2272***	0.232***
Yn,2005	-0.038	0.0108	-0.023
WnYn,2005	-0.002	-0.003	-5E-04
Constant	0.0567	0.005	0.0419
Pseudo R2	0.6556	0.706157	0.77144
LR	42.86494	59.46108	61.74165

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.27, there is no convergence in other goods and service expenditure in all quantiles among the 26 NUTS-2 regions in Turkey.

Table 3.28 : Estimation results of the dynamic panel quantile regression for income in 26 regions of Turkey.

Quantile	**0.25**	**0.5**	**0.75**
WnYn*	0.206932***	0.207694***	0.206562***
Yn,2004	-0.000521	0.002652	0.004712
WnYn,2004	-0.000669	-0.000739	-0.000721
Constant	0.029909	0.007358	-0.008991
Pseudo R2	0.718741	0.733865	0.740901
LR	55.91043	59.31543	60.27972

* indicates that test statistics are significant at the 10 percent level of significance
** indicates that test statistics are significant at the 10 percent level of significance
*** indicates that test statistics are significant at the 10 percent level of significance

According to the Table 3.28, there is no convergence in income in all quantiles among the 26 NUTS-2 regions in Turkey.

According to the results of dynamic panel quantile regression, convergence is not found for many groups of goods and income, Exceptional cases are as followings:

(1) For food expenditure, convergence is found in the 50th and 75th quantile regression.

(2) For clothing expenditure, convergence is found according to all the quantile regression results.

(3) For health expenditure, convergence is found according to all the quantile regression results.

(4) For communication expenditure, convergence is found in the 25th quantile regression.

In addition to these cases, similar results are also obtained in the conditional convergence models reported in the appendix. Details can be seen on the tables in the appendix. The fact that the initial income is negative and significant in the high quantile values such as 75th quantile indicates that it is compatible with previous studies with quantile regression technique. That is, high quantile values correspond to high growth rates. High growth rates also represent areas of low initial income but fast-growing regions.

3.5.3 Estimation results of the convergence clubs

The above regression results indicate that in many cases there is no convergence for consumption expenditures and income. This situation strengthens the presence of convergence clubs. In order to test the situation, the third approach in this study is convergence club, developed by Hobijn & Franses (2000), based on unit root analysis According to this approach, convergence clubs are formed for consumption and income based on asymptotically perfect convergence. The results are presented in the tables below.

In these tables, each of the Convergence clubs for goods and service groups and income consists of the regions. These regions at the same convergence clubs converge.

Table 3.29 : Convergence clubs for food expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR71 (Kırıkkale, Aksaray, Niğde,	TR72 (Kayseri, Sivas, Yozgat)	TR63 (Hatay, K. Maraş, Osmaniye)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR32 (Aydın, Denizli, Muğla)
TR82 (Kastamonu, Çankırı, Sinop)	TR81 (Zonguldak, Karabük, Bartın)	TR83 (Samsun, Tokat, Çorum, Amasya)	TRC2 (Şanlıurfa, Diyarbakır)	TR52 (Konya, Karaman)
TR90 (Trabzon, Ordu, Giresun, Rize,	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	TRC1 (Gaziantep, Adıyaman, Kilis)		
TRA1 (Erzurum, Erzincan, Bayburt)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR21 (Tekirdağ, Edirne, Kırklareli)	TR22 (Balıkesir, Çanakkale)	TR31 (Izmir)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TR42 (Kocaeli, Sakarya, Düzce, Bolu, Yalova)
TR41 (Bursa, Eskişehir, Bilecik)	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR51 (Ankara)		
Club 11	**Club 12**	**Club 13**	**Club 14**	
TR61 (Antalya, Isparta, Burdur)	TR62 (Adana, Mersin)	TRB2 (Van, Muş, Bitlis, Hakkari)	TR10 (Istanbul)	

According to the Table 3.29, eight out of 14 convergence clubs for food expenditure includes more than one regions that converge.

Table 3.30 : Convergence clubs for alcohol expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR41 (Bursa, Eskişehir, Bilecik)	TR52 (Konya, Karaman)	TR10 (Istanbul)	TR82 (Kastamonu, Çankırı, Sinop)	TR22 (Balıkesir, Çanakkale)
TR62 (Adana, Mersin)	TR83 (Samsun, Tokat, Çorum, Amasya)	TR61 (Antalya, Isparta, Burdur)	TR90 (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane)	TR71 (Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir)
TR81 (Zonguldak, Karabük, Bartın)	TRC1 (Gaziantep, Adıyaman, Kilis)	TRC3 (Mardin, Batman, Şırnak,	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	
TRC2 (Şanlıurfa, Diyarbakır)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR33 (Manisa, Afyon, Kütahya, Uşak)	TR21 (Tekirdağ, Edirne,	TR42 (Kocaeli, Sakarya, Düzce,	TR63 (Hatay, K. Maraş, Osmaniye)	TR32 (Aydın, Denizli, Muğla)
TRA1 (Erzurum, Erzincan,	TR31 (Izmir)	TR72 (Kayseri, Sivas, Yozgat)		
Club 11	**Club 12**	**Club 13**		
TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR51 (Ankara)	TRB2 (Van, Muş, Bitlis, Hakkari)		

According to the Table 3.30, eight out of 13 convergence clubs for alcohol expenditure includes more than one regions that converge.

Table 3.31 : Convergence clubs for clothing expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR22 (Balıkesir, Çanakkale)	TR52 (Konya, Karaman)	TR21 (Tekirdağ, Edirne, Kırklareli)	TRB2 (Van, Muş, Bitlis, Hakkari)	TRA1 (Erzurum, Erzincan, Bayburt)
TR32 (Aydın, Denizli, Muğla)	TR71 (Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir)	TR63 (Hatay, K. Maraş, Osmaniye)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TRC2 (Şanlıurfa, Diyarbakır)
TR61 (Antalya, Isparta, Burdur)	TR90 (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane)	TR81 (Zonguldak, Karabük, Bartın)		
TR72 (Kayseri, Sivas, Yozgat)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR51 (Ankara)	TR42 (Kocaeli, Sakarya, Düzce, Bolu, Yalova)	TR41 (Bursa, Eskişehir, Bilecik)	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	TR10 (Istanbul)
TR82 (Kastamonu, Çankırı, Sinop)	TR83 (Samsun, Tokat, Çorum, Amasya)	TR62 (Adana, Mersin)	TRC1 (Gaziantep, Adıyaman, Kilis)	
Club 11	**Club 12**	**Club 13**		
TR31 (Izmir)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR33 (Manisa, Afyon, Kütahya, Uşak)		

According to the Table 3.31, nine out of 13 convergence clubs for clothing expenditure includes more than one regions that converge.

Table 3.32 : Convergence clubs for shelter expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR21 (Tekirdağ, Edirne, Kırklareli)	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR52 (Konya, Karaman)	TRA1 (Erzurum, Erzincan,	TR90 (Trabzon, Ordu, Giresun, Rize,
TR32 (Aydın, Denizli, Muğla)	TR61 (Antalya, Isparta, Burdur)	TR62 (Adana, Mersin)	TRB1 (Malatya, Elazığ, Bingöl,	TRC2 (Şanlıurfa, Diyarbakır)
TR63 (Hatay, K. Maraş, Osmaniye)	TR71 (Kırıkkale, Aksaray, Niğde,	TR81 (Zonguldak, Karabük, Bartın)		
TR82 (Kastamonu, Çankırı, Sinop)	TR83 (Samsun, Tokat, Çorum, Amasya)			
TRC1 (Gaziantep, Adıyaman, Kilis)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR10 (Istanbul)	TR41 (Bursa, Eskişehir,	TR22 (Balıkesir, Çanakkale)	TRC3 (Mardin, Batman, Şırnak,	TR31 (Izmir)
TR51 (Ankara)	TR72 (Kayseri, Sivas, Yozgat)	TR42 (Kocaeli, Sakarya, Düzce,		
Club 11	**Club 12**			
TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TRB2 (Van, Muş, Bitlis, Hakkari)			

According to the Table 3.32, eight out of 12 convergence clubs for shelter expenditure includes more than one regions that converge.

Table 3.33 : Convergence clubs for furniture expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR71 (Kırıkkale, Aksaray, Niğde,	TR41 (Bursa, Eskişehir, Bilecik)	TR21 (Tekirdağ, Edirne, Kırklareli)	TR22 (Balıkesir, Çanakkale)	TR61 (Antalya, Isparta, Burdur)
TR83 (Samsun, Tokat, Çorum, Amasya)	TR52 (Konya, Karaman)	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR31 (Izmir)	TR63 (Hatay, K. Maraş, Osmaniye)
TRA1 (Erzurum, Erzincan, Bayburt)	TR82 (Kastamonu, Çankırı, Sinop)	TR72 (Kayseri, Sivas, Yozgat)	TR32 (Aydın, Denizli, Muğla)	TRC1 (Gaziantep, Adıyaman, Kilis)
TRB1 (Malatya, Elazığ, Bingöl, Tunceli)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR42 (Kocaeli, Sakarya, Düzce, Bolu,	TR81 (Zonguldak, Karabük, Bartın)	TR51 (Ankara)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TR62 (Adana, Mersin)
TRC2 (Şanlıurfa, Diyarbakır)	TRB2 (Van, Muş, Bitlis, Hakkari)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)		
Club 11	**Club 12**			
TR90 (Trabzon, Ordu, Giresun, Rize, Artvin,	TR10 (Istanbul)			

According to the Table 3.33, eight out of 12 convergence clubs for furniture expenditure includes more than one regions that converge.

Table 3.34 : Convergence clubs for health expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR10 (Istanbul)	TR31 (Izmir)	TR61 (Antalya, Isparta, Burdur)	TR22 (Balıkesir, Çanakkale)	TR83 (Samsun, Tokat, Çorum, Amasya)
TR21 (Tekirdağ, Edirne,	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR71 (Kırıkkale, Aksaray, Niğde,	TR51 (Ankara)	TRC1 (Gaziantep, Adıyaman, Kilis)
TR63 (Hatay, K. Maraş, Osmaniye)	TR42 (Kocaeli, Sakarya, Düzce,	TR81 (Zonguldak, Karabük, Bartın)	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	
TR90 (Trabzon, Ordu, Giresun, Rize,				
TRB2 (Van, Muş, Bitlis, Hakkari)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR72 (Kayseri, Sivas, Yozgat)	TRA1 (Erzurum, Erzincan,	TR41 (Bursa, Eskişehir, Bilecik)	TR32 (Aydın, Denizli, Muğla)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)
TR82 (Kastamonu, Çankırı, Sinop)	TRC2 (Şanlıurfa, Diyarbakır)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TR52 (Konya, Karaman)	
Club 11				
TR62 (Adana, Mersin)				

According to the Table 3.34, nine out of 11 convergence clubs for health expenditure includes more than one regions that converge.

Table 3.35 : Convergence clubs for transportation expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR31 (Izmir)	TR10 (Istanbul)	TR90 (Trabzon, Ordu, Giresun, Rize, Artvin,	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR33 (Manisa, Afyon, Kütahya, Uşak)
TR41 (Bursa, Eskişehir, Bilecik)	TR42 (Kocaeli, Sakarya, Düzce, Bolu,	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	TRB2 (Van, Muş, Bitlis, Hakkari)	TR72 (Kayseri, Sivas, Yozgat)
TR52 (Konya, Karaman)	TR71 (Kırıkkale, Aksaray, Niğde,	TRC1 (Gaziantep, Adıyaman, Kilis)	TRC2 (Şanlıurfa, Diyarbakır)	TRA1 (Erzurum, Erzincan, Bayburt)
TR82 (Kastamonu, Çankırı, Sinop)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR51 (Ankara)	TR21 (Tekirdağ, Edirne, Kırklareli)	TR81 (Zonguldak, Karabük, Bartın)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TR22 (Balıkesir, Çanakkale)
TR62 (Adana, Mersin)	TR32 (Aydın, Denizli, Muğla)	TR83 (Samsun, Tokat, Çorum, Amasya)		
TR63 (Hatay, K. Maraş, Osmaniye)				
Club 11				
TR61 (Antalya, Isparta, Burdur)				

According to the Table 3.35, eight out of 11 convergence clubs for transportation expenditure includes more than one regions that converge.

Table 3.36 : Convergence clubs for communication expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR10 (Istanbul)	TR52 (Konya, Karaman)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR42 (Kocaeli, Sakarya, Düzce, Bolu,	TR22 (Balıkesir, Çanakkale)
TR31 (Izmir)	TR62 (Adana, Mersin)	TRC1 (Gaziantep, Adıyaman, Kilis)	TR51 (Ankara)	TR32 (Aydın, Denizli, Muğla)
TR33 (Manisa, Afyon, Kütahya, Uşak)	TR72 (Kayseri, Sivas, Yozgat)	TRC2 (Şanlıurfa, Diyarbakır)	TRA1 (Erzurum, Erzincan, Bayburt)	TR41 (Bursa, Eskişehir, Bilecik)
TRB1 (Malatya, Elazığ, Bingöl, Tunceli)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR82 (Kastamonu, Çankırı, Sinop)	TR71 (Kırıkkale, Aksaray, Niğde,	TR81 (Zonguldak, Karabük, Bartın)	TR61 (Antalya, Isparta, Burdur)	TRC3 (Mardin, Batman, Şırnak, Siirt)
TR90 (Trabzon, Ordu, Giresun, Rize, Artvin,	TR83 (Samsun, Tokat, Çorum, Amasya)	TRB2 (Van, Muş, Bitlis, Hakkari)		
Club 11	**Club 12**			
TR21 (Tekirdağ, Edirne, Kırklareli)	TR63 (Hatay, K. Maraş, Osmaniye)			

According to the Table 3.36, eight out of 12 convergence clubs for communication expenditure includes more than one regions that converge.

Table 3.37 : Convergence clubs for recreation expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR42 (Kocaeli, Sakarya, Düzce, Bolu,	TR63 (Hatay, K. Maraş, Osmaniye)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR22 (Balıkesir, Çanakkale)	TR31 (Izmir)
TR81 (Zonguldak, Karabük, Bartın)	TRA1 (Erzurum, Erzincan, Bayburt)	TRC2 (Şanlıurfa, Diyarbakır)	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR51 (Ankara)
TR83 (Samsun, Tokat, Çorum, Amasya)	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TR82 (Kastamonu, Çankırı, Sinop)	TR61 (Antalya, Isparta, Burdur)
TRC1 (Gaziantep, Adıyaman, Kilis)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR10 (Istanbul)	TR32 (Aydın, Denizli, Muğla)	TR71 (Kırıkkale, Aksaray, Niğde,	TR21 (Tekirdağ, Edirne, Kırklareli)	TR90 (Trabzon, Ordu, Giresun, Rize, Artvin,
TR62 (Adana, Mersin)	TR41 (Bursa, Eskişehir, Bilecik)	TRB2 (Van, Muş, Bitlis, Hakkari)	TR52 (Konya, Karaman)	
Club 11				
TR72 (Kayseri, Sivas, Yozgat)				

According to the Table 3.37, nine out of 11 convergence clubs for recreation expenditure includes more than one regions that converge.

Table 3.38 : Convergence clubs for education expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR22 (Balıkesir, Çanakkale)	TR71 (Kırıkkale, Aksaray, Niğde,	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR63 (Hatay, K. Maraş, Osmaniye)	TR83 (Samsun, Tokat, Çorum, Amasya)
TR32 (Aydın, Denizli, Muğla)	TR72 (Kayseri, Sivas, Yozgat)	TR61 (Antalya, Isparta, Burdur)	TRA1 (Erzurum, Erzincan, Bayburt)	TR90 (Trabzon, Ordu, Giresun, Rize, Artvin,
TR81 (Zonguldak, Karabük, Bartın)	TR82 (Kastamonu, Çankırı, Sinop)	TR62 (Adana, Mersin)	TRB2 (Van, Muş, Bitlis, Hakkari)	
TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	TRC1 (Gaziantep, Adıyaman, Kilis)			
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR10 (Istanbul)	TR31 (Izmir)	TR41 (Bursa, Eskişehir, Bilecik)	TR42 (Kocaeli, Sakarya, Düzce, Bolu,
TRC3 (Mardin, Batman, Şırnak, Siirt)	TR21 (Tekirdağ, Edirne, Kırklareli)	TR51 (Ankara)		
Club 11	**Club 12**			
TRC2 (Şanlıurfa, Diyarbakır)	TR52 (Konya, Karaman)			

According to the Table 3.38, eight out of 12 convergence clubs for education expenditure includes more than one regions that converge.

Table 3.39 : Convergence clubs for restaurant expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR21 (Tekirdağ, Edirne,	TR22 (Balıkesir, Çanakkale)	TR32 (Aydın, Denizli, Muğla)	TR82 (Kastamonu, Çankırı, Sinop)	TR52 (Konya, Karaman)
TR61 (Antalya, Isparta, Burdur)	TR33 (Manisa, Afyon, Kütahya, Uşak)	TR71 (Kırıkkale, Aksaray, Niğde,	TR83 (Samsun, Tokat, Çorum, Amasya)	TR62 (Adana, Mersin)
TR63 (Hatay, K. Maraş,	TR81 (Zonguldak, Karabük, Bartın)	TR72 (Kayseri, Sivas, Yozgat)		
TR90 (Trabzon, Ordu, Giresun, Rize,				
TRB1 (Malatya, Elazığ, Bingöl, Tunceli)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TRA1 (Erzurum, Erzincan,	TR42 (Kocaeli, Sakarya, Düzce,	TRB2 (Van, Muş, Bitlis, Hakkari)	TR31 (Izmir)	TRC2 (Şanlıurfa, Diyarbakır)
TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TRC1 (Gaziantep, Adıyaman, Kilis)	TR41 (Bursa, Eskişehir, Bilecik)	
Club 11	**Club 12**			
TR51 (Ankara)	TR10 (Istanbul)			

According to the Table 3.39, nine out of 12 convergence clubs for restaurant expenditure includes more than one regions that converge.

Table 3.40 : Convergence clubs for other goods and service expenditure.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR33 (Manisa, Afyon, Kütahya, Uşak)	TR62 (Adana, Mersin)	TR42 (Kocaeli, Sakarya, Düzce, Bolu,	TR22 (Balıkesir, Çanakkale)	TR10 (Istanbul)
TR51 (Ankara)	TR63 (Hatay, K. Maraş, Osmaniye)	TR61 (Antalya, Isparta, Burdur)	TRA1 (Erzurum, Erzincan, Bayburt)	TR52 (Konya, Karaman)
TR81 (Zonguldak, Karabük, Bartın)	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TRB2 (Van, Muş, Bitlis, Hakkari)	TRC3 (Mardin, Batman, Şırnak, Siirt)	TR82 (Kastamonu, Çankırı, Sinop)
TRC2 (Şanlıurfa, Diyarbakır)				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TR90 (Trabzon, Ordu, Giresun, Rize,	TR32 (Aydın, Denizli, Muğla)	TR31 (Izmir)	TR41 (Bursa, Eskişehir, Bilecik)	TR21 (Tekirdağ, Edirne, Kırklareli)
TRC1 (Gaziantep, Adıyaman, Kilis)	TR72 (Kayseri, Sivas, Yozgat)	TR71 (Kırıkkale, Aksaray, Niğde,	TRB1 (Malatya, Elazığ, Bingöl, Tunceli)	TR83 (Samsun, Tokat, Çorum, Amasya)

According to the Table 3.40, all of the convergence clubs for other goods and service expenditure includes more than one regions that converge.

The results of asymptotically perfect convergence analyses show that the number of clubs in terms of expenditures change from 10 or 14 clubs for these 26 regions in the NUTS-2 level. Food expenditure have the highest number of convergence clubs with 14 clubs among all groups. Alcohol and clothing expenditure have the second highest number of convergence clubs with 13 clubs. The next highest number of convergence clubs with 12 clubs belongs to shelter, furniture, communication, education and restaurant expenditure. We find 11 convergence clubs for health, transportation and recreation expenditure. Finally, other goods and service expenditure have the lowest number of convergence clubs with 10 clubs.

Istanbul, Ankara and Izmir, respectively, are three biggest cities as well as 3 different NUTS-2 regions by themselves in Turkey. Among these cities, Istanbul and Ankara are in the same club in shelter expenditure according to the empirical results. Ankara and Izmir are in the same club in food, education and recreation expenditures. Finally, Istanbul and Izmir are in the same club in communication expenditure according to the

results. Thus, the most populated cities seem to converge for these groups of expenditures.

There seems to be no neighborhood effects on convergence of consumption behaviors as the empirical results provide no significant evidence for locational proximity. The existing clubs seem to be not geographically but randomly constituted.

we obtain the following convergence clubs for income by employing the asymptotically perfect convergence method for 26 regions:

Table 3.41 : Convergence clubs for income.

Club 1	**Club 2**	**Club 3**	**Club 4**	**Club 5**
TR52 (Konya Karaman)	TR72 (Kayseri, Sivas, Yozgat)	TR32 (Aydın, Denizli, Muğla)	TR41 (Bursa, Eskişehir,	TR63 (Hatay, K. Maraş,
TR82 (Kastamonu Çankırı Sinop)	TR83 (Samsun, Tokat, Çorum,	TR81 (Zonguldak, Karabük, Bartın)	TR42 (Kocaeli, Sakarya, Düzce,	TRB1 (Malatya, Elazığ, Bingöl,
TR90 (Trabzon, Ordu, Giresun, Rize,				
Club 6	**Club 7**	**Club 8**	**Club 9**	**Club 10**
TRC3 (Mardin, Batman, Şırnak,	TRA1 (Erzurum, Erzincan,	TR71 (Kırıkkale, Aksaray, Niğde,	TRA2 (Ağrı, Kars, Iğdır, Ardahan)	TR62 (Adana, Mersin)
Club 11	**Club 12**	**Club 13**	**Club 14**	**Club 15**
TR61 (Antalya, Isparta, Burdur)	TRB2 (Van, Muş, Bitlis, Hakkari)	TR51 (Ankara)	TRC1 (Gaziantep, Adıyaman, Kilis)	TR33 (Manisa, Afyon, Kütahya, Uşak)
Club 16	**Club 17**	**Club 18**	**Club 19**	**Club 20**
TRC2 (Şanlıurfa, Diyarbakır)	TR31 (Izmir)	TR22 (Balıkesir, Çanakkale)	TR21 (Tekirdağ, Edirne,	TR10 (Istanbul)

According to the Table 3.41, only five out of 20 convergence clubs for income includes more than one regions that converge.

The results of the asymptotically perfect convergence analyses illustrate that number of the clubs in terms of income reaches up to 20 clubs. Even big cities constitute single groups. Thus one can say that regional income disparities seem to be not decreasing over the period in the country.

Asymptotically perfect convergence results for not only expenditures but also income present high number of convergence clubs, indicating a low level of convergence in Turkish regions. As mentioned in Koç(2008), each region has its own social, cultural, economic and geographical characteristics in the country with a wide geography. The largest clubs contain four or five regions, a result implying that consumption behaviors seem to converge within a small number of regions but not across the country. There are 20 clubs for 26 regions in terms of income, providing no significant evidence for convergence across the country. These results are in line with most of the literature that actually has mixed results on regional convergence in Turkey.

3.5.4 Estimation results of the kernel density and the dispersion approach

The last analysis used for regional consumption and income convergence is dispersion approach. According to this approach, the kernel density figures obtained for each group of goods and service and income for 26 NUTS-2 regions are given below. The bandwidth (h) is multiplied by 0.5 and 1.5 to show whether the kurtosis (sharpness) of the distribution varies according to different bandwidths. Thus, three different bandwidths are obtained (h, 0.5h, 1.5h) and are illustrated on the Figures.

In these Figures, each of the kernel density for goods and service groups and income shows the distribution across the regions that give clue about convergence and divergence.

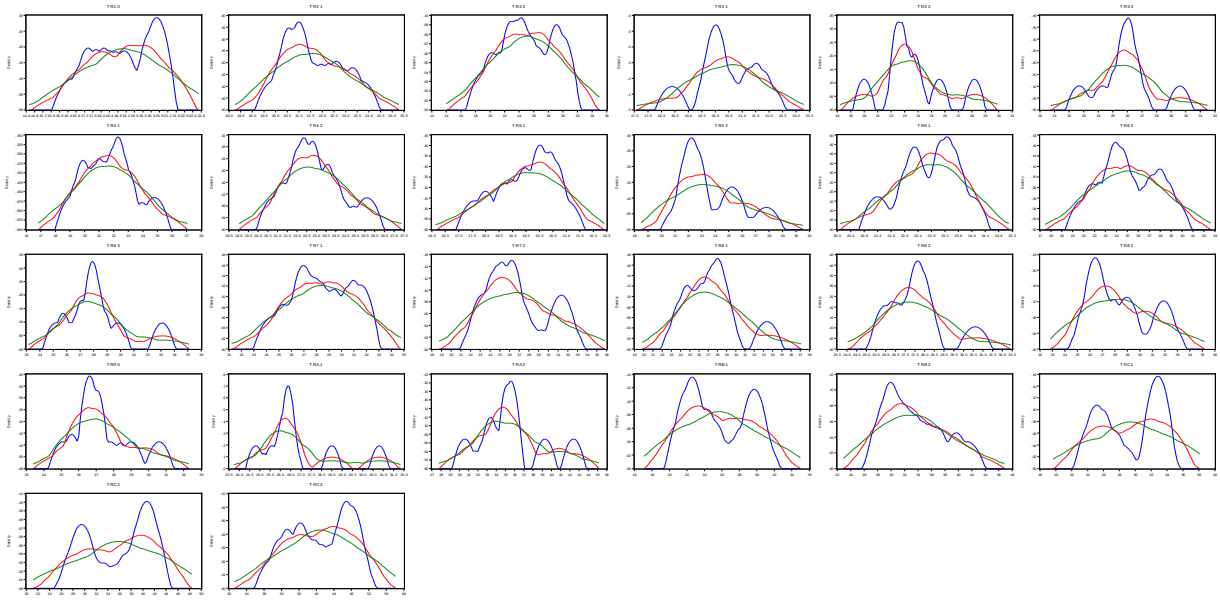

Figure 3.1 : Estimation of the kernel density for food expenditure in 26 regions of Turkey.

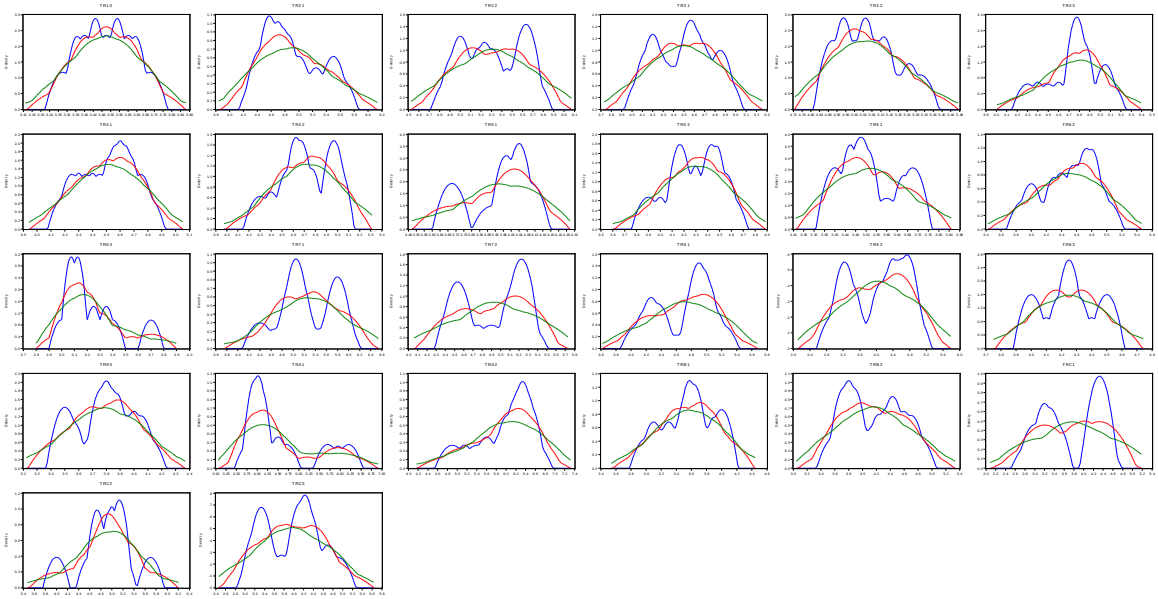

Figure 3.2 : Estimation of the kernel density for alcohol expenditure in 26 regions of Turkey.

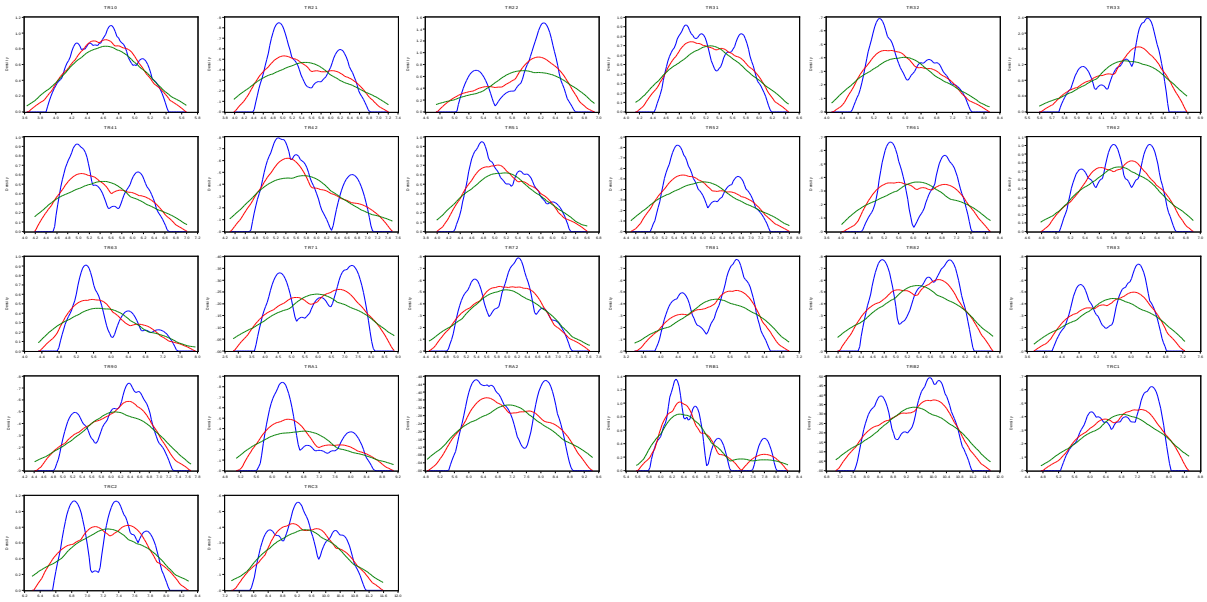

Figure 3.3 : Estimation of the kernel density for clothing expenditure in 26 regions of Turkey.

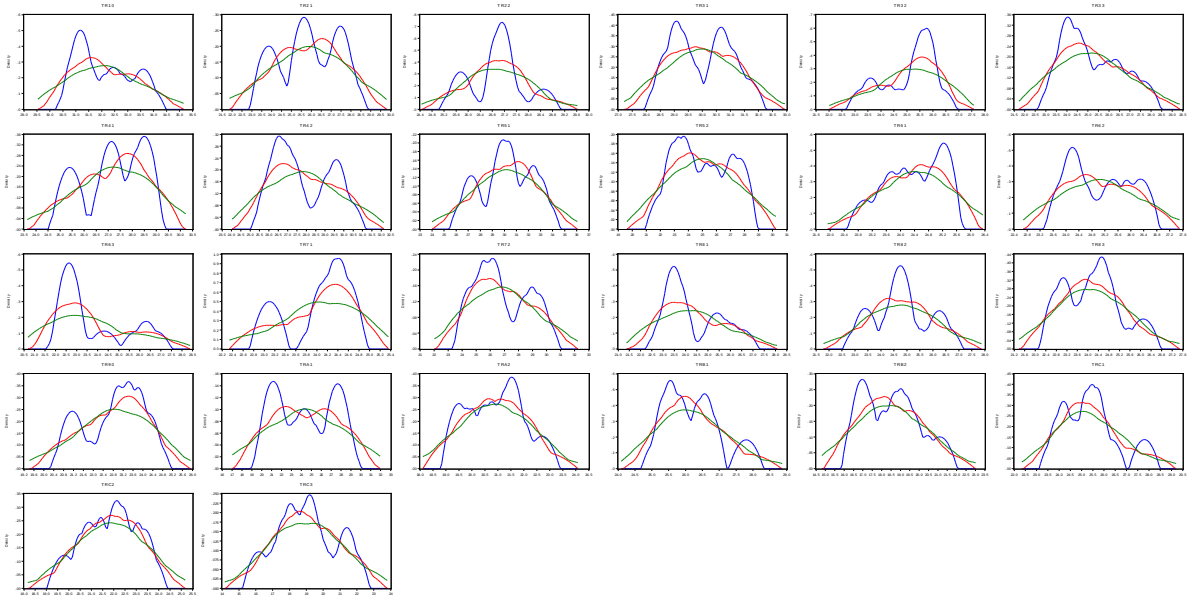

Figure 3.4 : Estimation of the kernel density for shelter expenditure in 26 regions of Turkey.

Figure 3.1, Figure 3.2, Figure 3.3 and Figure 3.4 show the estimation results of the kernel density for food expenditure, alcohol expenditure, clothing expenditure and shelter expenditure in 26 regions of Turkey. These expenditures have a kurtosis and skewed distribution

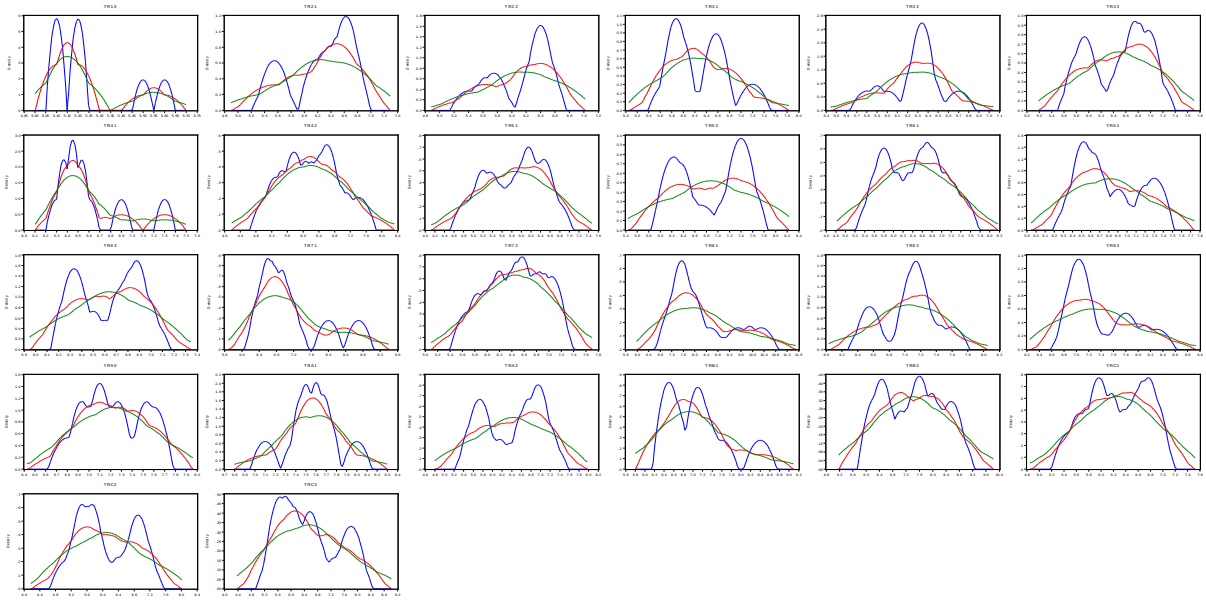

Figure 3. 5 : Estimation of the kernel density for furniture expenditure in 26 regions of Turkey.

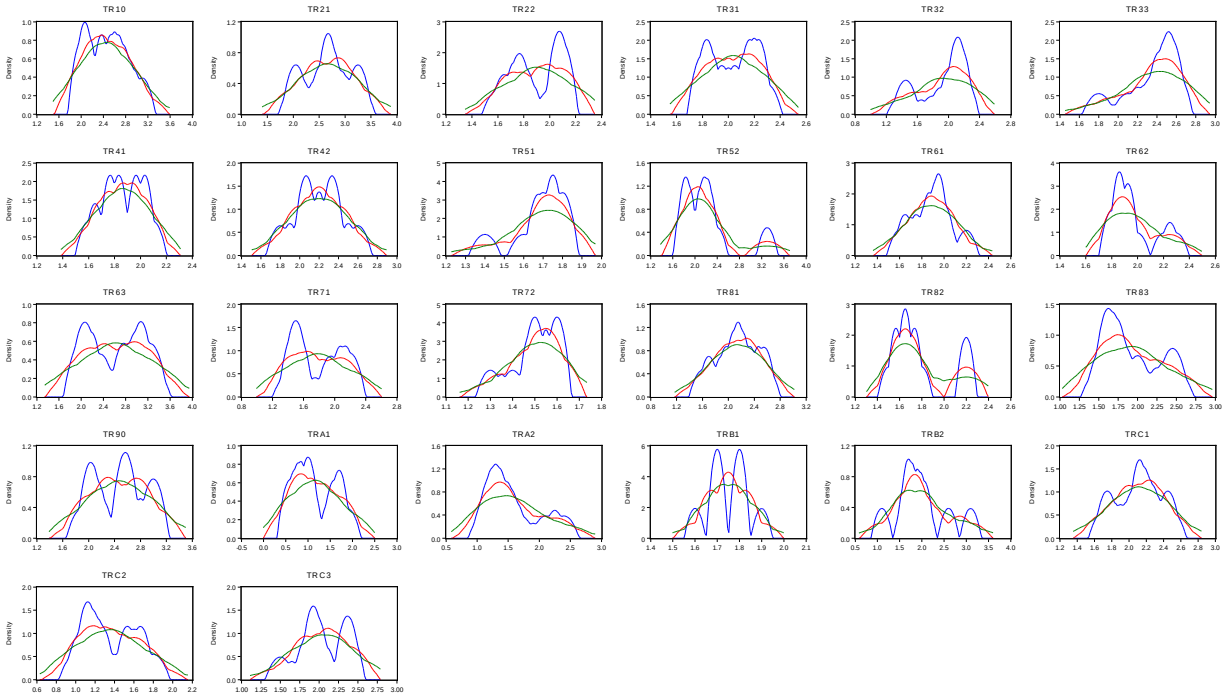

Figure 3.6 : Estimation of the kernel density for health expenditure in 26 regions of Turkey.

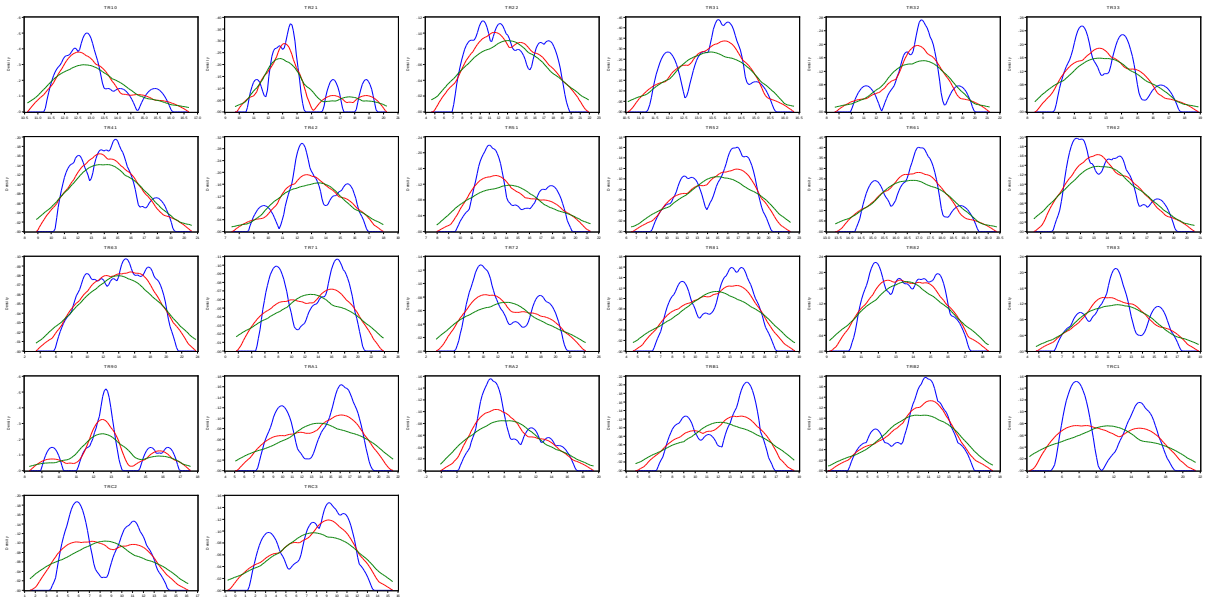

Figure 3.7 : Estimation of the kernel density for transportation expenditure in 26 regions of Turkey.

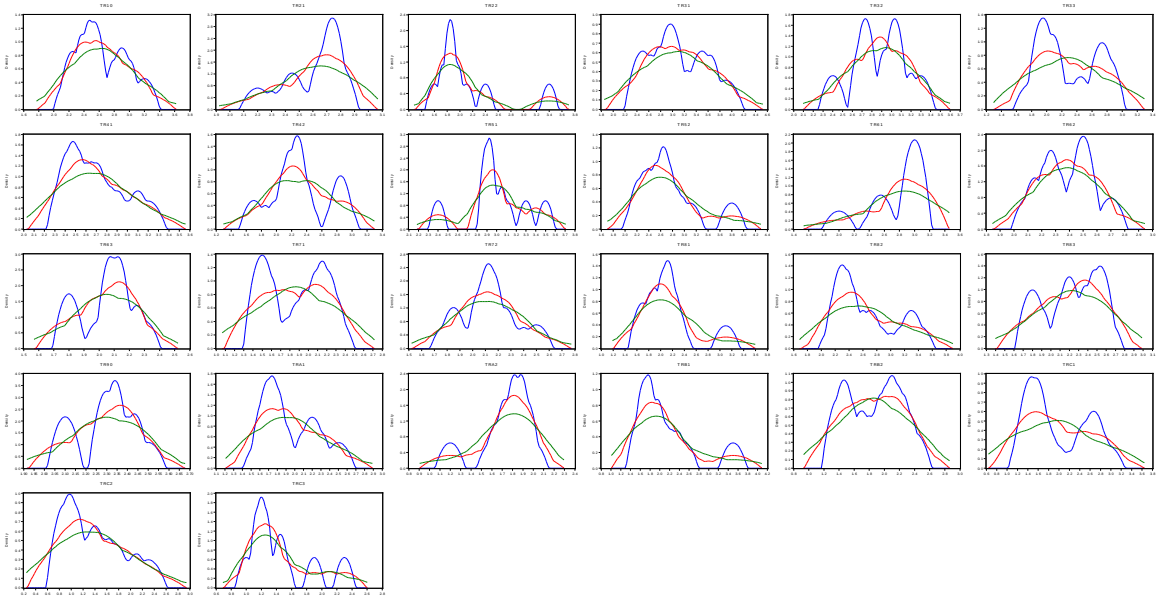

Figure 3.8 : Estimation of the kernel density for communication expenditure in 26 regions of Turkey.

Figure 3.5, Figure 3.6, Figure 3.6 and Figure 3.8 present the estimation results of the kernel density for furniture expenditure, health expenditure, transportation expenditure and communication expenditure in 26 regions of Turkey. These expenditures also have a kurtosis and skewed distribution.

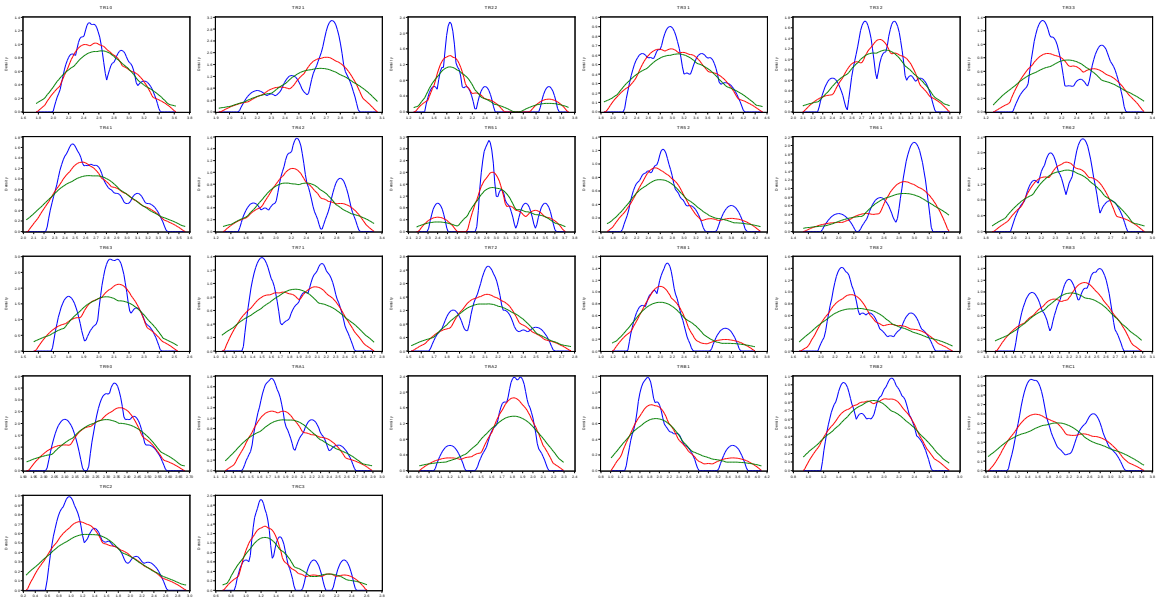

Figure 3.9 : Estimation of the kernel density for recreation expenditure in 26 regions of Turkey.

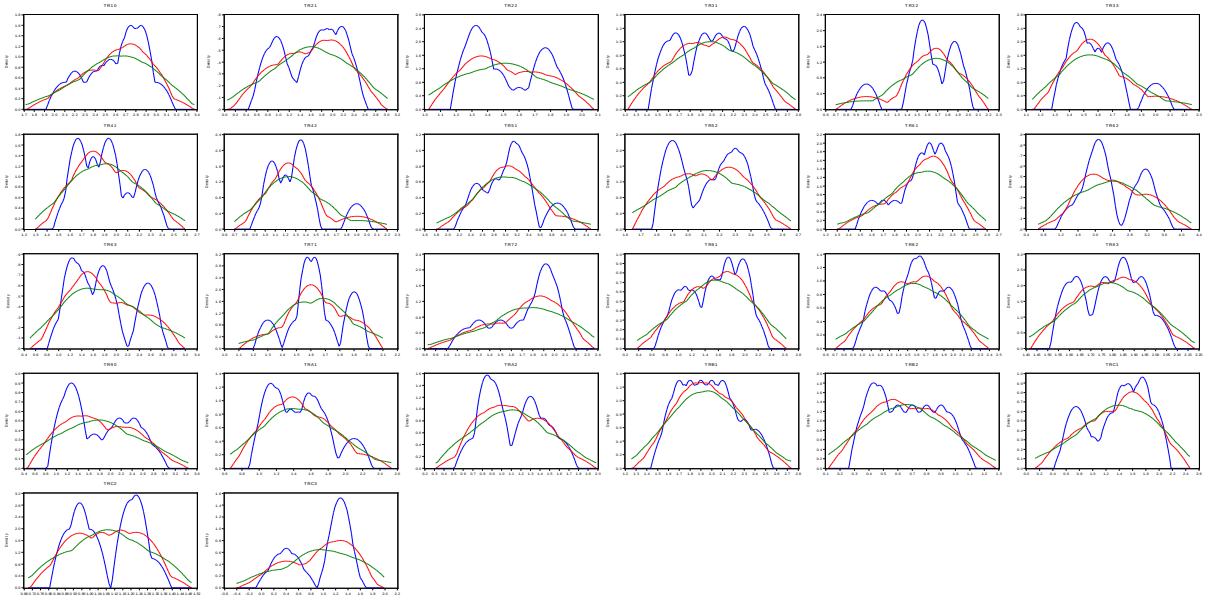

Figure 3.10 : Estimation of the kernel density for education expenditure in 26 regions of Turkey.

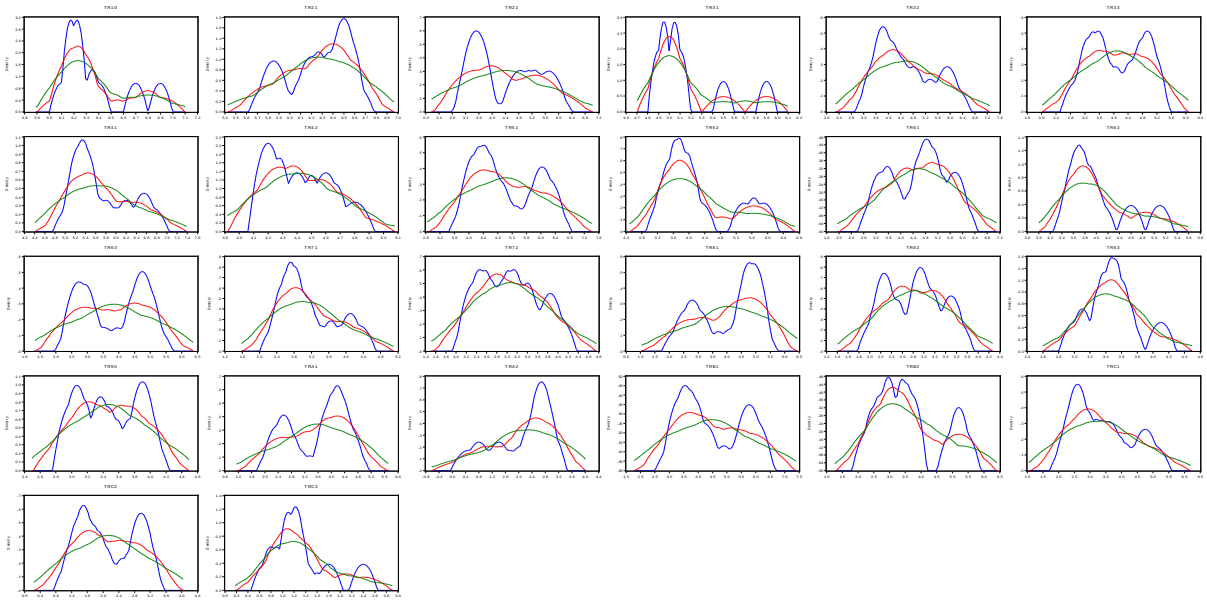

Figure 3.11 : Estimation of the kernel density for restaurant expenditure in 26 regions of Turkey.

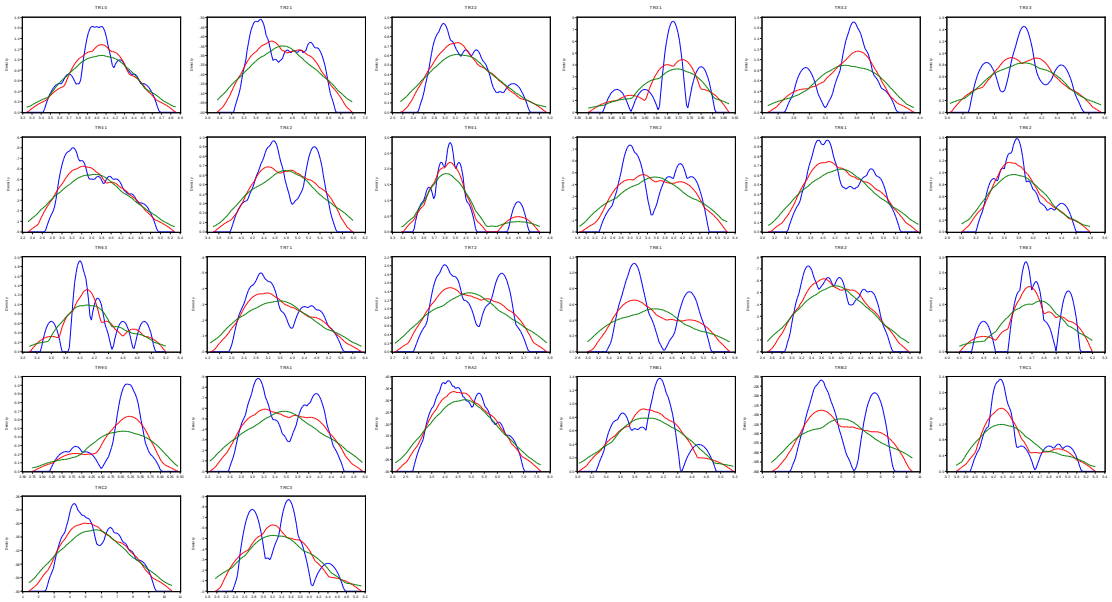

Figure 3.12 : Estimation of the kernel density for other goods and service expenditure in 26 Regions of Turkey.

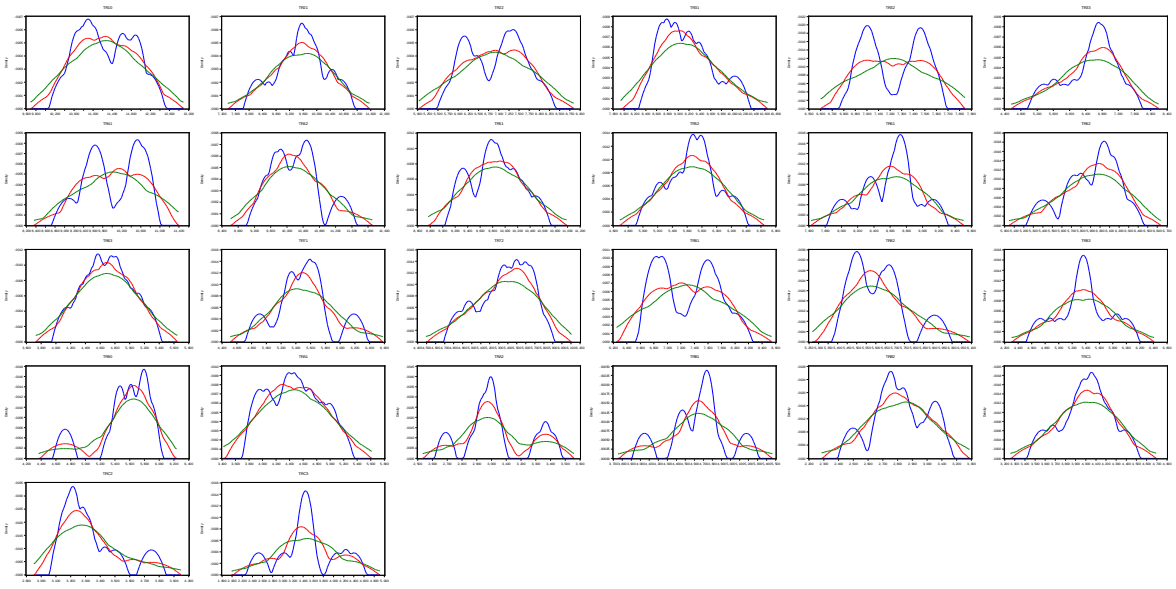

Figure 3.13 : Estimation of the kernel density for income in 26 regions of Turkey.

Figure 3.9, Figure 3.10, Figure 3.11, Figure 3.12 and Figure 3.13 illustrate the estimation results of the kernel density for recreation expenditure, education expenditure, restaurant expenditure, other goods and service expenditure and income in 26 regions of Turkey. Similarly, these expenditures also have a kurtosis and skewed distribution.

In conclusion, all of these kernel density figures present that almost all expenditures of goods and service groups, especially income, have a kurtosis and skewed distribution. It is seen that these results according to bandwidth are robust and in terms of both income and consumption expenditures, the number of regional differences are more than the number of similarities.

The results obtained from kernel density are in accordance with Spatial Panel Dynamic regression, Dynamic Panel Quantile Regression and unit roots approach results

3.6 Concluding Remarks

we analyze the convergence from demand and supply perspectives by using expenditures and income, respectively. The data are collected for 12 groups of goods and services groups as well as income across 26 NUTS-2 regions of Turkey.

Differences in consumption behaviors of the households may be because of their income differences, if not due to their preferences. Thus, having low level of

convergence in expenditures can be considered as a further support for the evidence that we obtain in terms of income convergence. Regional disparities across the regions are still a major problem for economic development of the country. The policymakers need to take into account these disparities when designing public policies.

This essay contributes to the existing convergence literature by analyzing the differences in consumption behaviors in addition to income differences using four different techniques for a more comprehensive understanding of the issue. For further research, the span of data may be extended for more robust estimations.

4. CONCLUSION

In this thesis, the presence of consumption and income disparities and whether they increase or decrease over time in the NUTS-2 regions of Turkey are analyzed using different methods.

4.1 Regional Income and Price Elasticities

For 26 regions and 12 goods and service groups, the significant signs and magnitudes of the elasticities are obtained from geographically weighted regression model. When We re-interpret the the results according to regions in the east and west of the Turkey, interesting and important results emerges.

When income elasticities are examined, there is a difference between eastern and western regions for goods and service groups of food expenditure, clothing expenditure, health expenditure, communication expenditure, recreation expenditure, education expenditure, restaurant expenditure. On the other hand, there is no difference between eastern and western regions for alcohol expenditure, shelter expenditure, furniture expenditure, transportation expenditure and other goods and services expenditure.

When price elasticities are examined, the demand for alcohol expenditure, shelter expenditure, furniture expenditure, health expenditure and the other good and service expenditure is found to be similar for consumers in both the eastern and western regions. For this reason, we can conclude that households' reactions to price changes in these goods and service groups are similar in the eastern and western regions. However, it has been observed that the demand for food Expenditure, clothing expenditure, transportation expenditure, communication expenditure, and education expenditure, which can be counted among the main goods and service groups, differs from the western and eastern regions. In addition, there has been a variety of

households' reactions to price changes in expenditure of recreation and restaurant considered as a luxury goods and service groups

4.2 Regional Convergence

Due to the rapid progress in communication and communication technologies, and in particular improvements in road and air transportation, the interaction of households with each other can be expected to increase and thus the disparities in consumption behavior between regions may decrease and even be similar. In order to test the NUTS-2 level of these expectations in Turkey for 12 goods and service groups and income, both unconditional convergence analysis and conditional convergence analysis by means of control variables such as education and employment are carried out. The robustness of these analysis results are checked using different econometric methods.

In quantile regression analysis, convergence/divergence differs by goods and service groups. For food expenditure, clothing expenditure and health expenditure measured by their share of total expenditure, weak convergence is observed. For other goods and service groups, statistically significant convergence or divergence is not detected.

Unconditional convergence analyses across the regions in terms of expenditure groups are repeated with the addition of control variables such as education and employment These factors have been tested to see if they influence the convergence/divergence processes. From the analysis results, it is seen that the control variables do not make a significant change in the results. At the same time, almost none of these variables are statistically significant in the models that are included alone or together.

In summary, in goods and service groups with relatively low price and income elasticities as well as with a high share of the budget such as food expenditure, clothing expenditure, and health expenditure, it is observed that the differences between the regions are slowed down.

Convergence or divergence is not found in relatively elastic goods and service groups such as furniture expenditure, shelter expenditure, recreation expenditure, restaurant expenditure, and education expenditure. This can be explained by the fact that in the share of such inelastic expenditure groups, there are no significant changes in the short term and that the budget shares remain relatively constant. In addition, changes in

social factors such as education and employment do not create significant changes in these shares

Analyses of convergence on consumption differences between regions in terms of goods and services groups are repeated with the spatial dynamic panel method as an alternative estimation method. According to the results of unconditional convergence analysis, there is no convergence or divergence in alcohol expenditure, health expenditure, education expenditure and income whereas divergence is found in all the rest of goods and service groups. According to the results of conditional convergence analysis, convergence or divergence is not found for income, health expenditure and the other goods and service expenditure, whereas divergence is found in all the rest of goods and service groups.

Spatial dynamic panel regression models have been observed to accelerate divergence when the employment rate is included in the model.

It should be noted that the indicator of consumption behavior used in the thesis is measured by the share of the related expenditure in the total household budget. The fact that the shares show little variance over time and even virtually unchanged in some consumption groups has made it difficult to reach meaningful results in the analysis of convergence.

In Turkey, which has a wide geography, each region has its own social, cultural, economic and geographical structure. For this reason, it is obvious that consumption habits is different. Therefore, it can not be expected that the consumption behaviors among the regions spread over a wide geographical area will converge in the short term. Moreover, the NUTS-2 level regions defined here are exogenous defined regions.

In the analysis of the club convergence carried out within the scope of the thesis, many small regions appear endogenously. Consumption behaviors can resemble over time in smaller regions with common characteristics. In addition, the fact that the kernel density graphs are skewed and leptokurtic and visually unequal are supporting the findings of econometric estimates made by different methods.

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APPENDICES

APPENDIX A : Tables

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Table A.1 : Estimation results of the conditional spatial panel dynamic model for food expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.321117086	-6.07034	-0.03493	-2.00783019418732
$Y_{n,t-1}$	0.315890005	5.313839	0.001541	0.0438560107287664
$W_n Y_{n,t-1}^*$	-0.00497547	-1.80901	9.64E-05	0.0248991822395342
schooling	0.001861878	1.847137	0.002304	2.04008999448405
employment	0.33496935	3.892268	0.263994	2.58432391663788
Likelihood	407.50024		379.1465	
LR(prob)	0.144237646	0.999601		

Table A.2 : Estimation results of the conditional spatial panel dynamic model for alcohol expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.42848	-6.810611	-0.01427364	-0.380084693493976
$Y_{n,t-1}$	-0.06422	-0.436528	0.098910263	1.19741394964953
$W_n Y_{n,t-1}^*$	-0.00247	-0.452423	0.000770511	0.100243981285090
schooling	0.003105	1.5725349	0.003518863	1.55260694803054
employment	6.61E-05	0.0006418	3.73E-05	0.000313264913002190
Likelihood	287.1		257.0730	
LR(prob)	0.220965	0.9988715		

Table A.3 : Estimation results of the conditional spatial panel dynamic model for clothing expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.34959	-6.07161	0.02229	1.08751646522459
$Y_{n,t-1}$	0.312704	4.506434	-0.025	-0.632506939933145
$W_n Y_{n,t-1}^*$	-0.00072	-0.21339	-0.0094	-2.04281376721498
schooling	-0.0002	-0.15919	-0.0016	-1.22556930343634
employment	0.371974	4.401588	0.16401	1.54500941381493
Likelihood	368.34		349.7689	
LR(prob)	0.103478	0.999823		

Table A.4 : Estimation results of the conditional spatial panel dynamic model for shelter expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.411002034	-6.80355	-0.00203	-0.0731381303821868
$Y_{n,t-1}$	0.238347223	2.240581	0.070327	1.29084712018580
$W_n Y_{n,t-1}^*$	0.008571381	2.597795	0.009096	2.04517012951553
schooling	-0.002876668	-2.4655	-0.00284	-2.19021779622151
employment	0.340968996	3.977407	0.112	0.999316102990904
Likelihood	379.0692481		354.3982	
LR(prob)	0.134595365	0.999663		

Table A.5 : Estimation results of the conditional spatial panel dynamic model for furniture expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.55377	-8.306032	0.149193426	2.94495780226877
$Y_{n,t-1}$	0.286923	2.4675834	0.143319698	1.26033232587808
$W_n Y_{n,t-1}^*$	-0.00316	-0.635529	0.001571377	0.224958321313111
schooling	0.000414	0.2243504	-0.00238454	-1.12208231224265
employment	0.220971	2.3452059	0.008046077	0.0690306122262642
Likelihood	303.24		274.3246	
LR(prob)	0.200408	0.9991095		

Table A.6 : Estimation results of the conditional spatial panel dynamic model for health expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.59773	-8.05899	-0.0447	-0.799161645946146
$Y_{n,t-1}$	-0.0516	-0.28809	0.28154	2.46023589451915
$W_n Y_{n,t-1}^*$	-0.00765	-0.58258	-0.024	-1.27367819081484
schooling	-0.0038	-0.8128	-0.0016	-0.292299508222576
employment	6.61E-05	0.00064	0.00201	0.0160089160335546
Likelihood	130.79		101.3439	
LR(prob)	0.510113	0.991748		

Table A.7 : Estimation results of the conditional spatial panel dynamic model for transportation expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.530413776	-8.05308	-0.08643	-2.42371031979892
$Y_{n,t-1}$	0.450366844	5.70997	-0.08065	-1.09912252039320
$W_n Y_{n,t-1}^*$	0.002046252	0.24219	-0.00264	-0.205855038318556
schooling	-0.00683066	-2.16854	-0.00251	-0.668434149565302
employment	0.180983659	1.906588	0.167024	1.26918512452571
Likelihood	203.435115		169.8780	
LR(prob)	0.360532657	0.996347		

Table A.8 : Estimation results of the conditional spatial panel dynamic model for communication expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.3243	-5.00	0.08414169	1.857070406
$Y_{n,t-1}$	0.418932	3.4137024	0.094228887	0.948717563
$W_n Y_{n,t-1}^*$	1.24E-02	2.83	2.00E-02	3.821482462
schooling	-4.72E-03	-3.19E+00	-4.63E-03	-3.010882215
employment	9.00E-02	9.27E-01	4.84E-05	0.000394189
Likelihood	344.32		329.0266	
LR(prob)	0.090866	0.9998718		

Table A.9 : Estimation results of the conditional spatial panel dynamic model for recreation expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.36986	-5.65362	-0.0903	-2.25116399567432
$Y_{n,t-1}$	0.506206	5.485472	-0.0324	-0.389446023308061
$W_n Y_{n,t-1}^*$	-0.00467	-0.54299	3.30E-05	0.00276883481575922
schooling	-0.00146	-0.45962	-0.0011	-0.305907720268896
employment	0.31299	3.572523	0.13103	1.20031555981831
Likelihood	201.22		183.9857	
LR(prob)	0.179094	0.999323		

Table A.10 : Estimation results of the conditional spatial panel dynamic model for education expenditure in 26 regions of Turkey

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.543889164	-8.78647	-0.08026	-1.58716263968475
$Y_{n,t-1}$	0.089477384	0.654676	-0.11624	-1.08128733669651
$W_n Y_{n,t-1}^*$	0.001176634	0.073639	0.021313	0.912420650319310
schooling	-0.007683281	-1.36699	-0.00112	-
employment	0.320972109	3.630264	0.344979	2.71911688434089
Likelihood	93.633907		63.0971	
LR(prob)	0.78943432	0.977702		

Table A.11 : Estimation results of the conditional spatial panel dynamic model for restaurant expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.54025	-12.69415	-0.02836008	-1.02632447471874
$Y_{n,t-1}$	0.550146	9.4193024	-0.15583079	-2.92773832656013
$W_n Y_{n,t-1}^*$	-0.01573	-1.951451	-0.00416438	-0.302500353763595
schooling	0.008323	2.8259575	0.000977389	0.242774598424203
employment	0.382	4.7534369	3.01E-03	0.0238743718113285
Likelihood	216.21		156.6308	
LR(prob)	0.644725	0.985864		

Table A.12 : Estimation results of the conditional spatial panel dynamic model for other goods and service expenditure in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.39243	-6.55523	0.05551	1.04911385246922
$Y_{n,t-1}$	0.123205	1.297635	0.07491	0.682161598314948
$W_n Y_{n,t-1}^*$	-0.01316	-1.44301	-0.046	-3.49761047609823
schooling	-0.00327	-0.9783	-0.0039	-1.03859818417503
employment	0.123985	1.257004	0.02702	0.218901155145169
Likelihood	192.23		170.9505	
LR(prob)	0.234657	0.998695		

Table A.13 : Estimation results of the conditional spatial panel dynamic model for income in 26 regions of Turkey.

	Model 1	**t-stat**	**Model 2**	**t-stat**
$W_n Y_{nt}^*$	-0.452998	-8.27035	0.00538	0.724857838984487
$Y_{n,t-1}$	0.3228144	4.66403	-0.0041	-0.281576031268836
$W_n Y_{n,t-1}^*$	0.0061926	2.87465	-0.0058	-1.96174202982226
schooling	0.0003974	0.527089	0.0012	1.40119090452502
employment	0.6679752	11.89126	0.41497	4.19752611360045
Likelihood	450.75		426.2417	
LR(prob)	0.1117953	0.999786		

Table A.14 : Estimation results of the conditional dynamic panel quantile regression for food expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.198884	0	0.242197	0	0.214943	0
Yn,2005	-0.01577	0.149	-0.013656	0.2162	-0.02702	0.0691
WnYn,2005	0.002292	0	0.002344	0	0.00219	0.0001
schooling	0.000155	0.856	-0.000207	0.8156	-0.00045	0.7581
employment	-0.00029	0.107	-0.000159	0.3572	-0.00031	0.1157
Constant	0.009244	0.936	0.040487	0.7315	0.115778	0.522
Pseudo R2	0.710048		0.751151		0.753183	
LR	57.21016		81.62479		75.46712	

Table A.15 : Estimation results of the conditional dynamic panel quantile regression for alcohol expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.136823	0	0.171818	0.1463	0.189792	0
Yn,2005	-0.01027	0.338	-0.0121	0.357	-0.00612	0.5311
WnYn,2005	-0.00027	0.490	-6.70E-05	0.9116	0.000146	0.5299
schooling	0.001341	0.317	0.001145	0.5757	0.001082	0.2097
employment	0.000428	0.253	0.000274	0.5252	1.07E-05	0.9669
Constant	-0.13158	0.331	-0.10399	0.6095	-0.0961	0.239
Pseudo R2	0.679136		0.727131		0.785975	
LR	56.86857		61.82253		102.4776	

Table A.16 : Estimation results of the conditional dynamic panel quantile regression for clothing expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.2198	0	0.186067	0	0.1912	0
Yn,2005	-0.02554	0.014	-0.03002	0.0107	-0.032	0.002
WnYn,2005	0.002792	0	0.002704	0	0.003	0
schooling	-0.00124	0.098	-0.00165	0.0537	-0.001	0.0742
employment	-2.70E-	0.886	2.38E-06	0.9886	-1E-04	0.391
Constant	0.145472	0.110	0.191024	0.0624	0.173	0.0607
Pseudo R2	0.816752		0.806332		0.829274	
LR	108.9809		95.07562		98.91160	

Table A.17 : Estimation results of the conditional dynamic panel quantile regression for shelter expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.226004	0	0.222351	0	0.206836	0.0002
Yn,2005	0.015772	0.314	0.003189	0.7945	-0.0041	0.7815
WnYn,2005	0.000154	0.194	9.64E-05	0.4555	1.07E-05	0.9559
schooling	-0.00032	0.637	0.000131	0.8306	1.23E-05	0.9915
employment	-6.15E-	6.69E	-9.39E-05	4.21E-01	-8.46E-05	5.00E-01
Constant	-0.02167	0.517	-0.021565	0.5491	0.01599	0.8826
Pseudo R2	0.735157		0.761637		0.783629	
LR	89.51030		99.16917		94.14009	

Table A.18 : Estimation results of the conditional dynamic panel quantile regression for furniture expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.184398	0.052	0.240693	0	0.237533	0
Yn,2005	-0.03537	0.515	-0.00636	0.7743	-0.01479	0.4062
WnYn,2005	0.001115	0.332	6.02E-05	0.9421	0.000191	0.7856
schooling	-0.00021	0.900	-0.00015	0.8823	-0.0005	0.5316
employment	-6.07E-	9.31E	0.000807	1.35E-01	0.00078	1.19E-01
Constant	0.076662	0.754	-0.00629	0.9508	0.045834	0.5769
Pseudo R2	0.730023		0.753621		0.738211	
LR	71.98053		94.69302		119.2348	

Table A.19 : Estimation results of the conditional dynamic panel quantile regression for health expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.066535	0.401	0.207433	0.0006	0.1944	0.0155
Yn,2005	-0.09601	0.039	-0.05443	0.0692	-0.074	0.0977
WnYn,2005	0.002641	0.571	0.005707	0.2783	0.0058	0.1854
schooling	0.000828	0.864	0.000306	0.9409	-1E-04	0.9782
employment	0.001328	4.05E	2.16E-05	9.77E-01	-4E-04	6.64E-01
Constant	-0.08991	0.847	-0.01298	0.9739	0.0664	0.8723
Pseudo R2	0.735441		0.723315		0.75069	
LR	71.84736		72.04381		102.4832	

Table A.20 : Estimation results of the conditional dynamic panel quantile regression for transportation expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.186631	0.018	0.186155	0.014	0.093669	0.0562
Yn,2005	0.026181	0.576	0.034271	0.4632	-0.03686	0.4311
WnYn,2005	-0.00715	0.034	-0.008135	0.015	-0.00413	0.0484
schooling	-0.00274	0.518	-0.002078	0.6455	-0.00413	0.2546
employment	-3.87E-	9.61E	9.13E-05	9.07E-01	0.001052	4.56E-01
Constant	0.290676	0.483	0.220679	0.6165	0.548445	0.0958
Pseudo R2	0.697231		0.697787		0.766132	
LR	50.84319		58.75248		59.29523	

Table A.21 : Estimation results of the conditional dynamic panel quantile regression for communication expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.141012	0.014	0.152567	0.0029	0.150333	0.0002
Yn,2005	-0.03886	0.219	-0.02735	0.3628	0.01336	0.7415
WnYn,2005	0.000548	0.566	0.001048	0.2165	-0.00063	0.5466
schooling	-0.00095	0.617	6.26E-05	0.9732	-0.00165	0.1417
employment	0.000448	2.28E	0.000104	7.46E-01	0.000116	6.93E-01
Constant	0.120616	0.461	0.019613	0.9027	0.141663	0.1161
Pseudo R2	0.730656		0.697601		0.683525	
LR	50.88321		50.11674		39.09158	

Table A.22 : Estimation results of the conditional dynamic panel quantile regression for recreation expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.140994	0.000	0.151995	0	0.0733	0.1904
Yn,2005	-0.05246	0.224	-0.00157	0.972	-0.068	0.193
WnYn,2005	-0.00262	0.653	-0.0063	0.3672	-0.003	0.4106
schooling	0.008936	0.445	0.000235	0.9374	0.0037	0.2834
employment	-9.22E-	9.30E	0.000833	4.00E-01	0.0007	5.98E-01
Constant	-0.81891	0.464	-0.02102	0.9404	-0.297	0.3453
Pseudo R2	0.77812		0.688034		0.65423	
LR	57.47905		50.24262		37.19463	

Table A.23 : Estimation results of the conditional dynamic panel quantile regression for education expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.182526	0	0.161917	0.0009	0.196424	0.0001
Yn,2005	-0.0559	0.244	-0.064534	0.1781	-0.00871	0.849
WnYn,2005	0.002164	0.748	0.003695	0.5682	-0.00211	0.7702
schooling	0.006332	0.194	0.007947	0.1679	0.001854	0.7721
employment	0.000489	0.652	-0.000738	0.6287	0.00171	0.1797
Constant	-0.62142	0.176	-0.714572	0.1697	-0.22555	0.701
Pseudo R2	0.712411		0.747799		0.805898	
LR	54.65045		66.17102		75.80105	

Table A.24 : Estimation results of the conditional dynamic panel quantile regression for restaurant expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.175927	0.005	0.189214	0	0.181873	0.0001
Yn,2005	0.016992	0.528	0.015968	0.7355	0.011898	0.7552
WnYn,2005	-0.00704	0.254	-0.01078	0.0204	-0.00808	0.0256
schooling	-0.00735	0.166	-0.00073	0.9077	-0.00412	0.225
employment	0.000654	0.780	0.001921	0.0535	0.002777	0.0636
Constant	0.701312	0.195	0.035196	0.9514	0.335411	0.2728
Pseudo R2	0.697487		0.758922		0.827456	
LR	42.38811		69.56015		88.10128	

Table A.25 : Estimation results of the conditional dynamic panel quantile regression for other goods and service expenditure in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.177649	0.004	0.230793	0	0.2345	0
Yn,2005	-0.0409	0.470	0.005019	0.8622	-0.027	0.3557
WnYn,2005	-0.00348	0.324	-0.00263	0.334	-4E-04	0.8665
schooling	-0.00034	0.937	0.001515	0.6643	0.0006	0.796
employment	-0.00035	0.71	-0.00033	0.7282	-2E-04	0.8221
Constant	0.115019	0.788	-0.12667	0.6985	-0.003	0.9894
Pseudo R2	0.663912		0.713163		0.77269	
LR	37.82146		58.71129		78.25945	

Table A.26 : Estimation results of the conditional dynamic panel quantile regression for income in 26 regions of Turkey.

Quantile	**0.25**	**Prob.**	**0.5**	**Prob.**	**0.75**	**Prob.**
WnYn*	0.205285	0	0.202235	0	0.209773	0
Yn,2005	-0.00321	0.601	0.002156	0.7389	0.005474	0.4394
WnYn,2005	-0.00069	0	-0.000652	0	-0.00074	0
schooling	0.000499	0.672	0.000105	0.9326	-6.87E-06	9.96E-01
employment	1.50E-05	9.40E	-0.000103	0.6245	3.58E-05	8.75E-01
Constant	0.004606	0.953	0.003056	0.9709	-0.01597	0.8609
Pseudo R2	0.728544		0.737139		0.743012	
LR	49.34201		56.42871		53.63040	

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