Economic Growth and Employment Patterns in Turkey

By

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Abstract

This research aims at exploring the empirical relationship between the real GDP output, GDP growth and employment in Turkey over the period from $2000Q_1$ to $2013Q_4$ by using employment elasticity of growth and output in order to determine whether Turkey has been experiencing the problem of "jobless growth". Employment elasticity is a numerical measurement of the changes in employment induced by the changes in economic growth or economic output. This study examines the correlation between these variables at the level of economy as a whole as well as each sector individually, considering gender, age and educational aspects. Two different methods were used to calculate the employment elasticity such as "simple and descriptive" method and Ordinary Least Square (OLS) regression method. The results of this research show that there is a positive relationship between the aggregate GDP growth and total employment. Using the real GDP growth as a proxy provides the evidence against the presence of "jobless growth" in Turkey. However, examining the relationship between the real GDP and employment at a more disaggregate level reveals that several sectors as well as demographic groups experience the features of "jobless growth".

Key words: Employment elasticity, economic growth, economic output

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List of Abbreviations

AGR-Agriculture

GDP- Gross Domestic product

Bln.-billions

CON-Construction

EGW-Electricity, gas and water

FI- Financial intermediation

ILO-International Labour Organization

Mln.-millions

OLS- Ordinary Least Squares

MF- Manufacture

MQ- Mining and quarrying

SER- Services

TC- Transport and communication

TL- Turkish Lira

TURKSTAT- Turkish Statistical Institute

UNDP-United Nations Development Program

WRT-Wholesale and retail trade

Chapter 1: Introduction

This research analyzes the relationship between the variables of employment (measured in thousand persons) and economic output (measured in billions of Turkish Lira), as well as between employment and economic growth in Turkey using output elasticity of employment and the employment elasticity of economic growth. The purpose of this analysis is to investigate the correlation of the employment with the economic expansion of the Turkish economy in order to determine whether the Turkish economy has been experiencing the phenomenon of "jobless growth" for the period from 2000 to 2013 or not. For the purpose of consistency, this thesis will examine the problem of "jobless growth" in terms of very low or negative employment elasticity values and negative employment growth (Kapsos, 2005:15, Yeldan, 2013).

Prior to the period when the global economy entered the phase of the 2008 recession, high rates of economic growth had been achieved for the duration of several years. Yet, the levels of unemployment remained high, while the employment situation did not change in many countries, especially in the developing ones (ILO Brief, 2009). UNDP's Human Development Report (UNDP 1996) points out that: "Many parts of the world are witnessing a new phenomenon—jobless growth". Based on exploring the relationship between unemployment and economic growth, numerous authors such as Ercan (2007), Berument (2008), Yeldan (2013) claim that Turkey has also been suffering from this problem.

However, this thesis argues that the total employment outlook in Turkey and estimations of existing employment elasticities provide evidence for the overall positive relationship between the total economic output, its growth and total employment in Turkey. This means that the Turkish economy as a whole does not suffer from the problem of "jobless growth". However, the elements of "jobless growth" such as negative or statistically insignificant elasticities can be found at the

disaggregate level, when the employment elasticities are separately calculated for smaller sectors and demographic subgroups using economic output as a proxy. In order to determine that Turkey has not been experiencing "jobless growth" at the aggregate level, but rather has been affected by this problem on the level of specific sectors and demographic subgroups, the present study will focus on examining the relationship between macroeconomic variables such as economic output, economic growth and employment by looking into the specific characteristics of the Turkish economy and labour market, analyzing economic developments and identifying general trends based on the comparative outlook of the changes that taken place since 2000.

The choice of the country has been determined by the interest to explore to which extent the country with the second highest GDP growth rates translates its improvements in the economic performance into creating additional employment opportunities among the population. In order to determine this, I will first identify whether there exists a positive or negative correlation between the growing GDP of Turkey and its employment. As a second step, I will measure the percentage change in employment generation associated with an increase in both the total and sector real GDP and its growth rates by implementing two different employment elasticity models, which will also provide me with the information on the number of additional job opportunities generated from the employment elasticity of growth and aggregate economic output. Furthermore, I will disaggregate the industry and service sector into 7 sectors to demonstrate the presence of "jobless growth" on the disaggregated sector level.

The decision to utilize employment elasticity models for investigating the level of ability of economic growth and aggregate output to create employment opportunities is based on the fact that employment elasticity of growth is one of the key labour market indicators commonly used for examining the performance of the labour market. The two different models used in this study

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to make calculations of the responsiveness of the Turkish labour market to the economic performance of the country are regarded as standard and widely applied and adopted models in the international organizations, for example, the ILO (2004). One model will estimate the employment elasticity of economic growth measuring the percentage variation in employment growth induced by changes in real GDP growth, whereas the other will provide essential information about the responsiveness of employment to total aggregate output.

The existing research on "jobless growth" examining the relationship between economic growth, real GDP and employment opportunities is rather scarce, because most of the studies done in this area (Berument, 2008; Tiryaki, 2011) are limited to determining causality between economic growth and unemployment levels to determine whether Turkey experiences "jobless growth" or not. These studies concentrate on examining "jobless growth" in the prism of Okun's Law. There are only few studies using employment elasticities covering the time period up to 2000 or 2007. This research will contribute to the existing literature by presenting more recent evidence on general trends in elasticity of employment covering the period from 2000 to 2013. Moreover, it will provide an extensive overview of comparative analysis of employment elasticity among different subgroups of the population, such as gender, age and educational subgroups while investigating the "jobless growth" phenomenon.

This thesis is organized as follows: Chapter 1 introduces the problem and setting for the investigating the phenomenon of "jobless growth" by measuring elasticities of employment. This is followed by the literature review in Chapter 2. Chapter 3 present an extensive information on the trends and developments existing in the Turkish economy and labour market. Chapter 4 provides an overview of data and methodology used throughout the work, whereas Chapter 5 delivers the empirical results and summarizes the findings of the work, followed by the conclusion.

Chapter 2: Literature review

The problem of "jobless growth" in Turkey received much attention in the post-2001 era. As high real GDP growth rates accompanied by the high rates of unemployment remained stable over the several years, the focus of studies shifted from "jobless recovery" to "jobless growth" (Berument, 2006). Ercan and Yeldan (2011) argue in their work "Growth, Employment Policies and Economic Linkages: Turkey" that high economic growth in the post-2001 period displayed characteristics of the "jobless growth" pattern. The authors view "jobless growth" in Turkey as the inability of the Turkish economy to allocate its economic resources well and absorb the existing labor supply. Ercan and Yeldan (2011) point out that despite the fact that the performance of economic growth in Turkey has been positive during the last ten years, the unemployment rate remained at a very high level of above 10%. The authors provide descriptive evidence for the presence of "jobless growth" in the Turkish economy for the period from 2002 to 2008 by emphasizing that the unemployment rates had not returned to their pre-crisis rate (of 6.5% in 2000) in spite of the high growth rates. In addition to this, Ercan and Yeldan (2011) reinforce the presence of "jobless growth" in the Turkish economy as a whole by looking into the quarterly data for employment and real GDP growth rates to find that employment growth was negative in 14 quarters out of 27 between 2002.Q1 and 2008.QIII, whereas GDP growth remained positive in all 27 quarters.

There are also papers such as Yeldan's (2013) emphasizing the problem of "jobless growth" and the low job creation capacity of the Turkish economy. The work "Growth and Employment in Turkey" by Yeldan (2013) underlines that "jobless growth" for Turkey is featured by the massive labour resource reallocation from the agriculture sector and low employment elasticities in the non-agricultural sectors. The author calculates the output elasticities of total and

sector employment for three different periods from 1989 to 2008, 1989-2000 and 2002-2008 to find that the agriculture sector experienced negative employment elasticities in all three periods, whereas total elasticity of employment as well as sector elasticities on average had elasticities of a greater value in the period from 1989 to 2000 than from 2002 to 2008. Yeldan (2013) interprets these low elasticity results as the main signals of "jobless growth" in Turkey, therefore the elasticities calculated in his work will serve as a benchmark against which the results of this thesis will be compared.

In contrast to both papers presented above, the research done by Sahin, Tansel and Berument (2013) provides empirical evidence for the existence of the long-run relationship between the aggregate output and non-agricultural employment, as well as sector employment in seven out of nine sectors. The results of the studies done by Sahin, Tansel and Berument (2013) cover the period from 1988 to 2008 and point to the presence of "jobless growth" in sectors such as agriculture, construction and wholesale and retail trade.

There are several studies examining the effect of output on employment in Turkey using the employment elasticity of economic growth to obtain empirical results to determine whether the phenomenon of "jobless growth" is existent in the Turkish economy or not. For instance, Akkemik (2007) performed the econometric estimation of the response of employment to GDP growth in Turkey for the period of 1988 to 2004. Working with the annual data gave the following results: at the level of aggregate economy the estimate of the employment elasticity is 0.7 and 0.5 in the manufacturing sector, which is presented by the author as the evidence against "jobless growth".

Akcoraoglu (2010) provided empirical evidence on the relationship between economic and employment growth for the period 1995Q1-2007Q4 in his work. His results indicate the long-run relationship and bi-causality existing between the variables of real GDP and employment.

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Estimations of the employment elasticity of economic growth by Akcoraoglu result in a value of 0.20, thus indicating the positive correlation between employment and output (Akcoraoglu, 2010).

The examination of this literature contributes to the present research by providing empirical evidence to refer to while interpreting the results of employment elasticity estimations obtained in this work. The findings of previous research about "jobless growth" and employment elasticities in Turkey facilitate understanding of the developments in the Turkish economy and labour market up until the year of 2008. Due to the time span from 2000 to 2013 investigated in this thesis, the given research will build upon the existing literature and offer its results for this period, providing evidence that the Turkish economy is now displaying higher employment elasticities and positive employment dynamics, which cannot be considered as "jobless" on the whole economy level. However, the paper does reveal the presence of "jobless growth" in several sectors of the economy.

Chapter 3: Developments in economic growth and employment patterns

In this chapter I perform an extensive analysis of the developments in real GDP and real GDP growth in the overall Turkish economy as well as in its three main sectors: agriculture, industry and services in pursuit to identify the trends evolving during the last fourteen years from 2000 to 2013. Furthermore, I explore the pattern of employment growth and structure of employment in Turkey both for the total and sector Turkish economy. Moreover, I illustrate the differences in the employment structure by region, gender, age and educational level. In order to provide a more detailed picture on the sector level, overall developments in employment, data on real GDP and real GDP growth rate for the group of 7 sectors are presented by breaking down the industry sector into the manufacturing, mining, construction and electricity sectors and by disaggregating the service sector into the wholesale and retail trade, financial intermediation and transportation and communication sectors. By doing this analysis I aim to eye spot the trends which can support my hypothesis about positive relationship between economic growth, real GDP and employment and the absence of "jobless growth" in Turkey at the aggregate level and its presence in some sectors of the Turkish economy affecting particular subsets of Turkish population.

3.1 Developments of real total and sector GDP growth in Turkey

The data used for this chapter has been taken from the TURKSTAT database in order to track the development of the changes in the indicators of real total and sector GDP growth in Turkey throughout the period from 2000 and 2013. Analyzing the trends in the real GDP and real GDP growth of Turkey is important for this work, as these are the independent variables that I am using in my calculations for establishing evidence against the "jobless growth" in Turkish

economy as whole, but its presence at the disaggregate level of the economy. All the graphs and calculations are based on the annual data.

Figure 1 illustrates the development of the total GDP growth rate during the period from 2000 to 2013. The total GDP growth rates have been positive during the whole period, except for the two years which were marked by the world financial crises, negatively affecting Turkish economy. After plunging to its lowest point of -5.7 percent during the economic crisis of 2001, economic growth in Turkey rapidly recovered reaching high real GDP growth indicators. The average real GDP growth rate between the crises of 2001 and 2008-09 was approximately 6.8 percent, which characterized Turkey as "one of the fastest growing countries among the emerging economies" (OSEC, 2012). During the global economic crisis of 2008-2009 the Turkish economy experienced a sharp contraction, displaying its lowest indicators of 0.7 and -4.8 percent in 2008 and 2009 respectively. After such a dramatic drop in 2008-2009, the Turkish economy recovered very fast by reaching a robust real GDP growth of 9.2% in 2010 and of 8.8% in 2011, becoming the second highest growing economy of the world (IMF, 2010).

Figure 2 shows that the sector GDP growth followed a similar pattern to the one displayed by the total real GDP growth. The sector GDP growth rates presented in Figure 2 indicate that the sector which has reached the highest output growth rates is the industry sector with an average growth rate of 4.7 percent, followed by the service sector with an average growth of 4.3 percent.

Figure 1. Total GDP growth rate (%), 2000-2013

Source: TURKSTAT

The agriculture sector growth lags behind the industry and Services with an average growth amounting to 2.7 percent. Interesting, while all three sectors experienced contraction in output growth during the crisis episode of 2001, the second crisis was marked by the fall in growth rates in the agriculture sector already in 2007, whereas the industry and the service sector growth plunged sharply in 2009.
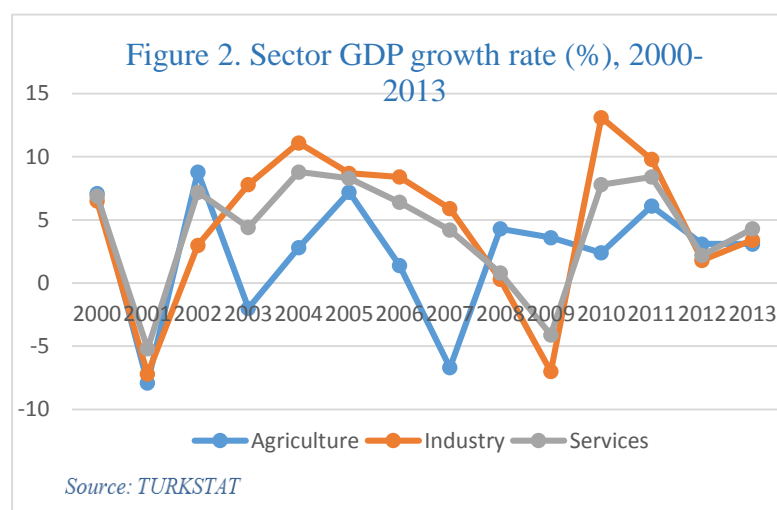
Figure 2. Sector GDP growth rate (%), 2000-2013

Source: TURKSTAT

Figure 3 illustrates the patterns in economic growth in the group of seven sectors of the Turkish economy. Looking at the growth rates in the presented sectors reveals that the sectors with the highest average real GDP growth rates during the period from 2000 to 2013 are the financial intermediation sector (7.7 %) and transportation and communication sector (6.6 %). These are

Figure 3. Sector GDP growth rate (%), 2000-2013

Source: TURKSTAT
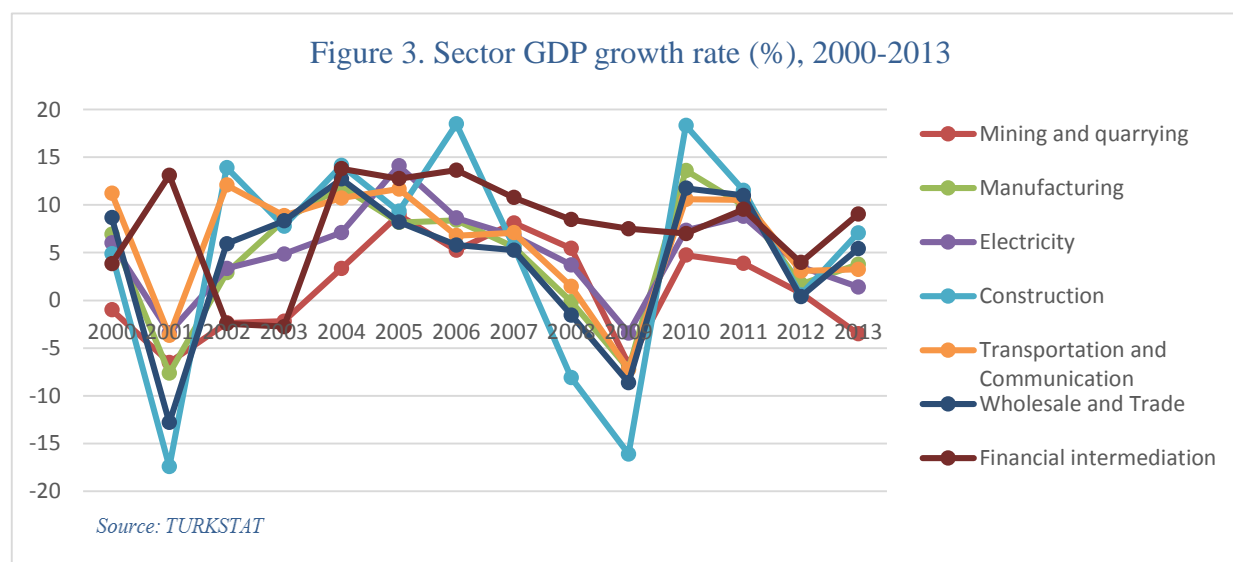
followed by the manufacturing, electricity and construction sectors with around 5 percent average real GDP growth each. Mining and quarrying has had the lowest average growth of less than 2 percent.

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Examining contribution of separate sectors to the total real GDP shows that mining and quarrying together with electricity sector have the least share in total real GDP with less than 2 percent from the overall GDP. Manufacturing remains the main driver of the Turkish economy generating almost one fourth of the total real GDP. Examining changes in the sector share of GDP, it can be concluded that the sector composition has not changed significantly since 2000. There has been an increase in the sectoral share of the transportation and financial intermediation sector by approximately 2.5 and 6 percent respectively. On the other hand, the share of the agriculture sector has gone down by 3 percent during the same period. The sectors whose share rose the most during the 14 year period are financial intermediation and transportation sector. The sectors with the negative growth in terms of the share in the total GDP have been mining, wholesale and trade as well as agriculture. The remaining sectors have experienced minor positive changes in their shares.
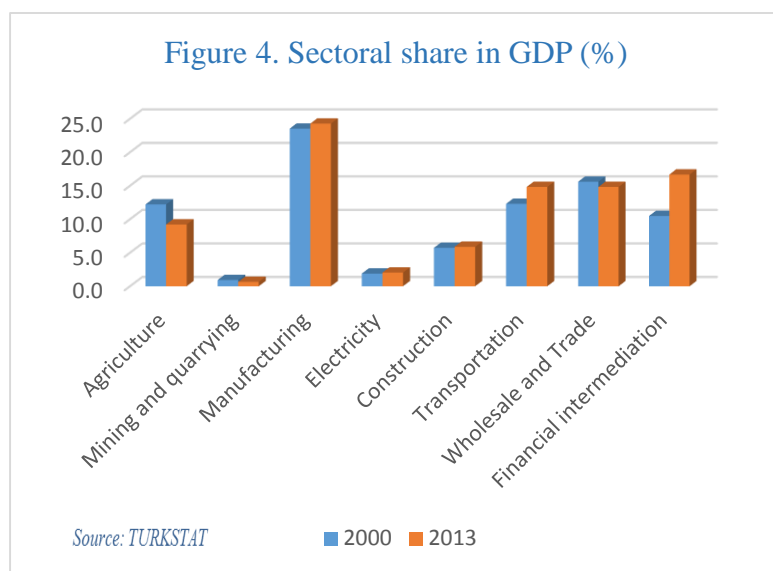
Figure 4. Sectoral share in GDP (%)

Source: TURKSTAT ■ 2000 ■ 2013

3.2 Developments and trends in Turkish labor market

Figure 5 illustrates that there was a downward trend in the overall employment until 2004. The number of employed persons in Turkey declined by almost 1.95 million in only four years. However, starting from 2004, there can be observed positive dynamics in total employment. The Turkish economy not only managed to restore its employment to the levels of the 2000, but also

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Figure 5. Distribution of employment (thousands, persons)

Females ■ Males ■ Total
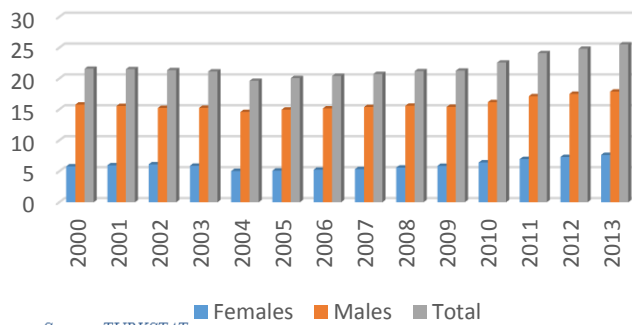
Figure 6. Distribution of unemployment (thousands, persons)

Females ■ Males ■ Total

generated approximately extra 4 million jobs compared to the numbers of 2000. Thus, the number of the employed persons increased from 2000 to 2013 by 18.3 percent. However, it needs to be taken into account that the number of the unemployed also rose during the period from 2000 to 2013 by 1.250 mln. persons, which leaves Turkey with the total of 2.693 mln. job gained in total employment. This increase in the numbers of the employed speaks in support of the expansion of the Turkish overall employment during the last 14 years, rather than indicating its "jobless" nature.
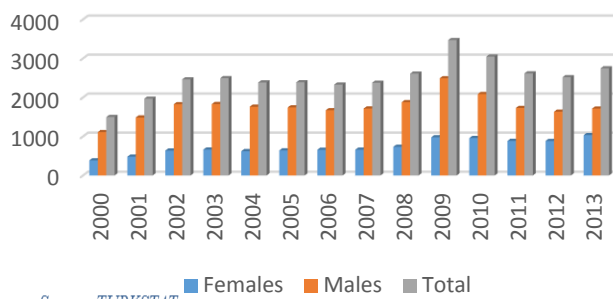
The next step in analyzing the patterns of employment is examining disparities in the Turkish labor market in the regional context. Figure 7 illustrates the dynamics in urban and rural employment over the period between 2000 and 2013. Figure 7 demonstrates that urban employment has experienced a constant rise in the number of employees, having increased by 50 percent during the whole period, whereas rural employment has gone down in total by 16 percent. The pattern of rural employment can be divided into two phases. The first phase from 2000 to 2006 saw a massive loss of jobs (3.57 mln.) in the rural sector. The declining numbers of the employed persons in rural areas hit the through in 2006. However, starting from 2006, there was a 26 percent

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rise in the generating capacity of employment in rural areas. Although total rural employment has

Figure 7. Regional distribution of employment (thousands, persons)

Source: TURKSTAT
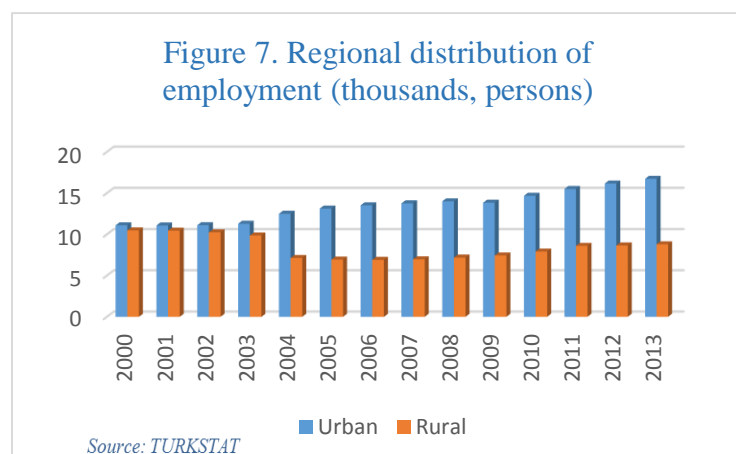
not still returned to its levels of 2000, it has been able to create 1.88 mln. jobs since 2006. The total share of the employed persons from urban and rural areas in total employment has substantially changed from 0.51 to 0.65 for urban and 0.48 to 0.34 for rural areas, signaling the shift of the employed people from rural to urban areas.

Gender

Focusing on the gender aspect of total employment, Figure 8 shows that both female and male employment has improved since 2000. Although the economy generated approximately the

Figure 8. Share of females and males in total employment (%)

Source: TURKSTAT
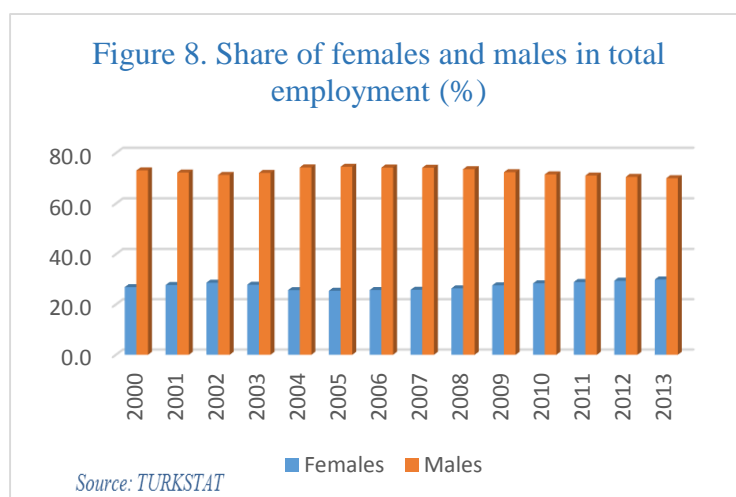
same number of jobs for both females (1.84 mln.) and males (2.1 mln.), female employment has experienced almost 2.5 as much growth as male employment has, reaching 31.7 percent. However, male employment still dominates in the Turkish labor market, being 2.3 times as much as the female one. The regional distribution of employment by gender reveals the following pattern: the number of males employed in urban areas has been steadily increasing, during the course of 14 years, having reached a rise of 35 percent. Male employment in urban areas has gone down only twice in 2001 and 2009, which can be associated

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Figure 9. Regional distribution of employment by gender (thousands, persons)

Source: TURKSTAT
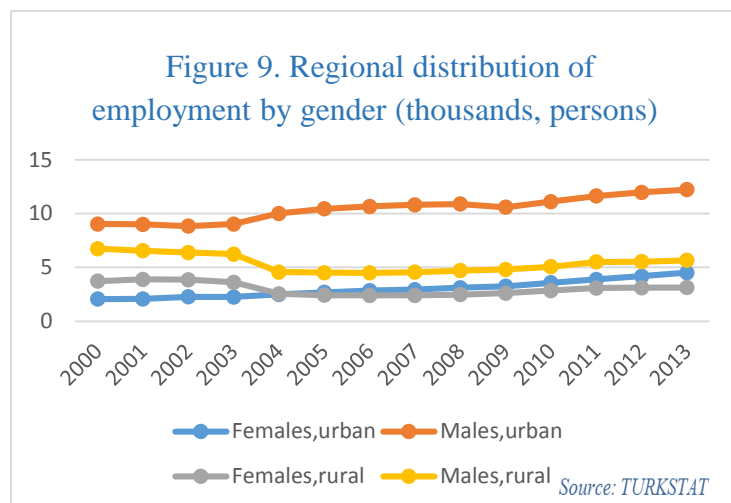
with the crisis period. On the other hand, the number of males employed in rural areas has faced a decline of 16 percent from 2000 to 2013. The number of men employed in rural areas fell steadily till 2006, after which it began rising again following the trend similar to the one displayed by total employment. Thus, on the whole, the Turkish economy generated 3.2 mln. of jobs for the males in urban areas, while it saw a loss of approximately 1 mln. jobs in rural male employment. It is noteworthy to say that for the last 8 years, from 2006 to 2013, there can be seen some restoration process in rural male employment, which resulted in generation of 1.158 mln. jobs for the males in the respective area.

As to female employment in urban and rural areas, there can be observed positive trend in the employment generating capacity of the Turkish economy in urban areas. During the period from 2000 to 2013 the number of employed females in urban areas has more than doubled, whereas it has decreased by 16 percent in rural areas. The period from 2000 to 2006 saw a significant decrease in the number of employed females, followed by the increase of 30 percent (725 thousands). Therefore, on the whole, the Turkish economy generated 2.18 mln. of jobs for the females in urban areas, while it saw a loss of 603 thousand jobs in rural areas from 2000 to 2013.

There can be observed a significant change in the ratio of females and males in urban areas. While the share of females improved from 18.6 to 26.9 percent, the share of male employment in total urban employment declined from 81.3 to 73 percent. Different pattern can be seen in rural

employment, where the ratio of females and males apart from minor fluctuations has not changed overtime and remained 0.35 and 0.65 respectively. The ratio of women to men employed in urban areas has changed from 0.23 to 0.35.

Figure 10. Regional distribution of employment (thousands, persons)

Urban Employment, 2000 (%)

Females   Males

Source: TURKSTAT

Rural Employment, 2000 (%)

Females   Males

Source: TURKSTAT

Urban Employment, 2013(%)

Females   Males

Source: TURKSTAT

Rural Employment, 2013 (%)

Females   Males

Source: TURKSTAT
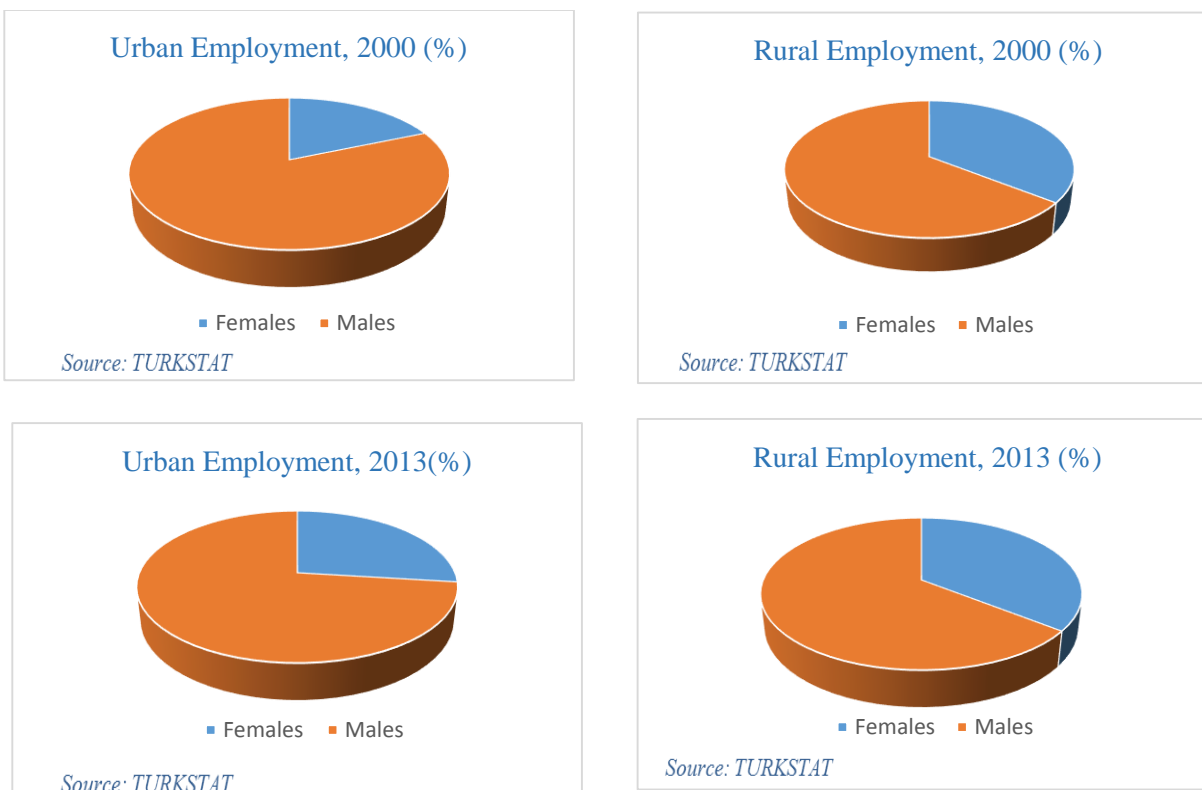
Drawing conclusions from the information presented above, it can be said, that there is a positive dynamics in overall employment with the definite reallocation of labor resources from rural to urban areas, although the numbers indicate that rural areas started to gain significance again and the employment generation capacity of the Turkish economy has been gradually improving. From the gender aspect, it can be stated that the number of employed males prevail both in urban and rural areas, however, whereas in rural areas the gender composition remained the same in 2013 as in 2000, there can be seen a significant shift in urban employment gender composition with women share in the urban economy and its ratio to men growing significantly.

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Age structure

Looking at the employment distribution among the different age groups, Figure 11 shows

Figure 11. Age distribution of the employment, 2013 (thousands, persons)
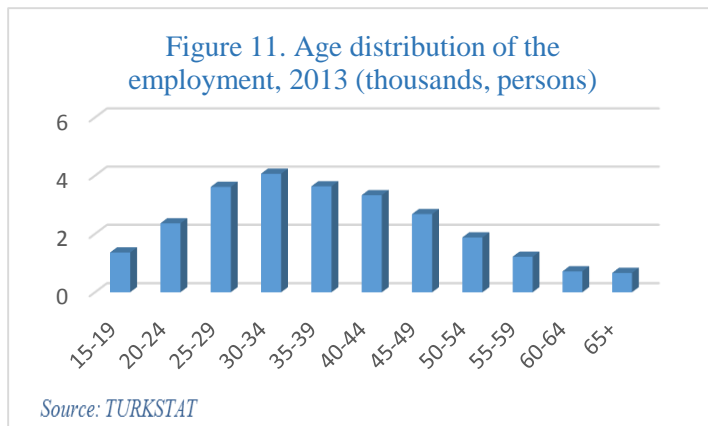
that the employees between 25 and 49 years old constitute the largest part of the Turkish employment. The age group between 30-34 years old makes up almost one fifth of total employment. The groups that are least represented in the total employment distribution can be divided into two, the youth 15-24 and 55-65+.

Examining employment patterns by age structure, it can be seen that there have been some significant changes in the age composition of employment in Turkey. Three age groups that have

Figure 12. Total growth in employment by age 2000-2013, (%)

experienced negative employment growth during the period from 2000 to 2013 are young people from 15-19, 20-24 and people working after 55, indicating the problem of Turkish youth and old age unemployment. The age groups that have witnessed the greatest growth in employment are the age groups from 30 to 54.

In total, the youth employment from 15-24 has seen a decline of total of 1.155 mln. jobs out of which 528 thousand female jobs and 627 thousand male ones, whereas the age group 25-29 has experienced a loss of 304 thousand of the male and 164 thousand of the female employees. Meanwhile male employment among 15-29 went down by 931 thousand, urban male employment went up only by 13 thousand, unable to accommodate the rest 918 thousand of young males who

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moved out from the rural region. As for the females, out of 692 thousand rural female employees who moved out from rural employment, only 173 thousand could be absorbed by urban, leaving more than half a million females without a job.

Educational Status

The next characteristic to look into is the labor market composition by educational attainment of the employed persons. Turkish statistical office classifies the employed into eight levels of education: illiterate, literate but with no school completed, primary school and primary education graduates[1], junior and high school graduates, as well as vocational school and university graduates. Figure 13 illustrates current educational composition of the Turkish labor market, showing that the share of illiterate and
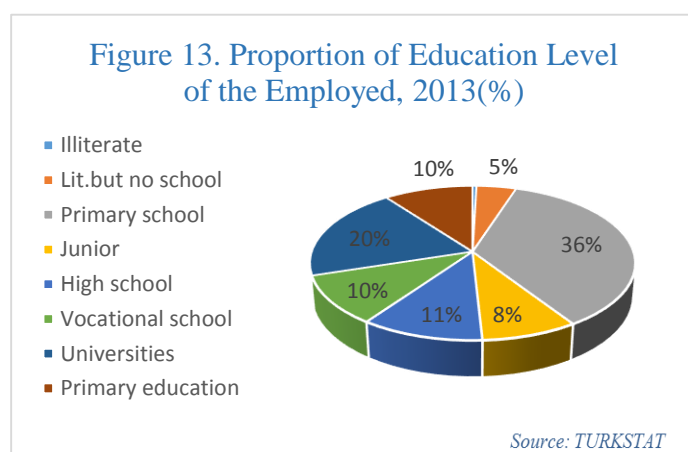
Figure 13. Proportion of Education Level of the Employed, 2013(%)

- Illiterate
- Lit.but no school
- Primary school
- Junior
- High school
- Vocational school
- Universities
- Primary education

Source: TURKSTAT

employed persons with no school completed accounts for only about 6 percent. The highly educated people account for 30 percent of the total employed persons, whereas persons with primary education make up almost the half of the employed in Turkish economy.

Examining the evolution of the educational composition of employment during the period from 2000 to 2013 presented in Table A.1 in Appendix I shows that the number of people with different educational levels has not changed much since 2000. The number of illiterate persons in employment has gone down by 42 percent during the whole period. As a result of it, the share of literate people with no school education increased by 57 percent. The educational groups that have

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[1] Primary school is from the 1st to the 4th grade. Primary education is from the 5th to the 8th grade.

seen the biggest change are university graduates and vocational school graduates, whose number in employment increased more than doubled from 2000 to 2013. There has been a considerable increase in the number of employed primary education graduates, 107 (urban) and 31(rural) percent change in 2013 compared with 2000. In contrast, the total number of the primary school graduates in total employment has declined by almost 20 percent during the same period.

Additionally, Table A.1 in Appendix I provides disaggregation of the employed into urban and rural areas by education level. Table A.1 illustrates that the regional composition of employment by educational attainment is different between the two areas. The number of illiterate and literate with no school completed is higher in rural areas compared to urban ones, whereas the number of the highly educated employees at the junior, high, vocational and university level is 4.4 times as big in urban areas as in rural ones. In terms of educational differences by gender and age, it can be inferred from Figure 14 that most of the employed females are either primary school or

Figure 14. Share of females and males by educational attainment, (thousands, persons)

Source: TURKSTAT
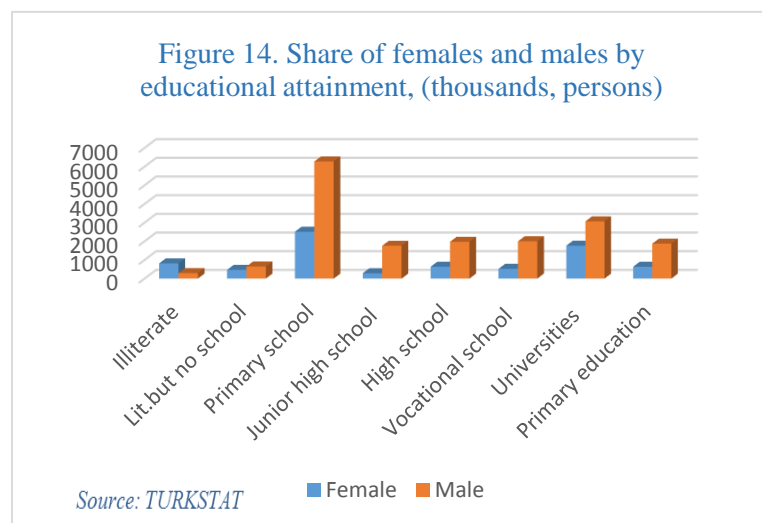
university graduates. The least number of the employed females graduated from junior high school. The educational background of the male counterparts is similar to the females, except that the number of men with junior high, high and vocational school diploma is the least represented in total employment. As to the differences in the educational attainment between men and women, Figure 14 shows that the number of illiterate employed females is 2.8 higher than of the males. The number of male primary school and primary education graduates is 2.5 and 2.9 times respectively higher than the female graduates with the

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same level of educational level. The number of male university graduates is also higher than that of female graduates by 1.7 times. Particularly high is gender disparity among the employed persons with junior, high and vocational school education, where the number of men is 6, 3 and 3.8 times higher than that of women. The educational level of the women has gone up compared to 2000, the number of the employed illiterate females has almost halved, whereas the number of the female graduates in total employment has increased by two times.

Sector Employment

Analysis of the changes in the sector labor market by the main 3 sectors is presented in Figure 15. Based on the employment rates, the service sector is the largest employer throughout the whole period from 2000 to 2013, accounting for almost a half of total employment. This is followed by the industry and the agriculture sector respectively. The employment rates in the agriculture exceeded those in the industry sector up until 2005. However, starting from 2005, the industry sector provides jobs to more persons than the agriculture sector, employing one quarter of the total number of employed persons. Throughout the whole period from 2000 to 2013 the Turkish agriculture sector has faced a decline in the number of employed persons, having an 18.8 percent decrease in the employment rates, when 2000 and 2013 compared.
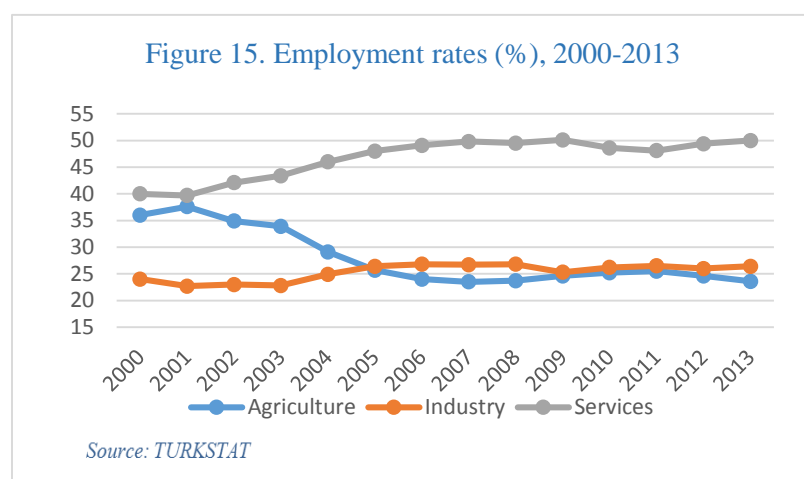
Figure 15. Employment rates (%), 2000-2013

Source: TURKSTAT

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Figure 16 provides an illustration of the changes in the sector employment growth rates for the group of 3 sectors over the period from 2000 to 2013. It can be seen that the agriculture sector suffered from negative growth rates in the employment rates for the period from 2002 to 2007,

Figure 16. Employment growth rates (%) (%), 2000-2013

Source: TURKSTAT
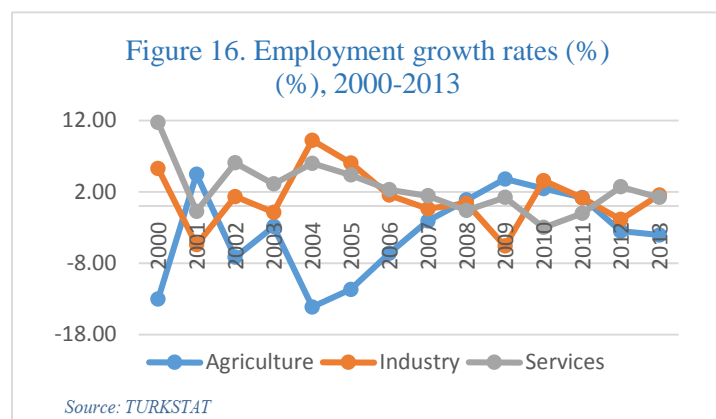
exactly when the overall real GDP growth rate experienced positive improvements. Although after 2004 the performance of employment growth improved significantly, since 2009 it had been falling again displaying negative growth rates in 2012 and 2013. The service sector on the other hand, experienced very strong performance during the period between 2002 and 2007, reaching high percentage of growth ranging from 1.43 to 6.05. In total, the growth of the service sector reached an average of 2.48, whereas it was -3.75 and 1.13 for the agriculture and the industry sectors respectively.

The next step is to analyze the changes in the employment patterns in the group of seven sectors. Figure 17 is examined as to make inferences about the employment generating capacity of the givens sectors. As can be seen from Figure 17, the sectors that have expanded the most during the period from 2000 to 2013 in terms of the numbers of the persons employed are the

Figure 17. Employment growth rates (%) (%), 2000-2013

Source: TURKSTAT
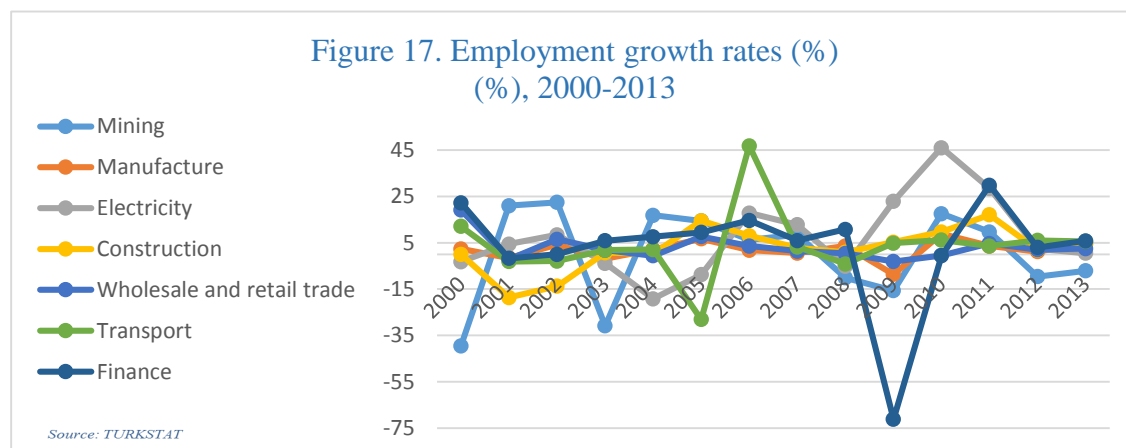
wholesale and retail trade sector together with manufacturing sector, namely by 1.010 and 995 thousand jobs. Construction, transportation and communication sectors have contributed to total employment with generating 418 and 340 thousand jobs. However, the agriculture, finance and real estate sector have seen negative changes. It is interesting to notice that the number of the employed people in the agricultural sector had been falling up until 2007, after which it began rising again, which goes in line with the developments observed in rural employment. The financial crisis of 2008-2009 affected almost all sectors, apart from electricity, construction and transportation which continued to expand during the whole period from 2000 to 2013. An interesting case is the financial sector, which was booming with employment opportunities during 2007 and 2008, but after the crisis contracted sharply by almost 3.5 times.

Looking into general trends with respect to the share of the employed persons in each sector by gender presented in Figures 18 and 19, it can be seen that half of the male population is working in the service sector, this number has been stable during the whole period. The share of the females has been rising in the service sector from 26.4 percent in 2000 to about 48 percent in 2012. It can be seen that the industry sector has been the most stable with respect to the ratios of females and males employed in this sector. The percentage of males working in the

Figure 18. Female share in employment (% of female employment) 2000-2013
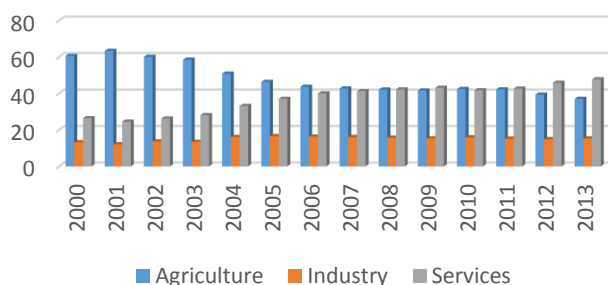
Source: TURKSTAT

Figure 19. Male share in the employment (% of male employment), 2000-2013

Source: TURKSTAT

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industry sector reaches almost one third of total male employment, although it provides only about a quarter of all females with employment. Regarding the agriculture sector, the shares of both men and women have gone down by 10 percent for the last fourteen years.

Looking into the gender distribution across the eight presented sectors, it can also be seen, that the major bulk of women as well as men are employed in the agriculture, wholesale and trade as well as manufacturing sector. The share of female employees in the mining and quarrying, electricity and construction sector is very low, with total employment in three sectors reaching 85 thousand persons. The sectors that accounted the most for generating employment for the females are the manufacturing and wholesale and trade. Since 2000 female employment in the two sectors has increased by 0.5 and 2.75 times, providing females with more than a million of jobs. For the men on the other hand, significant number employment opportunities are provided not only by manufacturing and wholesale and trade, but also by construction and transportation sectors.
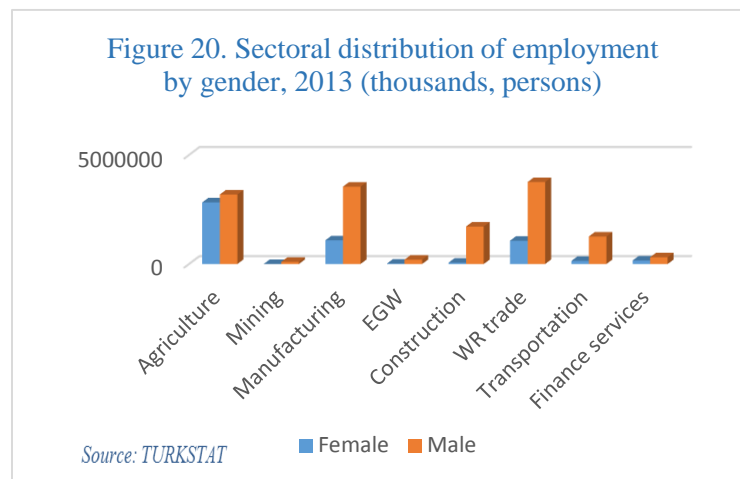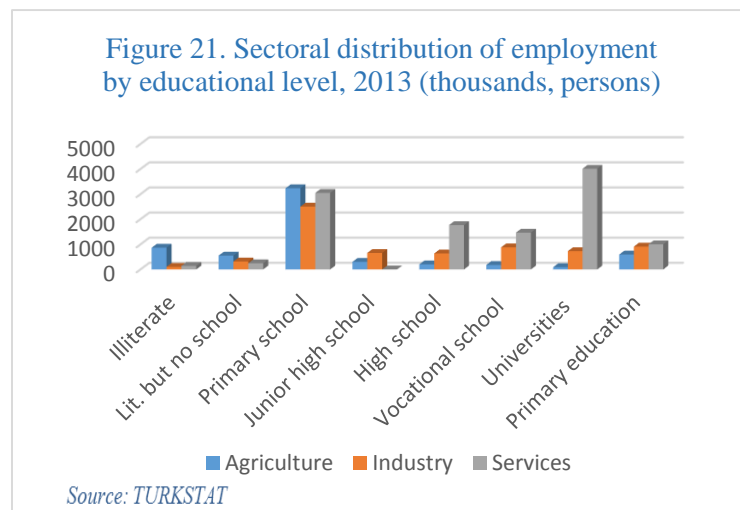
Figure 20. Sectoral distribution of employment by gender, 2013 (thousands, persons)

Source: TURKSTAT

Figure 21. Sectoral distribution of employment by educational level, 2013 (thousands, persons)

Source: TURKSTAT

Analyzing the present structure of the three main sectors by educational groups, it can be seen, that the majority of illiterate persons and literate persons with no school completed are

accommodated in the agricultural sector, whereas university, vocational school and high school graduates are mostly found in the service sector. Primary school graduates are prevalent in all of the three sectors. The composition of each sector employment by educational attainment is rather diverse. 54 percent of the employed persons in the agriculture sector are primary school graduates. Next 33 percent of the agricultural employment also consist of people with low educational and literacy level. Thus, it can be concluded, that the agriculture sector mostly accommodates the low-skilled rather than providing employment opportunities for the high-skilled workers. As for the industry sector, it can be seen, that it is mostly made up by primary school and primary education graduates (37 and 14 percent respectively). Junior, high, vocational school and university

Figure 22. Sector distribution of employment by educational level, 2013 (%)

Source: TURKSTAT
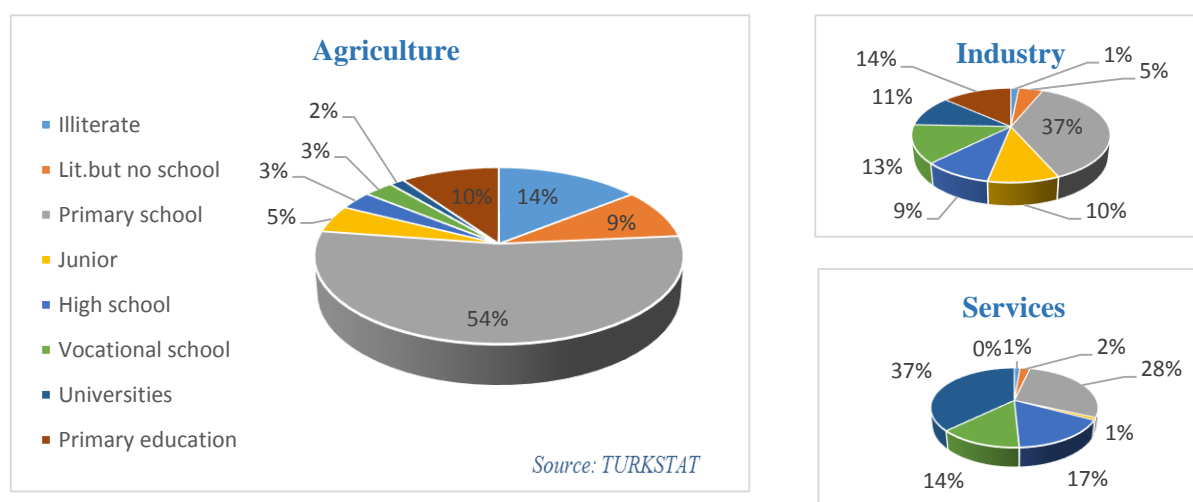
graduates are almost equally represented in the industry sector accounting for 10 to 13 percent for the industry employment each. The number of the literate with no school completed and illiterate persons reaches less than 7 percent altogether. The service sector composition is more high-skilled compared to the other two sectors. University graduates and primary school graduates dominate in this sector with the representation of 37 and 28 percent of the service sector employment. High

school together with vocational school graduates make up 30 percent of the total service sector employment.

Current age composition of the sector employment is depicted in Figure 23. In terms of trend it has remained almost the same throughout the period from 2000 to 2013. The share of female employment in the agriculture and service sectors constantly grows with the age for the women in the category of 15-44, however, after 44 there is a gradual decrease of females in both of these sectors. Employment of 20-44 is prevalent in the service sector, whereas starting from 50 till 65+,
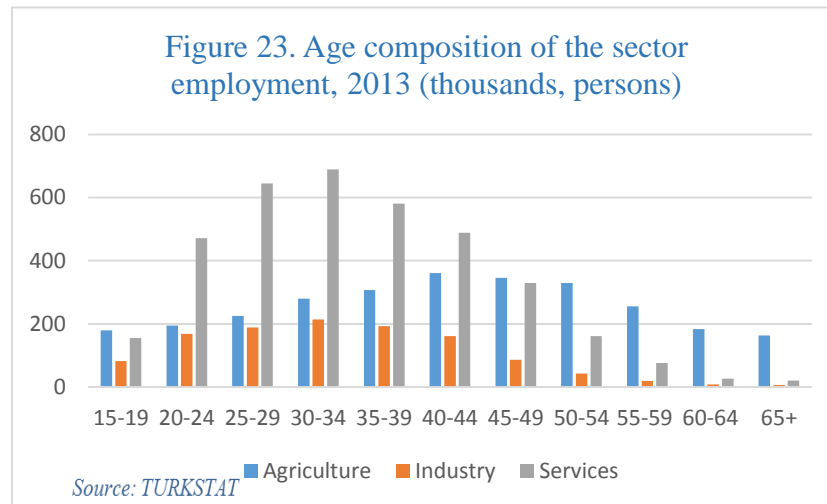
Figure 23. Age composition of the sector employment, 2013 (thousands, persons)

Source: TURKSTAT ■ Agriculture ■ Industry ■ Services

Female employment is mostly concentrated in the agriculture sector. The majority of men in the service sector are aged 25-49. The number of the employed in the service sector sharply goes down after 50. In the agriculture sector the share of men is increasing as the employees become older, whereas in the industry sector it starts falling after 34.

Chapter 4: Data and methodology

4.1 Data and Methodology

This thesis deals with the analysis of the influence of real GDP on the industry, regional, sector employment, including gender, age and educational aspects. The present research analyzes the time series data ranging from $2000Q_1$-$2013Q_4$ taken from the Turkish Statistical Institute. Therefore, the sample consists of 56 observations. The choice of the time period (from 2000 to 2013) has been determined by the availability of data as well as by the existence of the extensive research on the earlier periods. Empirical investigation has been carried out by using employment measured in number of persons as a dependent variable, whereas total and sector GDP acted as independent variables. All data used for the econometric estimations in the given research are quarterly and seasonally adjusted.

Before proceeding with presenting the results explaining the relationship and causality between the real GDP and employment, the first step would be to obtain the results from the stationary test and co-integration test. Both tests have been done with the purpose to avoid unreliable estimations which can be a result of "spurious regression". In order to receive reliable information based on the regressions in this research, it needs to be made sure that the model is not a result of "spurious regression" (Gujarati, 1995). Thus, it needs to be determined first whether the time series are of stationary or non-stationary nature. The first step of the analysis is to check the order of integration of the given variables, which will ensure the validity of the co-integration test, provided the variables fall into the same order of integration. To check if the variables are stationary or non-stationary, the Augmented Dickey-Fuller test is used.

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4.2 Models
4.2.1. "Simple and descriptive" model

Analyzing changes in GDP growth along with those in employment elasticities provides an idea as to whether economic growth in a country is accompanied by the gains in employment or not. In this section I introduce the "simple and descriptive" model of employment elasticity, which is regarded as one of the key labor market indicators which are easy to use and make inferences about the general trends while examining performance of the labor market (Kapsos, 2005:12). The employment elasticity of growth measures the percentage variation in employment growth induced by one percentage change in real GDP growth, providing estimation of the extent to which the employment responds to the changes in real GDP growth. A high employment elasticity estimate implies that correlation between real GDP growth and employment is high as well, while an employment elasticity closer to zero implies that increase in economic growth does not result in considerable job creation (Khan, 2002).

In a production function, an output for an economy as a whole equals to the product of the labour force employed and labour productivity, which can be expressed through the following expressions (Mankiw, 1995):

$$Y = L \times Y/L, \ (1)$$

where Y and L denote respectively output and employment.

Growth in output is generated by the sum of the growth of the employed labour force and growth of labour productivity, which means that positive changes in employment growth will result in an increasing GDP level. This can be depicted through the following expression:

$$\Delta Y = \Delta L + \Delta (Y/L), \ (2)$$

where ΔY stands for growth rate.

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Based on this, the relevant formula for estimation the employment elasticity of growth is (Boltho, Glyn, 1995):

$$\varepsilon = \frac{\Delta L/L}{\Delta Y/Y} \quad (3)$$

where L denotes employment, while Y stands for the real GDP for the Turkish economy as a whole. The numerator of the given equation refers to the percent change of employment, while the denominator denotes the growth rate of GDP. The elasticity of employment thus indicates the percent responsiveness of employment to every one per cent change of real GDP. The availability of the data on GDP and employment make the calculation of the elasticity of employment rather simple.

However, Kapsos (2005:12) emphasizes that interpreting employment elasticities and drawing inferences about the labor market performance upon them should be done with cautiousness. There are several drawbacks of using employment elasticity for the purpose of analyzing employment performance. First of all, calculation of the employment elasticity only utilizes information regarding historical employment and economic growth. Kapsos (2005:12) underlines that the estimations of employment elasticities are likely to suffer from omitted variable bias due to absence of other variables in the model to control for. Second shortcoming is that employment elasticities can be very volatile from one period to the next.

However, despite the obvious shortcomings, the simplicity of the method using employment elasticity as a measure allows to track the general trends and tendencies occurring in the economy. Based on this, this research will proceed with the estimation of an employment elasticity for the selected economies using a descriptive method for calculating elasticity of employment.

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4.2.2. Employment elasticity using OLS regression

I also elaborate on another method of calculating elasticity of employment which measures the responsiveness of employment to the real economic output. This method employs an estimation of equations (4 and 5), one developed for each industry, sector, region and demographic group. The OLS regression method is applied to compute the coefficients β_1 of the following equation:

$$\ln E_i = \beta_0 + \beta_1 \ln Y_{total} \; (4),$$

where E is employment, Y_{total} is the overall real GDP and *i* stands for the subset of the investigated employment: total, sector, regional, gender, age, education. From the above presented model, the coefficient β_1 measures the elasticity of employment (E) with respect to economic output (Y) that is the percentage change in the employment induced by the percentage change in the economic output for the economy as a whole. β_0 is a constant in the given model (4). Since the purpose of the given study is not only to examine the changes in the employment in response to changes in real GDP as a whole, but it also investigates the level to which sector employment responds to changes in sector real GDP, the study uses the following equation developed by Islam and Nazara (2000):

$$\ln E_i = \beta_0 + \beta_1 \ln Y_{sector} \; (5),$$

where *i* indicates a subset of employment: total, sector, regional, gender, age, education , E_i denotes employment, whereas Y_{sector} stands for the sector output. This equation contains sector GDP which determines the elasticity of employment in the sector and total economy.

Chapter 5: Empirical Evidence

In this section I discuss the empirical results of my estimations on the relationship between economic growth, output and employment. First, I calculated elasticity of employment of economic growth and employment elasticity of output based on the methodology presented in Chapter 4. Second, I interpret my estimations and highlight the results that support my hypothesis about the absence of "jobless growth" at the aggregate level and its presence at a more disaggregate levels of the economy.

5.1 The 'simple and descriptive' method of calculating arc elasticity of employment

The results of the employment elasticity estimations that I obtained based on simple and descriptive model are presented in Table 1. The 'descriptive' method of calculating the elasticity of employment for economy as a whole indicates that the total employment elasticity for the Turkish economy during the examined period from 2000 to 2013 was between -0.76 and 1.32, which indicates the percentage points of the total gains in employment growth resulting from a one percentage point change in economic growth. Negative values of the employment elasticity show that for an additional percentage change in the GDP, employment growth declined by the calculated value, whereas positive values indicate the opposite.

Table 1 shows that the Turkish economy as a whole had negative employment elasticity values during the three consecutive years after the crisis of 2001 and once more in 2009 right after another world financial crisis. As can be inferred from Table 1, starting from 2010 Turkey has been experiencing an overall increasing trend in the elastic reaction of employment with respect to changes in GDP growth, reaching the elasticity of output of 0,67, 0,76 and 1,29 percentage points. Thus, it can be concluded that recently employment rates have become more elastic with respect to the economic growth dynamics of the country, which means that starting from 2010 the

economic began generating more employment opportunities compared with the previous periods.

Figure 24. Sectoral employment elasticity using descriptive method, 2000-2013

Source: TURKSTAT
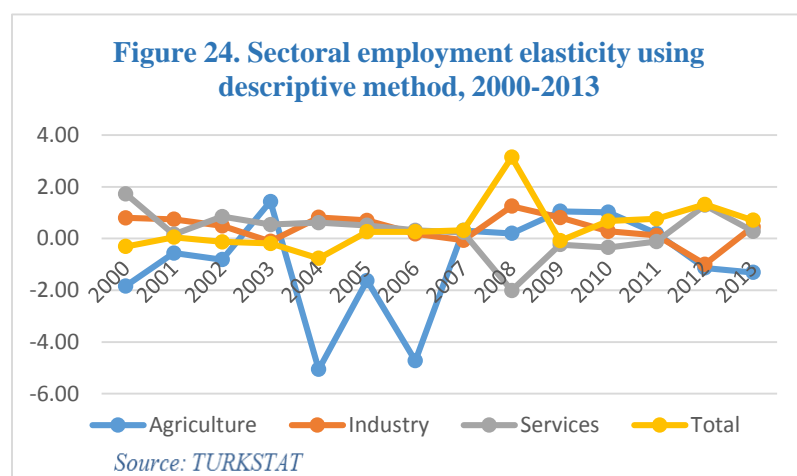
Generally, Turkish economy can be characterized by the positive employment elasticity values with the average total employment elasticity for the period of 14 years equaling to 0.43 percentage points.

Employment elasticities in the group of three main sectors of the Turkish economy varied widely during the period from 2000 to 2013. Analyzing sectoral elasticities of employment presented in Table 1, it is possible to distinguish several general trends. Table 1 shows that the agricultural sector has had an employment elasticity ranging from -5.06 to 1.05, which implies that an increase in agricultural output growth by one percentage point would cause fluctuations in the employment growth rate in this sector ranging from -5.06 to 1.05 percentage points. Among the three sectors employment elasticity in the agricultural sector experienced the highest fluctuation, displaying negative average elasticity of -0.92. Thus, evaluating the responsiveness of the employment in the agricultural sector, it can be inferred from the average employment elasticity estimations that the growth rate in employment results in decreasing employment opportunities when the real GDP of the country grows. This tendency could be explained by the massive outflow of labor from the agricultural sector into urban areas (Sahin, Tansel, Berument, 2013).

The average employment elasticities for the industry and service sectors were 0.39 and 0.27 respectively. These results can be interpreted the following way: the average responsiveness of the industry sector to changes in GDP growth among the other sectors is the highest. The

increase in the employment rate of the industry sector with respect to one percentage point increase in GDP amounts to 0.39 percentage points, whereas it is almost twice as low for the service sector.

Table 1. Total and Sector employment elasticity, 2000-2013

Year	Agriculture	Industry	Services	Total
2000	-1.84	0.80	1.73	-0.30
2001	-0.56	0.74	0.16	0.05
2002	-0.82	0.49	0.85	-0.13
2003	1.43	-0.11	0.54	-0.18
2004	-5.06	0.82	0.61	-0.76
2005	-1.62	0.70	0.51	0.26
2006	-4.72	0.18	0.32	0.26
2007	0.31	-0.06	0.24	0.32
2008	0.20	1.25	-2.01	3.14
2009	1.05	0.81	-0.23	-0.08
2010	1.02	0.28	-0.34	0.67
2011	0.20	0.12	-0.12	0.76
2012	-1.14	-0.99	1.29	1.32
2013	-1.3	0.45	0.28	0.71

Source: Author's calculations

During the economic boom between 2002 and 2007, the service sector was the one accompanied with the gains in the employment from economic growth, whereas the other two sectors were significantly less elastic to the GDP improvements in the economy. However, the industry sector was less sensitive to the economic shocks and still displayed positive employment elasticities of 0.32 in the period from 2008 to 2013. In contrast, services had negative employment elasticity, whereas the agriculture sector had zero employment elasticity.

The employment elasticities for the group of seven additional sectors are calculated the same way and presented in Table B.1 in Appendix B. Table B.1 shows that the sectors with the highest elasticities are mining (3.3) and wholesale and retail trade (1.9) sector. The construction and transportation sector display a very high average employment elasticity of 0.59 and 0.49 respectively. The only sector with a negative average employment elasticity is the manufacturing sector with the indicator of -1.18. But if I take out a negative elasticity during the crisis period, the value becomes positive 0.50 percentage points.

Based on the estimations of elasticities of economic growth computed by "simple and descriptive" method, it can be concluded that the only sector consistently suffering from the

negative employment elasticities is the agricultural sector. A one percent change in the economic growth of the agricultural sector is associated with a decrease in the agricultural employment growth by 0.92 percentage points.

5.2 Econometric estimates of employment elasticity using OLS regression

This section presents the results of my estimations on the total, regional and sector elasticity of employment as well as gender, age and educational elasticities of employment with respect to total and sector output obtained from the OLS regression method for the period from 2000 to 2013.

For the purpose of analyzing the relationship between the total and sector economic output and the total and sector employment, quarterly data of the total GDP and total employment covering the period from 2000 to 2013 are used. All variables taken from the TURKSTAT database are seasonally adjusted and measured in logarithms. The real GDP series (GDPTL) is and measured by constant 1998 prices, whereas employment series (EMPL) include the total number of employed persons in Turkey aged 15-64. Both variables have been changed into the new series LGDPTL and LEMPL, which represent the logarithms of the GDPTL and EMPL series respectively. To begin with, I am interested whether there exists any causality between these two variables, and if so, to which extent the one percentage change in the variable in GDP correlates with changes in the variable of employment.

First, I investigate whether the variables LGDPTL and LEMPL are stationary or non-stationary and determine the order of integration they fall into using unit root test (ADF). The Schwarz Info criterion is used to determine the lag number that is needed to avoid the serial correlation in the residuals. Table C.1 presents the results of the performed ADF unit root test for the series of logarithm of the total real GDP and logarithm of total employment. The ADF examination shows that both series are non-stationary in levels. However, both LGDPTL and

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LEMPL become stationary when checked for the stationarity in the second differences, therefore their integration of order is two, i.e. II (2). The same is true for the sector, gender, age and education variables.

The next step before proceeding with running the OLS regression is to see whether the variables are co-integrated using the Johansen co-integration test. The necessity to check the variables for co-integration is a prerequisite for formulating a valid equation for OLS estimation (Johansen, 1988). As can be seen from Table C.2 presenting the results of the Johansen test, both variables are co-integrated, which allows to proceed further with OLS estimations.

Furthermore, before starting calculating elasticities by running OLS regressions, I explore the causality between economic growth and employment for the economy as a whole by applying the Granger (1969) causality test. While performing the Granger causality test, I use stationary values of the variables LGDPTL and LEMPL, using their second differences, since they are integrated of order two. The results of the Granger causality test together with the values of F-statistic and p-values are shown in Table C.3.

Both of the null hypotheses of "no granger causality from GDP to employment" and "no granger causality from employment to GDP" were rejected. This means that increases in the real GDP result in the increasing employment, as well as increases in the employment lead to the positive changes in the real GDP. These findings go in line with the research covering the earlier period from 1995-2007 (Akcoraoglu, 2010).

Finally, I proceed with presenting the results on the estimated values of the employment elasticity of economic output which have been calculated by using the method of ordinary least squares based on the equations 3 and 4. As the results of the OLS regression suggest during the period from $2000Q_1$ to $2013Q_4$, the employment elasticity of economic output equaled to 0.37,

which implies that employment was positively related to the real GDP in Turkey. This result of the total output elasticity of employment is significantly higher than the total elasticity values presented by Yeldan (2013) for the periods from 1989 to 2008 (0.25) and from 2002 to 2008 (0.14).

Table 2 provides a picture of the total and sector (value-added) output employment elasticities calculated using equation 4. The total GDP elasticity gives an indication of the percentage point responsiveness of sector-specific employment to a one-percentage point change in total GDP, whereas the sector (value-added) elasticity shows the percentage change in sector

Table 2. Sector Employment Elasticities

EMP	Total GDP	AGR GDP	IND GDP	SER GDP	MQ GDP	MF GDP	CON GDP	TC GDP	WRT GDP	EGW GDP	FI GDP
Total	0.375* (0.060)	0.059* (0.008)	0.593* (0.169)	0.710* (0.168)	0.103*** (0.058)	0.829* (0.166)	0.116 (0.162)	0.890* (0.108)	0.147 (0.098)	0.114* (0.026)	-0.473* (0.087)
Urban	0.171* (0.033)	0.026* (0.004)	0.386* (0.081)	0.352* (0.088)	0.052*** (0.030)	0.529* (0.074)	0.073 (0.083)	0.477* (0.053)	0.074 (0.051)	0.062* (0.013)	-0.201* (0.049)
Rural	-2.818* (0.899)	0.697* (0.366)	-3.489* (0.807)	-3.887* (0.871	-3.597* 1.077)	-3.448* (0.819)	-3.537* (0.708)	-3.251* (0.687	-2.698* (0.890)	-2.208* (0.679)	-1.744* (0.575)
Female	0.554* (0.104)	0.085* (0.015)	0.802* (0.286)	1.053* (0.282)	0.094 (0.097)	1.255* (0.278)	-0.006 (0.265)	1.361* (0.189)	0.137 (0.162)	0.155* (0.045)	-0.780* (0.140)
Male	0.218* (0.028)	0.033* (0.004)	0.500* (0.070)	0.517* (0.072)	0.180* (0.020)	0.281* (0.037)	0.356* (0.069)	0.416* (0.063)	0.281* (0.037)	0.085* (0.010)	-0.077 (0.057)
Female urban	0.145* (0.038)	0.021* (0.005)	0.435* (0.081)	0.316* (0.096)	0.067** (0.031)	0.527* (0.081)	0.119 (0.086)	0.415* (0.067)	0.104** (0.053)	0.063* (0.014)	-0.134** (0.057)
Female rural	-0.306** (0.1310)	0.133* (0.050)	-0.420* (0.119)	-0.464* (0.129)	-0.006 (0.152)	-0.414* (0.120)	-0.442* (0.104)	-0.385* (0.102)	-0.298** (0.129)	-0.253** (0.098)	-1.410* (0.215)
Male urban	0.201* (0.027)	0.031* (0.003)	0.370* (0.076)	0.414* (0.076)	0.085* (0.027)	0.477* (0.073)	0.119 (0.078)	0.479* (0.045)	0.134* (0.045)	0.059* (0.012)	-0.221* (0.043)
Male rural	-0.296* (0.093)	0.056 (0.038)	-0.351* (0.085)	-0.395* (0.091)	-0.113 (0.111)	-0.346* (0.086)	-0.356* (0.074)	-0.332* (0.072)	-0.283* (0.092)	0.038 (0.052)	-0.560* (0.146)

Note:*Significant at 1 %, ** Significant at 5 %, *** Significant at 10%. Standard errors are given in parenthesis.
Source: Author's calculations

employment generated by a one-percentage change in real GDP of the corresponding sector. These two kinds of employment elasticity can provide useful information about the structural changes in the economy. Although structural changes in the economy take time and are regarded as a long-run phenomenon (Kapsos, 2005), it is still possible to illustrate current trends in output and employment by age, gender, level of education and economic sector using the 14 year period. In

this regard, the sector elasticity of employment to total output will shed light on whether employment in the given sector is expanding or shrinking compared to the other sectors and economy as a whole (Taymaz, 2013). The sector elasticity shows whether employment or productivity is the main driving force of the growth in the corresponding sector.

Table 2 demonstrates that at the level of the whole economy, the industry and service sectors experienced employment expansion over the whole period under examination, having the same employment elasticity value of 0.20. The elasticity of employment of agricultural sector to overall GDP is negative, which means that the agriculture sector employment has been shrinking compared to the other sectors. What regards the individual sector elasticities, the industry sector together with the service sector are the fastest growing sectors. Based on the results presented in Table 2, employment in the industry sector changes by 0.78 percentage points in response to one-percentage point of output generated in this sector, whereas employment in the service and agricultural sector changes by 0.44 and 0.15 percentage points respectively. These results differ from those that were obtained by Yeldan (2013) in a way that the current employment elasticity of industry is almost twice as high, the service sector elasticity has almost the same value as the one calculated by Yeldan (2013) for the period from 2002 to 2008. As to agricultural sector GDP, it shows positive elasticity of 0.15 percentage points against the negative elasticities in the Yeldan's (2013) paper. Thus, based on this results it cannot be stated that Turkey has been experiencing "jobless growth" during the period from 2000 to 2013 in its total and sector employment of the group of three. However, disaggregating two main sectors industry and services into seven for the purpose of studying "jobless growth" shows that the employment elasticities of the financial intermediation, construction, mining and electricity sector are insignificant at the value-added

level, whereas the employment in agriculture, mining and electricity does not seem to be significantly affected by the total GDP.

Table 3. Employment Elasticities

EMPL	AGR	IND	SER	MQ	MF	CON	TC	WRT	EGW	FI
Total GDP	-0.190 (0.145)	0.202* (0.043)	0.209* (0.048)	0.165 (0.133)	0.046*** (0.027)	-0.513* (0.161)	0.185* (0.059)	0.106* (0.022)	-0.044 (0.133)	-0.473* (0.087)
Sector GDP	0.154* (0.018)	0.779* (0.070)	0.440* (0.124)	0.108 (0.099)	0.282* (0.059)	0.309 (0.358)	0.419* (0.120)	0.140* (0.027)	-0.039 (0.051)	0.321 (0.244)

Note:*Significant at 1 %, ** Significant at 5 %, *** Significant at 10%. Standard errors are given in parenthesis.
Source: Author's calculations

Analyzing the responsiveness of the total employment to the sector real GDP, following trends can be singled out. There is a significant level of responsiveness of the total employment to the GDP in the service and the industry sector. A one percentage change in the GDP of the given sectors leads to 0.7 and 0.6 percentage points change in the total employment. In contrast, agricultural GDP is associated with only a 0.06 percentage change in the total employment. The most employment generating capacity can be attributed to the manufacture and transport sectors. Economic output in the construction and wholesale and retail sectors is statistically insignificant for the total, urban, female urban and male urban employment. However, a one-percentage point in the wholesale and retail sector's output is associated with the raise in the male urban employment of 0.13 percentage points. The only sector whose positive changes in GDP are negatively correlated with the changes in the total employment is the financial intermediation sector, while the change in the output of construction and wholesale and trade do not appear significant. The growth of real GDP in the financial intermediation sector is negatively associated with all types of employment, being especially detrimental for rural employment. The construction sector is the only sector whose elasticity is insignificant for total employment and urban employment. The real GDP in construction sector is negatively associated with all female, male

and total rural employment. The industry and the manufacture sectors tend to increase employment opportunities for the urban female workers more than for their male counterparts, while the contrary is the case of the services and the transportation sector. In general, it can be seen that rural employment both total and disaggregated by gender is negatively correlated with one percent change in the economic output of all the sectors except for the agriculture.

The analysis of the employment elasticities by sex reveals very interesting patterns. Female employment elasticity (0.55) during the examined period from 2000 to 2013 was almost 2.5 as large as the male elasticity (0.21). The underlying reason for that can be explained by the fact that the labor force participation rate of women improved during the 14 year period by 15.7 percent, whereas the male labor participation rate has seen a decline of almost 3 percent. Moreover, there are differences with regard to employment rates. While the female employment rates went up for the indicated period by 31.7 percent, male employment increased only by 13 percent. These figures show that speaking of aggregate employment, it can be said that the situation in Turkey has improved significantly for female job-seekers.

Analyzing regional differences, the OLS regression shows that urban employment responds positively to the changes in the real total GDP (0.17), while total rural employment shows negative elasticity. Moreover, total rural employment is negatively correlated with the growth in all sectors, apart from the agriculture sector. These results go in line with the assertion that there is a structural change in the employment and reallocation of rural labor to urban areas (Taymaz, 2007). The elasticity of male employment in urban areas equals to 0.20, whereas female employment elasticities in urban and rural areas are 0.14.

At the age group level, it can be seen that the age groups with negative employment elasticities are the young people aged between 15-19 and 20-24. These groups benefit only from

the agricultural GDP. The age group whose employment opportunities tend to increase the most as the total GDP grows is 35-39. However, it can be seen that the employment among those from 25 to 49 reacts strongly to the changes in the real GDP as well, particularly in the industry and the service sectors. The employment elasticities of the indicated groups are higher in the industry sector.

Table 4. Age employment elasticities

EMPL	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Total GDP	-0.303* (0.105)	-0.121** (0.056)	0.281* (0.067)	0.249* (0.057)	0.413* (0.029)	0.268* (0.048)	0.256* (0.062)	0.324* (0.078)	0.525* (0.076)	0.151 (0.098)
Agriculture GDP	0.139* (0.039)	0.056** (0.021)	0.045* (0.009)	0.040* (0.008)	0.043* (0.008)	0.042* (0.006)	0.042* (0.008)	0.055* (0.011)	0.121* (0.036)	0.095** (0.036)
Industry GDP	-0.418* (0.092)	-0.156* (0.052)	0.621* (0.163)	0.524* (0.141)	0.574* (0.144)	0.531* (0.125)	0.581* (0.149)	0.597* (0.197)	0.477* (0.076)	0.090 (0.095)
Services GDP	-0.4764* (0.0990)	-0.195* (0.055)	0.529* (0.177)	0.472* (0.151)	0.494* (0.156)	0.518* (0.132)	0.478* (0.163)	0.530** (0.209)	0.526* (0.082)	0.107 (0.103)

Note:*Significant at 1 %, ** Significant at 5 %, *** Significant at 10%. Standard errors are given in parenthesis.
Source: Author's calculations

Looking into the employment elasticities by the education level shows that the employment among the illiterate people is negatively correlated with the real GDP in the total, the industry and the service sectors, but positively correlated with the agricultural real GDP (0.1). This can be explained by the educational composition of the agricultural sector. The share of the illiterate in the highest in agriculture sector. Therefore, the illiterate persons experience the similar trend which

Table 5. Employment elasticities by educational level

EMPL	Illiterate	Literate, but no school	Primary school	Junior high school	High school	Vocational school	Universities	Primary Education
Total GDP	-0.769 (0.127)	0.602* (0.082)	0.461* (0.079)	0.240* (0.059)	0.141* (0.036)	0.312* (0.062)	-0.105** (0.060)	2.028* (0.386)
Agriculture GDP	0.119* (0.018)	0.165* (0.050)	0.072* (0.011)	0.039* (0.008)	0.024* (0.005)	0.050* (0.008)	-0.015*** (0.009)	0.252* (0.061)
Industry GDP	-0.848* (0.108)	0.746* (0.253)	0.811* (0.213)	0.363** (0.153)	0.334* (0.082)	0.384** (0.172)	0.434* (0.135)	-1.498* (1.114)
Services GDP	-0.958* (0.112)	0.955* (0.074)	0.894* (0.216)	0.423* (0.156)	0.311* (0.092)	0.533* (0.171)	-0.105 (0.152)	4.325* (1.008)

Note:*Significant at 1 %, ** Significant at 5 %, *** Significant at 10%. Standard errors are given in parenthesis.
Source: Author's calculations

the agriculture sector does. University graduates display negative employment elasticities, which is supported by the idea that high skilled workers suffer the most from unemployment (Suryadarma et. Al, 2007). The highest employment elasticities to total output are displayed by primary education, literate persons but with no school completed as well as primary school graduates.

Chapter 6: Conclusion

In my work I attempted to provide an empirical evidence of the relationship between the aggregate real GDP, real GDP growth and employment in Turkey during the period from 2000 to 2013 using the analytical tool of output elasticity of employment and employment elasticity of economic growth. The purpose of this research to find the evidence against the presence of "jobless growth" at the level of the total economy and show that the elements of "jobless growth" can be traced on the sectoral level using employment elasticity of output. In order to do so, I used first "simple and descriptive" method to calculate the employment elasticity with respect to GDP growth for the Turkish labour market and then ran simple linear regressions to identify correlations and relationship between the investigated variables.

An estimate of total employment elasticity of total output obtained by applying the OLS regression analysis over the period 2000Q1-2013Q4 has yielded a value of 0.37, whereas a simple method of calculating employment elasticity of economic growth showed the value of 0.43. Both obtained values indicate the existence of a positive relationship between total employment and output. A granger causality test showed that there is a bi-causality between the aggregate output and employment. These results mean that there is no "jobless growth" on the level of the total economy.

Analyzing the responsiveness of employment growth to economic growth on the sector level (3 main sectors) revealed that the agriculture sector has an average negative elasticity. The empirical results show that changes in economic output in the agriculture sector positively affects the employment of the sector itself, but the output at the level of the whole economy tends to decrease the agricultural employment. This can be explained by the exit of the labor from the agricultural activities to the non-agricultural. As for the economic growth and output produced by

the industry and service sectors, both indicators have positive correlation with the employment growth as well as employment on the whole.

This study has also provided empirical evidence for the shift in the employment from rural to urban areas based on the OLS estimations. Rural employment experiences negative correlation with the changes in the economic output in all of the sectors except the agriculture. In contrast, urban employment is positively correlated with economic output in all sectors except for the financial intermediation sector. Financial intermediation sector's output is negatively correlated with the employment of all subgroups.

The empirical findings also show that the situation of the females in the Turkish labor market has improved substantially. However high employment elasticities may speak of greater vulnerability of the female workers during the period of economic contraction, since their responsiveness to the changes in the output is highly elastic. The results obtained regarding age distribution of employees point out to the problems of youth unemployment. Negative youth employment elasticities imply that the employment intensity of real GDP for the Turkish youth population is not sufficient to promote a rise in the youth employment.

As to the results regarding educational level of the employees, the empirical investigation shows that the majority of the employed are primary school or primary education graduates, whose employment elasticities are the highest. Illiterate and university graduates are the two educational groups that suffer from the negative employment elasticities. This can be related to the fact that, the illiterates are mostly allocated in the agriculture sector, which experiences serious structural changes.

The analysis of the "jobless growth" using employment elasticities has important implications for the Turkish government and economy. Based on the results obtained in the study,

the Turkish government should develop a strategic plan taking into consideration all the peculiarities of the Turkish labour market. First of all, the Turkish government needs to deal with the problem of labour reallocation from rural to urban areas. The study revealed that not all employees who exited rural labour market were accommodated by urban employment. The incentives to stay and come to work in rural areas should be provided. Secondly, there has to be developed a sustainable national youth and employment programme and a series of pilot projects aimed at sustaining and promoting youth employment. Although position of women on the Turkish labour market has substantially improved, women still belong to the vulnerable group of employees in the period of economic contractions. Therefore, a number of policies securing a woman's job place during the economic recessions should be introduced. In addition to this, there have to be developed action plans to support such educational groups as illiterate and university graduates in getting access to employment.

Appendix A

Table A.1. Education Level of the Employed by Area, 2000–2013 (thousands persons)

Urban	Illiterate	Lit. but no school	Primary school	Junior high school	High school	Vocational school	Universities	Primary education	Total
2000	253	198	4.865	1.389	1.81	939	1.635	14	11.104
2001	251	185	4.799	1.389	1.655	1.078	1.691	28	11.076
2002	227	165	4.575	1.437	1.635	1.209	1.818	44	11.111
2003	211	162	4.42	1.486	1.674	1.294	1.969	72	11.287
2004	291	273	4.98	1.603	1.97	1.234	1.997	153	12.501
2005	301	369	4.964	1.613	1.89	1.483	2.213	294	13.126
2006	274	401	4.904	1.629	1.859	1.657	2.405	390	13.518
2007	233	411	4.79	1.569	1.907	1.739	2.568	546	13.764
2008	240	402	4.69	1.478	1.915	1.785	2.796	704	14.01
2009	243	405	4.556	1.385	1.797	1.701	2.947	805	13.839
2010	255	469	4.754	1.403	1.811	1.733	3.172	1.082	14.679
2011	270	512	4.749	1.438	1.914	1.826	3.53	1.269	15.507
2012	252	505	4.677	1.452	1.979	1.936	4.009	1.358	16.167
2013	262	494	4.667	1.445	2.046	2.026	4.27	1.525	16.736

Rural	Illiterate	Lit. but no school	Primary school	Junior high school	High school	Vocational school	Universities	Primary education	Total
2000	1.663	510	6.52	678	522	294	259	30	10.477
2001	1.649	563	6.402	654	529	337	259	56	10.449
2002	1.422	513	6.218	737	551	400	321	81	10.243
2003	1.282	446	5.907	751	561	442	364	108	9.86
2004	959	448	4.128	529	412	281	218	154	7.131
2005	808	502	3.695	609	459	375	268	223	6.94
2006	788	506	3.581	627	454	402	290	258	6.905
2007	757	510	3.595	567	457	417	316	353	6.973
2008	721	574	3.655	552	441	427	345	470	7.184
2009	759	584	3.696	554	469	425	374	579	7.438
2010	827	620	3.848	551	483	446	439	701	7.915
2011	877	681	4.163	571	519	471	479	842	8.603
2012	867	661	4.137	573	532	484	485	915	8.653
2013	848	619	4.116	603	563	498	560	980	8.788

Table A.2. Age composition of employment by gender, 2000–2013 (thousands persons)

Female	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	Total
2000	686	920	895	722	644	544	414	315	259	180	222	**5.801**
2001	619	955	876	777	672	577	457	342	249	194	251	**5.969**
2002	603	936	912	821	696	592	495	349	253	223	239	**6.122**
2003	532	844	905	807	708	600	479	341	261	191	224	**5.891**
2004	440	765	752	675	637	531	413	282	218	149	184	**5.047**
2005	420	753	788	685	658	563	439	299	201	135	166	**5.108**
2006	420	736	834	722	702	586	441	319	214	135	147	**5.258**
2007	399	749	858	753	720	594	453	322	213	144	152	**5.356**
2008	410	753	902	785	770	611	487	347	228	147	156	**5.595**
2009	404	734	912	871	796	678	510	381	256	166	163	**5.871**
2010	417	779	977	932	888	797	582	419	289	179	166	**6.425**
2011	435	816	1.007	1.031	961	871	674	473	318	196	191	**6.973**
2012	407	805	1.045	1.128	1.014	954	712	515	330	209	191	**7.309**
2013	417	835	1.059	1.183	1.08	1.011	761	534	352	219	189	**7.641**
Male	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	Total
2000	1.375	1.715	2.644	2.356	2.093	1.842	1.368	845	593	426	523	**15.78**
2001	1.228	1.658	2.63	2.388	2.072	1.827	1.387	846	593	424	503	**15.555**
2002	1.093	1.503	2.628	2.434	2.075	1.815	1.389	860	572	407	456	**15.232**
2003	943	1.458	2.64	2.524	2.132	1.864	1.415	913	534	385	448	**15.256**
2004	895	1.454	2.289	2.332	2.121	1.885	1.404	880	545	333	448	**14.585**
2005	927	1.454	2.4	2.371	2.165	1.923	1.47	927	564	324	432	**14.958**
2006	933	1.444	2.44	2.418	2.201	1.942	1.512	969	573	332	400	**15.165**
2007	925	1.42	2.523	2.437	2.254	1.989	1.531	1.001	580	341	381	**15.382**
2008	940	1.38	2.552	2.464	2.281	2.004	1.556	1.05	613	357	402	**15.598**
2009	894	1.296	2.416	2.456	2.248	2.003	1.59	1.066	649	377	411	**15.406**
2010	934	1.334	2.477	2.63	2.343	2.083	1.687	1.141	699	416	424	**16.17**
2011	943	1.503	2.566	2.763	2.437	2.183	1.785	1.25	785	462	459	**17.137**
2012	931	1.504	2.546	2.837	2.497	2.265	1.839	1.299	839	498	457	**17.512**
2013	948	1.528	2.555	2.882	2.553	2.317	1.917	1.344	867	496	475	**17.883**

Table A.3 Employment rates by economic activity (%)

Year	Agriculture, male (% of male employment)	Industry, male (% of male employment)	Services, male (% of male employment)	Agriculture, female (% of female employment)	Industry, female (% of female employment)	Services, female (% of female employment)	Agriculture (% of total employment)	Industry (% of total employment)	Services (% of total employment)
2000	27	28	45	60,5	13,2	26,4	36	24	40
2001	27,7	26,7	45,6	63,3	12,1	24,5	37,6	22,7	39,7
2002	24,8	26,7	48,4	60	13,7	26,2	34,9	23	42,1
2003	24,4	26,3	49,3	58,5	13,4	28,1	33,9	22,8	43,4
2004	21,6	28	50,4	50,8	16,1	33,1	29,1	24,9	46
2005	18,6	29,7	51,7	46,3	16,6	37	25,7	26,4	48
2006	17,2	30,5	52,3	43,6	16,3	40	24	26,8	49,1
2007	16,8	30,5	52,8	42,7	16,1	41,2	23,5	26,7	49,8
2008	17,1	30,8	52,1	42,1	15,7	42,2	23,7	26,8	49,5
2009	18,1	29,1	52,7	41,6	15,3	43,1	24,6	25,3	50,1
2010	18,3	30,3	51,4	42,4	15,9	41,7	25,2	26,2	48,6
2011	18,7	31,1	50,3	42,2	15,2	42,6	25,5	26,5	48,1
2012	18,4	30,7	50,9	39,3	14,9	45,8	24,6	26	49,4
2013	17,8	31,1	51	37	15,3	47,7	23,6	26,4	50

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Appendix B

Table B. 1 Sector employment growth rates, 2000-2013, (%)

Year	MQ	MF	EGW	CON	TC	WRT	FI
2000	-39.55	2.33	-3.19	0.00	19.13	12.08	22.24
2001	20.99	-1.57	4.40	-18.62	-2.10	-3.09	-1.69
2002	22.45	4.19	8.42	-13.69	6.50	-2.90	0.00
2003	-30.83	-1.82	-3.88	0.73	1.81	1.79	5.88
2004	16.87	2.16	-19.19	0.21	-0.62	2.05	7.59
2005	14.43	6.73	-8.75	14.48	7.67	-28.09	9.45
2006	6.31	1.78	17.81	8.04	3.60	46.80	14.61
2007	8.47	0.57	12.79	2.84	1.42	3.18	5.92
2008	-10.16	3.57	-5.15	0.89	0.40	-4.14	10.81
2009	-15.65	-8.60	22.83	5.24	-3.13	4.87	-71.17
2010	17.53	8.91	46.02	9.65	-0.47	6.13	-0.59
2011	9.65	3.61	28.48	17.04	4.69	3.63	29.85
2012	-9.60	1.21	2.36	1.97	1.99	6.05	2.99
2013	-7.08	4.82	0.46	4.27	2.51	5.63	5.80

Author's calculations based on TURKSTAT Database Information

Table B. 2 Sector employment elasticity, 2000-2013, (%)

Year	MQ	MF	EGW	CON	TV	WRT	FI
2000	39.55	0.34	-0.53	0.00	1.71	1.39	5.77
2001	-3.22	0.21	-1.29	1.07	0.57	0.24	-0.13
2002	-9.48	1.44	2.52	-0.98	0.54	-0.49	0.00
2003	14.14	-0.22	-0.80	0.09	0.20	0.22	-2.13
2004	5.03	0.18	-2.70	0.01	-0.06	0.16	0.55
2005	1.61	0.82	-0.62	1.55	0.66	-3.42	0.74
2006	1.20	0.21	2.06	0.43	0.53	8.08	1.07
2007	1.04	0.10	1.88	0.50	0.20	0.60	0.55
2008	-1.87	-23.81	-1.38	-0.11	0.27	2.68	1.28
2009	2.33	1.19	-6.64	-0.32	0.43	-0.56	-9.48
2010	3.70	0.65	6.28	0.53	-0.04	0.52	-0.08
2011	2.49	0.36	3.24	1.48	0.45	0.33	3.13
2012	-12.33	0.72	0.67	3.47	0.65	16.18	0.75
2013	2.02	1.27	0.33	0.60	0.77	1.04	0.64

Author's calculations based on TURKSTAT Database Information

Appendix C

Table C.1. The results of the ADF test

Variable	ADF	CV (1%)	CV (5%)	k^s
$LGDPTL_t$	-1.068	-3.568	-2.921	10
$LEMPL_t$	-0.946	-3.577	-2.925	10
$D(LGDPTL_t)$	-3.523	-3.568	-2.921	10
$D(LEMPL_t)$	-0.946	-3.577	-2.925	10
$D(LGDPTL_t,2)$	-21.56	-3.565	-2.919	10
$D(LEMPL_t,2)$	-8.006	-3.577	-2.925	10

Notes: k denotes the optimal lag length chosen by Schwarz-info test : critical values for ADF tests.
Author's calculations

Table C.2. The results of the Johansen test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.958376	205.3317	15.49471	0.0001
At most 1 *	0.536800	40.01904	3.841466	0.0000

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.958376	165.3127	14.26460	0.0001
At most 1 *	0.536800	40.01904	3.841466	0.0000

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Author's calculations

Table C.3. Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
DLGDPTL does not Granger Cause DLEMPL	52	98.3447	2.E-17
DLEMPL does not Granger Cause DLGDPTL		23.8655	7.E-08

Author's calculations

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