Regional Unemployment in Turkey

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Abstract

High unemployment rate is a concern for a country, existence of high regional unemployment differentials is another. Turkey has both. This paper using spatial and nonparametric techniques documents the wide regional unemployment disparities in Turkey from 1980 to 2000. Data indicate that the provincial unemployment rates are quite persistent and the gap across different regions widens even further with spatial clusters emerging across the country. There is also evidence that factors affecting unemployment rates are also responsible for spatial correlation of unemployment rates. Furthermore, the sources of unemployment differentials have changed over time.

JEL Codes: E24, R12, J60
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1 Introduction

Turkey's bid for full membership to the European Union created a heated debate within Europe. Besides Turkey's cultural differences with the rest of Europe, she is facing certain economic problems with serious implications for European citizens. On top of the list is the potential of a large inflow of Turkish workers into Europe that already struggles with high unemployment rates. A second concern is wide regional disparity within Turkey. While it is a major issue by itself, the existence of regional inequality increases the probability of migration of labor from poorer regions of Turkey into Europe. Before its accession to the EU, or even if it remains out of the EU, Turkey has to deal with both problems and improve conditions in national and regional labor markets. Yet, the type of policies that will be effective depends on the nature and dynamics of labor market in Turkey, particularly the differences across local labor markets may hinder the effectiveness of national policies.

There are comprehensive surveys of Turkish national labor market (Gursel et al., 2002; Tunali, 2003; World Bank, 2005). All of these studies point to the interaction of demographic and economic factors that shape labor market. Turkey is undergoing a rapid demographic transition. While there is a surge of young population into the market, the rural-agrarian society is transforming into an urban-industrial one. On the other hand, the move to an outward-oriented, market-driven economy in early 1980s created significant success in trade, yet, macroeconomic instability and high inflation, caused by continuous policy failures, dampened the performance of the economy and slowed down job creation.

All of these factors are expected to have varying effects on the development of different regions. The pace of demographic transition in Eastern and South-Eastern Turkey is significantly different than the West where fertility rate is falling much rapidly and the rate of urbanization is much higher. The change in the orientation of the economy during 1980s has also altered the overall composition of production and employment and, consequently, the West has grown much rapidly than the East.

The aim of this paper is, then, to focus on the disparity in regional unemployment rates and its causes in Turkey to complement earlier studies at

the aggregate level. Analysis of labor markets at detailed regional level has its own merits, as well. Elhorst (2003) proposes three reasons that make studying the spatially uneven distribution of unemployment worthwhile. First, the magnitude of regional unemployment disparities within a country is as large as the magnitude observed across countries. Therefore, policies that target regional welfare inequalities must take local labor markets more seriously.

Secondly, wide unemployment differentials imply inefficiency in the economy as a whole and reduces growth. Indeed, Altug and Filiztekin (2006) show that the contribution of labor to Turkish growth has been very little in the last twenty years. Furthermore, studying income differentials within the EU, Esteban (1999) finds that, while major bulk of existing regional income disparity can be explained by productivity differentials, unemployment differentials also play a small, but increasing, role. Particularly, Esteban finds that unemployment disparities account more than one fifth of per capita income gap in Italy and Spain.

Finally, there are very few explanations for the existence of regional unemployment differences. Most macroeconomic studies attempted to explain unemployment disparities between countries, and concluded that differences in labor market institutions are the major source of existing uneven distribution. However, within a country such institutions are usually common and cannot be used as an explanation. Therefore, identifying other variables that can explain existing regional differences is important.

Most empirical literature on regional unemployment differentials provide estimates of the effects of several variables on the average or representative region's unemployment [1]. Lately, following Quah's (1993) analysis of income disparities, the focus is shifted onto the examination of the effects of the variables under interest on the whole distribution. Overman and Puga (2002) and Lopez-Bazo et al. (2002) combining parametric and non-parametric techniques analyzed geographical distribution of unemployment and factors that shape the distribution in the EU and Spain, respectively. This paper follows their lead and using similar techniques attempts to describe the unemployment differentials between Turkish regions and to shed light on the sources of

[1] Elhorst (2003) provides a list of these studies most of which are on unemployment differentials either in the US or European countries.

existing disparities.

The next section provides a description and a spatial exploratory analysis of local labor markets in Turkey. In Section 3, a set of variables that have potential to explain the average behavior is discussed and standard parametric model is estimated. Based on the estimates, conditional distributions of unemployment differentials are also provided. As usual, the last section summarizes the findings and concludes.

2 Exploratory analysis of regional unemployment

Historical account of aggregate unemployment in Turkey is available in Bulutay (1995). The major characteristics of Turkish labor market are a declining trend of labor force participation and an increasing trend of unemployment rate since 1960s, due to rapid industrialization and urbanization. The average unemployment rate was around 3% until 1960s. It has steadily increased in the following two decades, reaching 8% in 1980. At the same time labor force participation rate decreased from 70% in 1960 to 60% in 1980. Both urbanization and industrialization continued after 1980 at a higher rate, with new industrial centers emerging all around the country partly as a consequence of abandoning import substitution policies and opening the economy to free trade.

Variations in the speed of both labor force participation and unemployment rates across provinces make it very likely to observe dispersed characteristic of local labor markets. Indeed, some early work has mentioned regional unemployment disparities in Turkey (e.g., Tunali, 2003), however, there is no in depth analysis of geographical distribution of unemployment.

The data in this paper come from General Censuses conducted in 1980 and 2000. In these Censuses, a person is coded as unemployed if (s)he claims that (s)he is "unemployed and seeking a job." As such the unemployment definition in the Censuses is not the definition provided by the ILO and used by Turkish Statistics Institute when compiling Labor Force Surveys (LFS). Properly defined, a person is unemployed if (s)he is not employed during the reference period and used at least one of the search channels for seeking a job during the last three months and is available to start work within 15 days.

Despite the lack of precision in the definition of unemployment, Census data has wider geographical coverage and gives unemployment figures for 1980, the end of import substituting industrialization episode in Turkish history, and thus, provides information on the effects of opening the economy to free trade[2]. However, there are significant differences between two data sets. Both labor force participation and employment rates are higher in the Census data than the Labor Force Surveys. Furthermore, there is an increasing trend in aggregate unemployment rate in the Census data from 1980 to 2000, while the average unemployment rate between 1988 and 2000 is 7.8% in LFS data with a standard deviation of 0.8%. Details and a comparison of Census data with LFS are provided in the Appendix.

The wide differences in unemployment rates across provinces are shown in Table 4. In any given year, the ratio of the highest to the mean unemployment rates was around two, implying a twice higher probability of being unemployed in these provinces relative to the average. Furthermore, there are substantial increases in both the standard deviation and range of unemployment rates over time.

Table 1: Unemployment rates

	National average	Std. dev.	Min.	Max.
Aggregate				
1980	3.60	1.53	1.45	7.64
2000	9.33	3.14	3.94	17.90
Urban				
1980	7.82	3.21	3.93	17.38
2000	16.82	7.64	7.89	38.01
Rural				
1980	1.92	1.21	0.36	6.00
2000	3.01	1.21	1.08	7.60

The table also provides information about urban and rural unemployment rates in provinces. The differences across types of settlements is striking. Average unemployment in urban areas is three to five times higher than that of

[2]The first Labor Force Survey is conducted in October of 1988.

in rural areas, and the distribution is wider. This fact suggests that provincial aggregate unemployment and urban unemployment may have different dynamics and causes.

One plausible explanation for the existing differential between types of settlements is that most people in rural areas consider themselves as "employed" as long as they do some work on the fields, a fact which is more pronounced in the Census data. Moreover, increasing urbanization implies that unemployment problem will be more serious in urban areas in the future and that the focus should be on urban labor markets. Nevertheless, certain provinces, particularly in the Eastern and Southeastern Turkey, have a large rural population, and ignoring the relevance of rural dynamics would make the analysis incomplete. Consequently, this paper will carry the investigation of the unemployment rate distribution and its causes for both provincial aggregates and urban areas simultaneously.

To provide further insight in the distribution of unemployment rates, kernel density estimates are presented in Figure 1[3]. The unemployment rates plotted in the Figure are deviations from national average[4] The shapes of both distributions in 1980 and in 2000 are markedly different for both provincial aggregate (panel a) and urban areas (panel b). In the latter year the distribution has become wider and both the mode and the median of the distribution has shifted to the left. There is also a slight hump emerging at the higher end of the distribution.

While, the differences in the shapes of two distributions are quite apparent, following Lopez et al. (2002), a test of similarity using Bradley's overlapping coefficients are also performed. The coefficient will be equal to one if two distributions are exactly the same, and take the value of zero when they are completely dissimilar. The overlapping coefficient for 1980 and 2000 distribu-

[3]Kernel density estimates can be thought as smoothed histograms. Technical details of kernel density estimation could be found in Silverman (1986), as well as in papers on unemployment distribution, such as Lopez et al. (2002) and Overman and Puga (2002).

[4]The choice of absolute deviations instead of relative unemployment rates may lead to different conclusions. Indeed, relative rates have declined while absolute differentials increased over the observed period. However, there is no general consensus which measure is more meaningful (Martin, 1997). The use of differentials here is based on the presumption that labor force participation depends on absolute differentials and policies should be designed accordingly.

tion is 0.4426 for the aggregate unemployment, and 0.3910 for urban unemployment rates. Thus the null hypotheses that 1980 and 2000 distributions are similar are rejected for both measure of unemployment at the conventional levels[5]. Furthermore, following Lopez et al., similarity at different ranges of the distribution is also tested in order to assess the contribution of individuals to the differences in the two distributions. The ranges are defined as "low", the range between minimum unemployment differential and average minus one standard deviation of the differential; as "high", the range between maximum unemployment differential and average plus one standard deviation of the differential; and "medium", the range in between. As shown in Table 2, estimated overlapping coefficients indicate that similarity is rejected at all ranges, however, it is more severe at the lower end of the distribution .

Table 2: Overlapping Coefficients of 1980 and 2000 Distributions

	Aggregate	Urban
OVL	0.4426	0.3910
OVL-LOW	0.2853	0.3389
OVL-MED	0.4926	0.4391
OVL-HIGH	0.5565	0.3673

Despite change in the shapes of densities over time, there is strong persistence in regional unemployment rates. Figure 2 plots 2000 provincial unemployment rates against 1980 rates. The superimposed dotted axes has national average numbers at the origin. As before increasing spread is evident, yet relative positions of provinces show a certain degree of stability. A simple regression of 2000 unemployment rates on 1980 unemployment rates yields an R^2 of 0.24 and the coefficient in front of initial year is 1.01. Persistence is markedly higher in urban unemployment rates; R^2 of a similar regression is 0.60 and the coefficient of persistence is 1.84. Both kernel density estimates and correlation of unemployment rates over time indicate an increasing unemployment gap between provinces in Turkey and very little within distribution movement.

[5]Since the statistical properties of overlapping coefficients depend on the data, simulations are performed to obtain critical values. Details are provided in the appendix.

The analysis so far ignores spatial distribution of unemployment rates. Most of the models in the literature (see Elhorst (2003) for a comprehensive survey) discuss the existence of unemployment differentials but not necessarily tie them to the geography. However, recently, Epifani and Garcia (2004) using a core-periphery model with job search frictions show that while transportation costs generate agglomeration economies, frictions in job matching and congestion induces unemployment disparities between regions. They show, even in the absence of significant migration costs, there would be higher unemployment in the periphery. Indeed, the paper by Lopez-Bazo et al. (2003) show that there is strong spatial correlation of unemployment rates in Spain.

To test the role of geography in the shape of unemployment distribution, Moran's I statistics for both years are calculated. The statistic is defined as

$$I = \frac{\sum_i^N \sum_j^N w_{ij}(x_i - \overline{x})(x_j - \overline{x})}{\sum_i^N (x_i - \overline{x})^2} \tag{1}$$

where x_i and x_j are unemployment rates for regions i and j, and w_{ij} is the i,j element of row standardized weight matrix $\mathbf{W}$. The shape of the weight matrix depends on the way one models the diffusion of effects across regions. Here, the most commonly used binary contiguity matrix is constructed, such that w_{ij}=1 if two regions have common borders and 0 otherwise.

The estimated statistics for aggregate unemployment rates are 0.2557 in 1980 and 0.4508 in 2000, both statistically significant at the conventional levels. Moran's I statistics for urban unemployment rates are even higher, 0.5037 and 0.6475 in 1980 and 2000, respectively. Hence, there is significant evidence of positive spatial correlation, and furthermore, the geographic concentration of regions with either high or low unemployment is getting stronger.

Moran's I statistic measures global correlation across all regions, thus, it fails to identify local "hot spots", or spatial nonstationarity. The Local Indicators of Spatial Association (LISAs) developed by Anselin (1995) allows a decomposition of the global measure with desirable properties; they provide an indication on the extent of spatial clustering, hence, enable detection of local instability, and the sum of LISAs are proportional to the global measure, allowing an assessment of the influence of each region on the magnitude of global measure. The definition of local Moran is:

$$I_i = \frac{(x_i - \overline{x})}{\sum_i^N (x_i - \overline{x})^2} \sum_j^N w_{ij}(x_j - \overline{x}). \quad (2)$$

The analysis of aggregate unemployment rates using LISAs show a significant hot spot at Northern Anatolia in 1980 where coal mines are located. However in the last twenty years the coal industry experienced a rapid demise. In 1980 the share of coal production in total gross value added generated in this region was 20%; in 2000 this share declined to a mere 4%. In year 2000, a new hot spot emerges in the Southeast, where economic development is far behind of the rest of the country.

There are two local clusters of urban unemployment in 1980. One is at the Northwest of the country, in the periphery of Istanbul, with relatively low unemployment rates, and the other is at the Southeast, the other end of the country, where provinces with relatively higher unemployment rates are clustered together. The only local cluster in 2000 is yet again in the Southeast of the country[6].

The descriptive analysis so far indicates that while unemployment rates, whether aggregate or urban, have increased in the last twenty years, there is also strong persistence and spatial correlation within the country with the Southeastern provinces emerging as regions with much severe unemployment problem. Next section turns to parametric regression approach to identify possible causes of regional unemployment.

3 Determinants of regional unemployment

In the literature there are a few theoretical models that explain disparity in unemployment rates within a country (Elhorst, 2000). Without going into the details of these models, it would be fair to summarize that all these models assume a stable equilibrium of unemployment differentials and the unemployment rate is explained by labor supply, labor demand or wage-setting mechanism although none of the empirical models incorporate all these factors simultaneously. Estimation is usually based on reduced form models that include variables that control these factors.

[6]Estimated LISAs are available upon request.

3.1 Empirical model

There is a large set of variables that are commonly used in the empirical literature. In this study the variables are chosen according to the availability, thus they are not exhaustive. The first set of variables are to control changes in demography and labor force participation behavior. Fertility rates differ quite substantially across provinces throughout the history, particularly higher fertility rates are observed in the eastern and southeastern regions. As regions ability to create jobs cannot match the rate that population grows, there would be increasing pressure on labor market (Groenewald, 1997). Therefore a variable that measures the change in working-age population, ΔWA, is included in the regression analysis.

Meanwhile, there is significant amount of migration between provinces. Migration effect may work in both directions. While out-migration may reduce labor supply, in-migration may increase demand for regional production and, henceforth, increase demand for labor. Indeed, early empirical research reports mixed results. The variable used in the analysis is net migration rate, NM, of each province.

Along the growth in population, labor force participation (LFP) is another important factor in determining unemployment rates. In a simple framework, increased labor force participation is expected to lead higher unemployment rates. However, Layard (1997) argues that 'people cause jobs', that is, increased participation encourages growth of local jobs. In most empirical studies there is strong evidence of a negative relationship between the two variables. In Turkey there is a remarkable difference in labor force participation of males and females. In year 2000, only around 43% of women at the working age were either working or looking for a job, as opposed to 79% of males. The gap between female and male participation is even larger in urban areas, the average female labor force participation was merely 20% in contrast to 73% for males. Thus, both male and female LFP variables, $LFPM$ and $LFPF$, respectively, are included in the regression.

Many studies also investigated whether the age structure of population has an impact on unemployment rate. The unemployment rate of young has been relatively very high in many different countries and time periods, and Turkey

is not an exception. There is five to seven percentage point difference between national unemployment rate and unemployment rate of young population (ages 15-24) depending on the type of settlement. To control for differences in age distribution share of young population, YOU, is also included in the estimation equation. Provinces with a larger share of young population are expected to observe higher unemployment rates.

A second set of variables that is used in regression analyses is to account for labor demand. A common argument in explaining spatial unemployment differentials is that regions specialized in declining industries are suspected to exhibit larger unemployment rates. Considering that Turkey is on a transition path from an agricultural society into an industrialized one, the role of industrial mix is expected to be quite significant. The change in the orientation of the economy in early 1980 increases the importance of industry mix argument in Turkish context, as many new industrial centers emerged in the last couple of decades. The variables that account for sectoral structure of provinces are the share of agricultural employment, AGR, and the share of manufacturing employment, MAN, in total employment.

Another variable that can be considered to explain the variation in labor demand is the market potential of each region. This variable is more often used in research on economic geography. For example, Black and Henderson (2003) provides evidence that urban growth is significantly related to the distance weighted population of neighboring regions. The market potential variable that is assumed to represent external economies is defined as:

$$m_{j,t} = \sum_{i \neq j} \frac{P_{i,t}}{d_{i,t}} \tag{3}$$

where i and t denotes province and time, respectively, P is population and $d_{i,t}$ is the great circle distance of province center i from province center j.

Finally, there are many reasons to expect that the level of human capital will have a significant effect on the unemployment level. Highly skilled workers are very likely to be more efficient in job search and are less likely to be laid off. Despite significant improvements in education level across the entire country there are still important differences across provinces. To control for human capital in each province, the shares of low skilled, defined as the share of working age population with no formal education, $LOWH$, and the share

of high skilled, defined as the share of working age population with upper secondary and more education, $HIGHH$, are also included in the analysis.

All variables are defined as deviations from Turkish average. In urban analysis, the variables are constructed for urban areas only. Net migration variable in urban analysis is defined as immigrants to minus emigrants from urban centers divided by total urban population using detailed migration statistics. Nonetheless, rural-urban distinction in sectoral composition and education levels were not available in 1980 data. Thus provincial aggregates are assumed to approximate urban levels for this year.

Thus the estimation equation is set as:

$$\begin{aligned} U_{jt} &= \beta_0 + \beta_1 YOU_{jt} + \beta_2 LFPM_{jt} + \beta_3 LFPF_{jt} + \beta_4 \Delta WA_{jt} \\ &\quad + \beta_5 NM_{jt} + \beta_6 AGR_{jt} + \beta_7 MAN_{jt} + \beta_8 MPOT_{jt} \\ &\quad + \beta_9 LOWH_{jt} + \beta_{10} HIGHH_{jt} + \epsilon_{jt} \end{aligned} \tag{4}$$

where the dependent variable U_{jt} is the unemployment rate of jth province at time t minus the average unemployment rate in Turkey at t and ϵ is the random disturbance term.

3.2 Regression analysis

Equation (4) is estimated using ordinary least squares for 81 provinces in Turkey in each year and for aggregate and urban level analysis separately[7]. The coefficient estimates are summarized in Table 3. The variables explain quite a substantial portion of regional variation in unemployment rates. The estimated R-square is above 80% in three out of four specifications.

In the presence of spatial correlation, ordinary least squares estimation is biased and inconsistent. The analysis above showed that there are substantial regional correlation in unemployment rates. Therefore it is necessary to test for the presence of such correlation after unemployment rates are conditioned on the factors stated in Equation (4). The first test statistics is Moran's I for the residuals of the regression analysis. However, spatial correlation can take two different forms, either the existence of spatially lagged dependent

[7]Since factors that are affecting unemployment rates are different in urban and rural areas, and the relationships have changed in the last twenty years no restriction of equality is imposed.

variable may lead the OLS estimates to be biased and inconsistent, or spatial autoregressive nature of residuals may lead to inefficiency in the estimates. Moran's I statistic cannot differentiate these two different types of processes. Anselin (1988) suggests Lagrange Multiplier tests for each type, and it turns out to be that both tests have higher power for given alternative hypotheses. All these tests are performed and reported in Table 3.

Based on the LM tests, there is significant spatial dependence only in one set of residuals, residuals of 1980 aggregate unemployment rate model, the LR-ERR statistic is significantly different from zero, rejecting the null hypothesis of no spatial autoregression. In that case, OLS estimates are not efficient and a spatial model is re-estimated by maximum likelihood estimation method.

The lack of spatial correlation in the residuals indicates that the variables used in the model account for the spatial correlation observed for regional unemployment rates. Except one case, there are no spill-overs of unemployment across provinces, but rather similarity in the determinants of unemployment results in the observed spatial correlation. This finding is in contrast to earlier research for britain by Molho (1995), for Spain by Lopez-Bazo et al. (2002) and for the EU by overman and Puga (2002).

An important conclusion to be drawn from the parameter estimates is that factors that explain differences in unemployment rates have changed over time. In 1980 aggregate unemployment rate differences are due to demographic factors, such as labor force participation and the share of young population. While labor force participation rates have negative impact on unemployment, providing evidence in favor of Layard's argument that people create jobs, higher share of young population causes unemployment rates to increase. In 2000, LFP of females and share of young becomes insignificant, instead growth rate of working age population becomes significant, implying that job creation was unable to catch up with population growth in recent years. There is also significant negative effect of net migration on unemployment rates, indicating the dominance of demand effect of migration.

The transformation of production from agriculture to manufacturing also evident in the estimates. In 1980, provinces with higher share of agriculture observed higher unemployment rates. In 2000, the situation is just opposite, now provinces with higher shares of manufacturing exhibit higher unemploy-

Table 3: Estimation Results

	Aggregate Unemployment			Urban Unemployment	
	1980(OLS)	1980(ML)	2000(OLS)	1980(OLS)	2000(OLS)
Young	0.1058	0.1210	-0.0403	-0.1052	0.1357
	(0.0470)**	(0.0396)***	(0.0445)	(0.0768)	(0.1357)
LFP-Males	-0.1880	-0.1482	-0.2388	-0.0908	-0.7055
	(0.0760)**	(0.0800)*	(0.1271)*	(0.0826)	(0.1176)***
LFP-Fem.	-0.0888	-0.1061	-0.0672	0.0349	0.3387
	(0.0224)***	(0.0193)***	(0.0534)	(0.0600)	(0.1270)***
WA Growth	-0.1572	-0.1079	0.6868	0.4739	0.3030
	(0.1372)	(0.1291)	(0.1162)***	(0.2805)*	(0.1156)**
Net Migr.	0.1405	0.0906	-0.2029	-0.1061	-0.1320
	(0.0659)**	(0.0578)	(0.0737)***	(0.1421)	(0.0837)
Sh. of Agr.	0.0312	0.0722	0.0029	0.0860	0.0972
	(0.0377)	(0.0341)**	(0.0504)	(0.0871)	(0.1356
Sh. of Man.	-0.0208	0.0401	0.12788	-0.0166	0.0295
	(0.0470)	(0.0462)	(0.0455)***	(0.1249)	(0.0696)
Low Skill	0.0486	0.0556	0.2143	0.2644	0.6183
	(0.0130)***	(0.0168)***	(0.0433)***	(0.0451)***	(0.0972)***
High Skill	0.1175	0.2270	0.2143	0.7857	-0.0580
	(0.1152)	(0.1040)**	(0.0974)**	(0.2734)***	(0.1592)
Mrkt. Pot.	-0.1976	0.3318	-1.0082	2.6877	-0.7274
	(0.4199)	(0.4300)	(0.5511)*	(1.2136)**	(1.4325)
Constant	0.2292	0.2068	-0.3508	-0.1730	-0.3542
	(0.1540)	(0.2183)	(0.1923)*	(0.3389)	(0.4237)
Lambda		0.5727			
		(0.1590)***			
R-squared	0.8020	-78.182[b]	0.8541	0.6558	0.8512
Moran's I[a]	0.000		0.673	0.134	0.011
LM-ERR[a]	0.007		0.698	0.561	0.103
LM-Lag[a]	0.228		0.129	0.554	0.111

Robust standard errors are in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
[a] p- values; [b] Log likelihood.

ment rates.

The variables that have significant effect in both years are education variables. Higher share of low skilled population implies higher unemployment rates, yet the effect is much stronger in 2000 than 1980. Surprisingly, share of high skilled population also has positive and significant coefficient. While this result requires more careful analysis, one may conjecture that there are not enough jobs for highly educated people.

As expected, factors that have significant effect at aggregate level are different than the determinants of urban unemployment differentials. As before, over time, the main causes of urban unemployment differentials have changed in the last twenty years. In 1980, human capital, market potential (though puzzlingly with reverse sign), and to a certain extent population growth were significant. In 2000, labor force participation variables become quite significant. More importantly, female participation has a negative effect on unemployment rates. Considering that only very limited number of females currently participating in labor force, and that it is very likely that they will enter into the market, urban unemployment rates may even be higher in the near future.

Another interesting observation is that the probability that low skilled people be unemployed in the urban areas has increased over time. The coefficient of high skill was positive and significant in 1980, but become negative, though insignificant, in the latter year.

3.3 Conditional distributions

The regression analysis shows how an average or representative province will respond to changes in the factors used in the estimation. However, one goal of this paper is to understand the contribution of each factor on the entire distribution of unemployment differentials.

Conditional distributions can be estimated in two different ways. Following Overman and Puga (2002) one can estimate joint and marginal densities. The ratio of the two will give the conditional distribution of unemployment rates. The second approach is suggested by Lopez et al. (2002) and is more structural in the sense that it uses regression results. Once the parameters of Equation (4) are estimated, the unemployment differentials can be computed conditional on specific factors by using the parameter estimates from the regression anal-

ysis and variables except the one that is used as conditioning variable. For example, if one is interested in the unemployment distribution conditional on skill variables, the unemployment rates are re-calculated by setting the values of these variables to zero and using current values of all remaining variables time their corresponding parameter estimates plus the residuals.

Figure 3 presents unconditional and conditional densities in each year for both provincial and urban unemployment differentials. Conditional distributions on all factors in the estimation equation, i.e., when within province variation in all of the right hand side variables are assumed to be non-existent, are much tighter than the unconditional distributions and are centered around zero. Indeed, overlapping coefficients are significantly different from one in all four cases, for the whole distribution as well as for above specified ranges.

Conditional distributions on specific factors, namely demographics (labor force participation rates and share of young population), population change (growth of working age population and net migration), industry mix (shares of agriculture and manufacturing in total employment), skills (low skill and high skill) and market potential are presented in Figures 4-8.

Considering the fact that Turkey is undergoing through a demographic and a sectoral transition, conditional distributions on these variables are curious. Demographic variables have large impact in shaping 1980 provincial aggregate unemployment rates, particularly these factors explain the mass of probability at the positive differentials. However, the importance of demographics diminishes in 2000. At the urban level, the influence of demographics is not as large as at aggregate level, nonetheless, relatively more stronger in 2000 than in 1980. Particularly, the bi-modality at the higher end of the distribution would be much stronger if there were no differences in demographic variables.

Conditional densities of unemployment differentials on industrial mix exhibit higher degree of polarization in 1980, both at aggregate and urban levels. Yet, conditional and unconditional distributions are almost identical in 2000. Based on these observations, it is possible to argue that Turkey has taken a long way through the transition process in the last twenty years.

Finally, the most influential impact is through skill variables. All four conditional distributions are highly significantly different from unconditional counterparts, and the differences are more pronounced in the latter year. Con-

vergence in human capital levels causes convergence in regional unemployment rates.

4 Conclusion

This paper analyzed regional disparities in unemployment rates in Turkey at provincial aggregate and urban levels in 1980 and 2000. Using both parametric and non-parametric spatial techniques, the change in the shape of geographical distributions are examined and the influence of determinants of regional unemployment on the whole distribution is assessed.

The paper stresses widening regional gap in and persistence of unemployment differentials while unemployment is increasing at the national level. Furthermore, there is strong evidence for spatial correlation in unemployment rates. Using local indicators of spatial association, we find that new high unemployment clusters are emerging at the Southeast of the country.

However, once certain determinants of regional unemployment is taken into account, the spatial features vanish. In other words, spatial correlation of causes of unemployment in provinces are responsible for geographic concentration.

Turkey has been through a demographic and sectoral transition, as many developing countries. Nonetheless, the findings imply that the importance of these variables diminished in the latter years. On the other hand, wide differences in human capital seems to be getting more important. In the absence of these differences the density function of unemployment rates becomes much tighter.

Table 4: Overlapping Coefficients: Unconditional vs. Conditional Distributions

	OVL	OVL-LOW	OVL-MED	OVL-HIGH
Agg. Unemp.				
1980				
All Factors	0.3853	0.1213	0.4720	0.1002
Demographics	0.5050	0.2842	0.5707	0.3474
Population growth	0.8203	0.6170	0.8465	0.8841
Skills	0.8427	0.8224	0.8462	0.8461
Industrial mix	0.7712	0.6713	0.8356	0.6937
Market potential	0.8760	0.6926	0.9134	0.8909
2000				
All Factors	0.3604	0.0048	0.4590	0.0968
Demographics	0.7993	0.5974	0.8512	0.7799
Population growth	0.8073	0.7665	0.8538	0.6552
Skills	0.6510	0.2953	0.7337	0.6026
Industrial mix	0.9463	0.9035	0.9619	0.9351
Market potential	0.7667	0.4231	0.8681	0.7200
Urban Unemp.				
1980				
All Factors	0.5192	0.2560	0.6151	0.3044
Demographics	0.8899	0.8683	0.9189	0.8225
Population growth	0.9147	0.9324	0.9377	0.8148
Skills	0.6538	0.5026	0.7213	0.5089
Industrial mix	0.8971	0.9405	0.8902	0.8771
Market potential	0.5305	0.3830	0.7205	0.2867
2000				
All Factors	0.3624	0.0704	0.4595	0.0470
Demographics	0.8354	0.7851	0.8447	0.8436
Population growth	0.9085	0.9017	0.9441	0.7921
Skills	0.5262	0.2593	0.6190	0.3104
Industrial mix	0.9860	0.9845	0.9931	0.9633
Market potential	0.9130	0.7958	0.9413	0.9140

A Census Data vs. Labor Force Surveys

The Censuses are conducted on October of respective years and provide data on demographic and labor market variables for each province and for district centers in each province by gender and age group. On the other hand, LFSs are conducted biannually from 1988 to 2000 and quarterly thereafter. Geographical coverage of LFSs are also limited to 19 provinces in early years and 26 aggregate regions in the last couple of years. Considering that Turkey has 81 provinces with area ranging from 847 (Yalova) to 38,873 (Konya) square kilometers (with Konya being larger than Belgium), using aggregate data could potentially curtail some properties of geographic distribution. Furthermore, first comprehensive survey was conducted in 1988. Turkey moved to an outward-oriented growth strategy in 1980 after twenty years of import-substitution based industrialization. Since then the geographical pattern of production has changed and new industrial centers all around the country emerged. To understand the effects of such a structural change on spatial distribution of unemployment would not be possible without a benchmark year.

The definition of unemployment in the Census data is not ideal. At least, whether an unemployed person has been through a job search using some formal channels is unknown. Nonetheless in most developing countries the conventional job search channels may be irrelevant because of low labor absorption in urban areas and prevalence of self-employment and unpaid family work in rural areas. Tansel and Tasci (2004) argue that both of these conditions are largely observed in Turkey.

Table 5 provides comparison of Census data with LFS data for two available years, 1990 and 2000. Typically, labor force participation is lower for males and higher for females rates in the Census data. Employment rates are also higher in the Census, however there is no systematic relationship in the unemployment rates. While the Census reports lower unemployment rate in 1990, it is 2.5% higher in 2000.

In the Census data, labor market statistics are provided for "centers", that is province or district centers, and "villages". However, most district centers, and in some instances even province centers have a very small population to be considered as *urban*. For example, among 923 such centers in year 2000,

35 of them had an urban population less than 2,500. Hence, a correction is required. An *urban* area is defined as any center with a population 20,000 and over. Using this definition, urban employment rate and unemployment rates show significant differences compared to the LFSs. Therefore, the data in this paper is not directly comparable to the Labor Force Surveys and and the analysis here may not be directly compatible with studies that use the latter data.

Table 5: Comparison of Census Data with Labor Force Surveys

	LFSs (15+)		**Census (15-64)**		
	1990	***2000***	***1980***	***1990***	***2000***
LFP Rate					
Provincial level	56.6	49.9	68.2	65.5	61.1
Males	79.7	73.7	87.5	85.6	78.7
Females	34.2	26.6	48.3	45.0	43.0
Urban	47.2	44.1	50.3	49.7	46.9
Males	76.8	70.9	82.1	80.8	73.1
Females	17.1	17.2	14.4	15.9	19.8
Rural	66.9	58.7	79.4	82.0	81.9
Males	83.0	77.9	91.1	90.9	87.0
Females	52.0	40.2	68.0	73.3	76.8
Unemp Rate					
Provincial level	8.0	6.5	3.6	5.6	9.3
Males	7.8	6.6	4.6	6.9	10.2
Females	8.5	6.3	1.7	3.0	7.8
Urban	12.1	8.8	7.8	10.6	16.8
Males	9.6	7.8	7.3	10.3	14.9
Females	23.6	13.0	10.9	12.3	24.1
Rural	4.9	3.9	1.9	2.4	3.0
Males	6.0	4.9	2.9	3.6	4.3
Females	3.4	2.0	0.6	1.0	1.6

B Overlapping Coefficients

Overlapping coefficient is suggested by Bradley (1985) as a measure of similarity of two distributions. The coefficient can be calculated (in the discreet case) as:

$$OVL = \frac{\sum_x min[f(x_1), f(x_2)]}{\sum_x max[f(x_1), f(x_2)]}$$

where $f(x_1)$ and $f(x_2)$ are the empirical density functions. The coefficient between zero, when the two distributions are completely dissimilar, and one, when the distributions are identical.

The statistical properties of OVL depend on the process that generate the data. In order to assess statistical significance of these coefficients, 10,000 samples are generating through bootstrapping. The estimated means and variances are provided in the following table:

Table 6: Mean and variance of OVL by 10,000 bootstraps

	Mean	Std.Err.	Min	Max	Mean	Std.Err.	Min	Max
	Bootstrap For Aggregate 1980				**Bootstrap For Urban 1980**			
OVL	0.8671	0.0538	0.5408	0.9769	0.8687	0.0445	0.5896	0.9804
OVL-LOW	0.8644	0.0786	0.4291	0.9984	0.8492	0.0874	0.3101	0.9947
OVL-MED	0.8945	0.0533	0.5498	0.9900	0.8966	0.0450	0.5885	0.9886
OVL-HIGH	0.7775	0.0936	0.2177	0.9862	0.7945	0.0899	0.3009	0.9911
	Bootstrap For Aggregate 2000				**Bootstrap For Urban 2000**			
OVL	0.8693	0.0456	0.5956	0.9795	0.8698	0.0476	0.6085	0.9801
OVL-LOW	0.8610	0.0807	0.3472	0.9978	0.8584	0.0819	0.4488	0.9967
OVL-MED	0.8988	0.0446	0.6216	0.9927	0.8956	0.0479	0.6048	0.9908
OVL-HIGH	0.7776	0.0902	0.2849	0.9901	0.7979	0.0921	0.1553	0.9871

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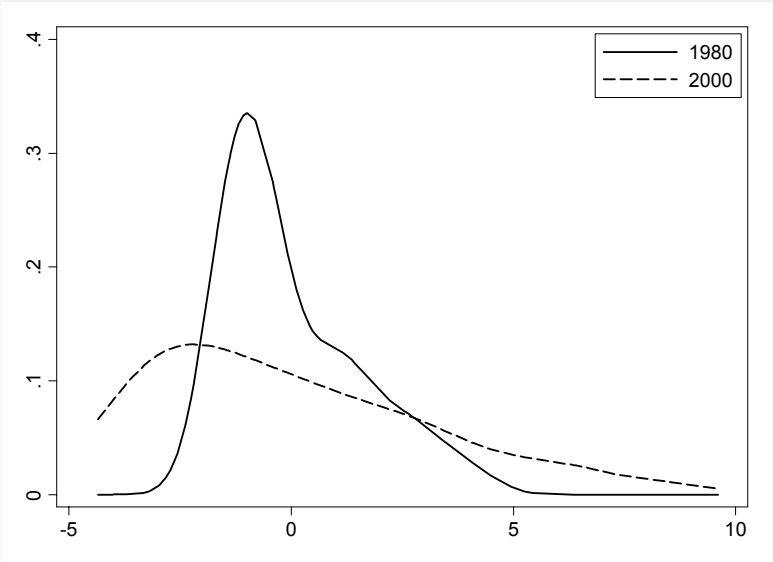
Figure 1: Estimated densities of regional unemployment differentials

panel a: provincial unemployment



panel b: urban unemployment

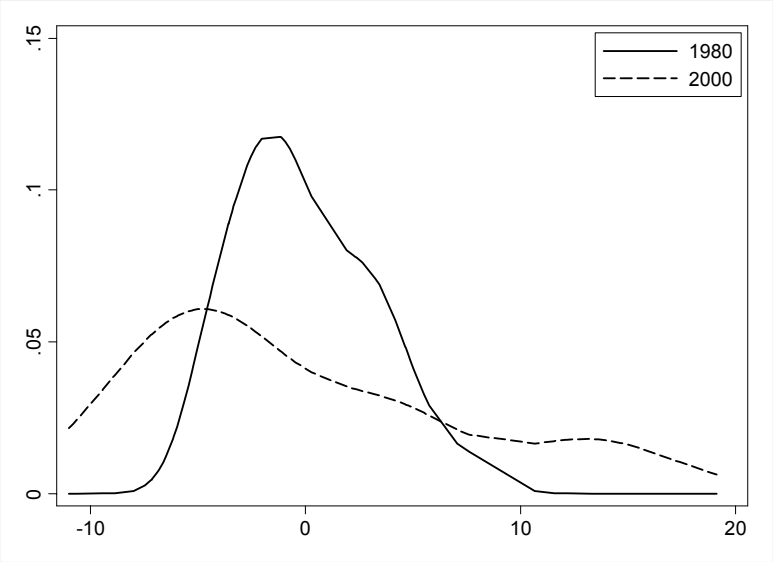
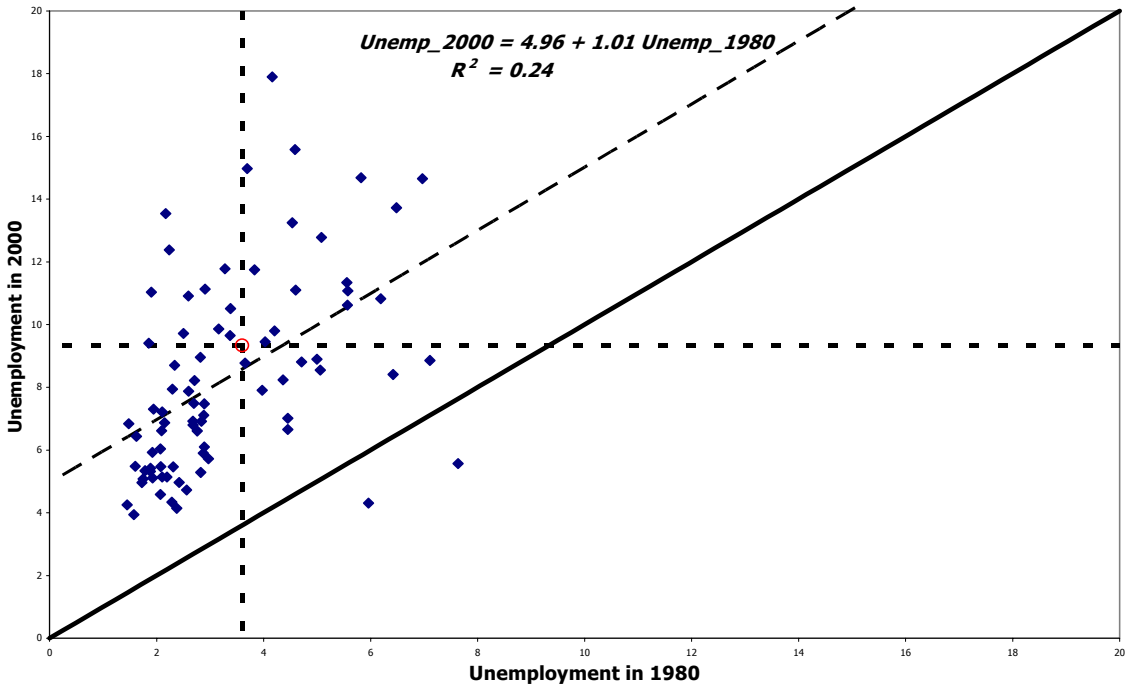


Figure 2: Persistence in unemployment rates

panel a: provincial unemployment



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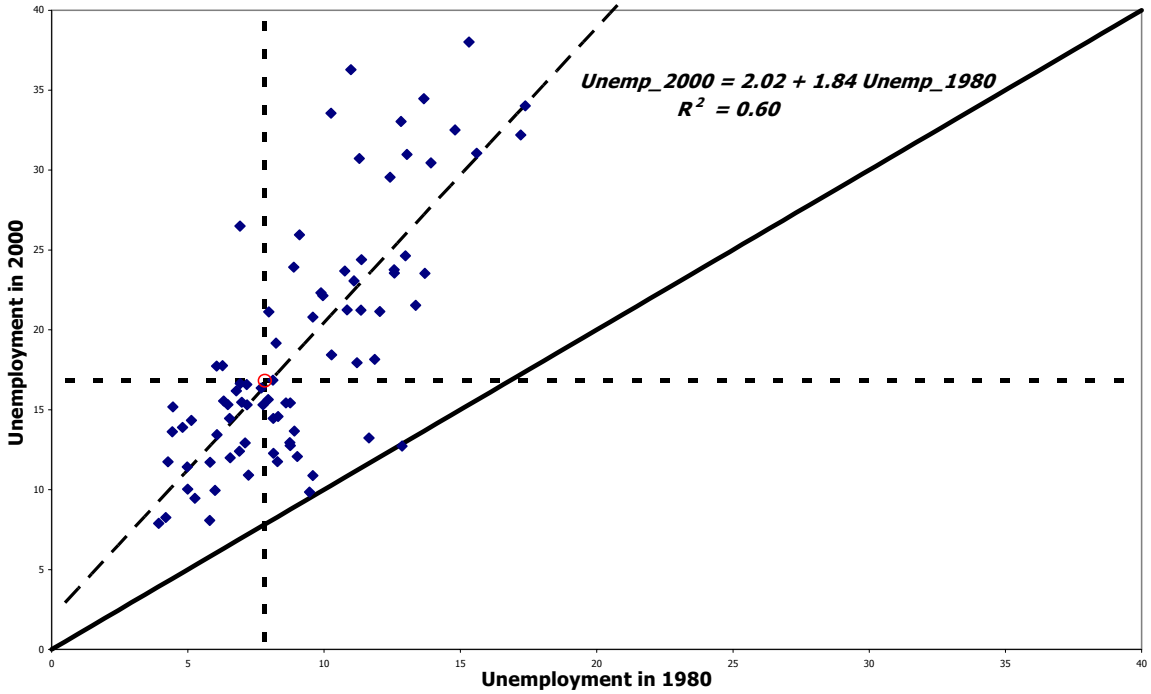
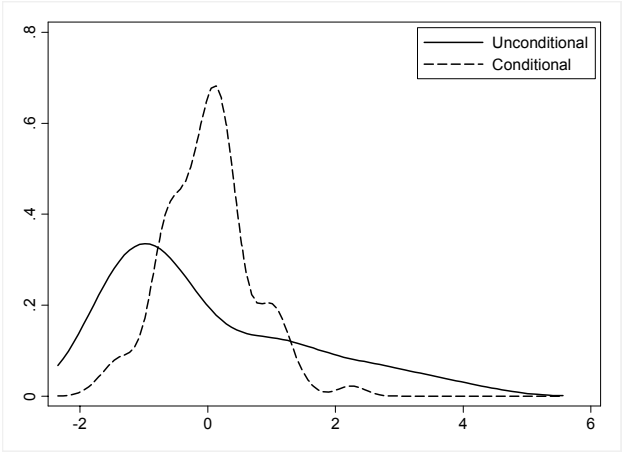
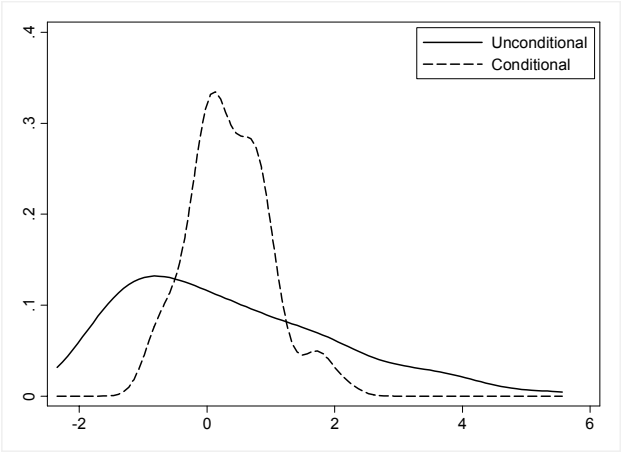


Figure 3: Unconditional and conditional densities of unemployment differentials

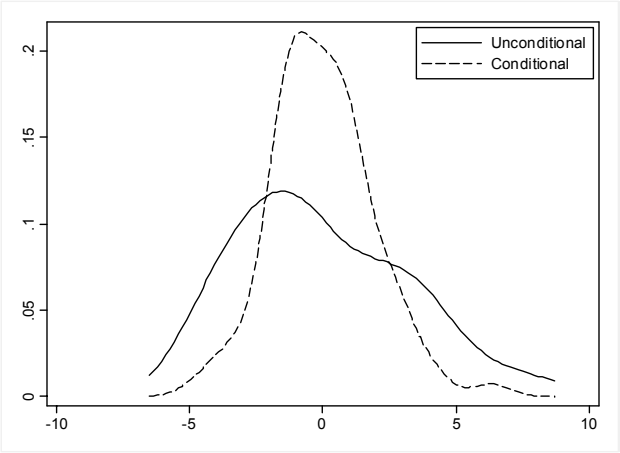
panel a: provincial unemployment in 1980



panel b: provincial unemployment in 2000



panel c: urban unemployment in 1980



panel d: urban unemployment in 2000

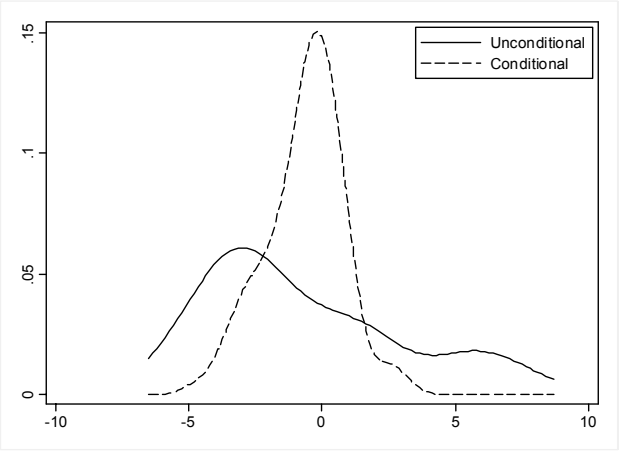
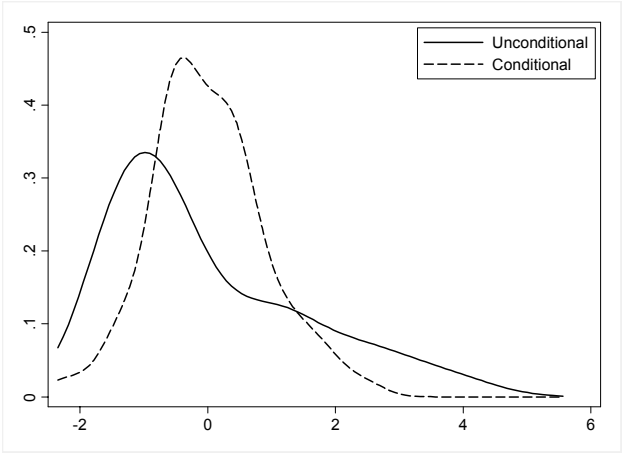
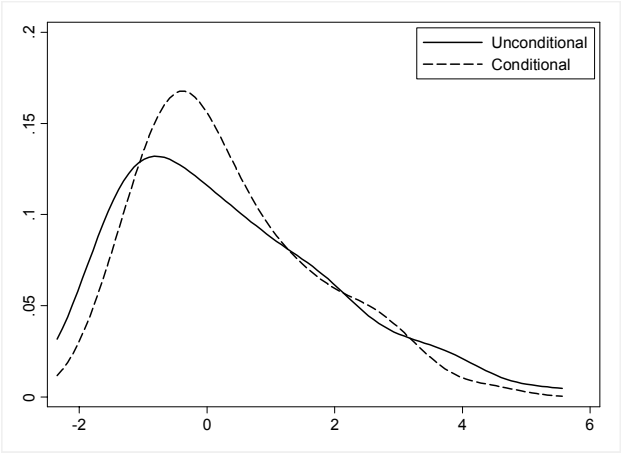


Figure 4: Unconditional and conditional densities of unemployment differentials (Conditional on demographics)

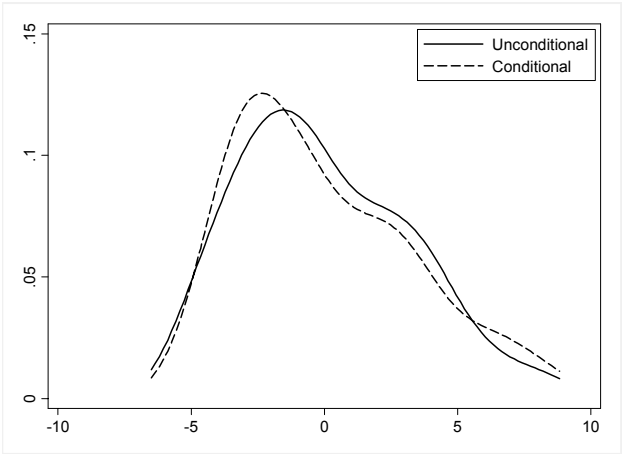
panel a: provincial unemployment in 1980



panel b: provincial unemployment in 2000



panel c: urban unemployment in 1980



panel d: urban unemployment in 2000

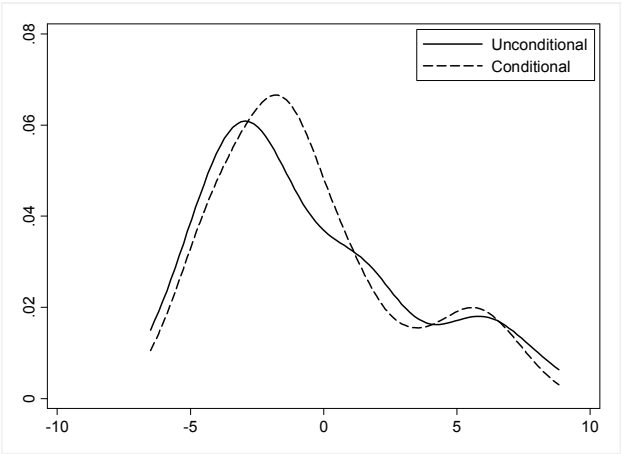
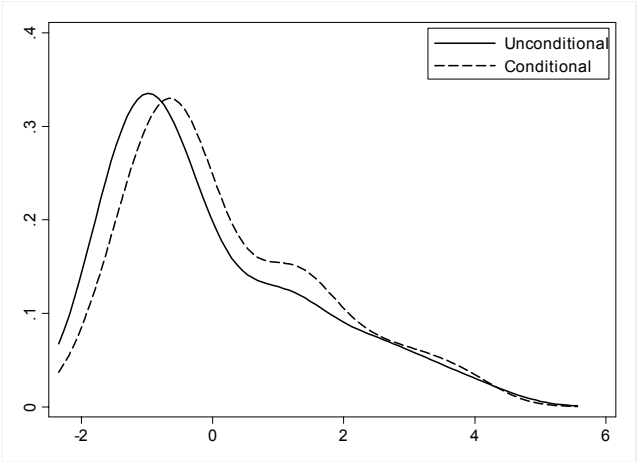
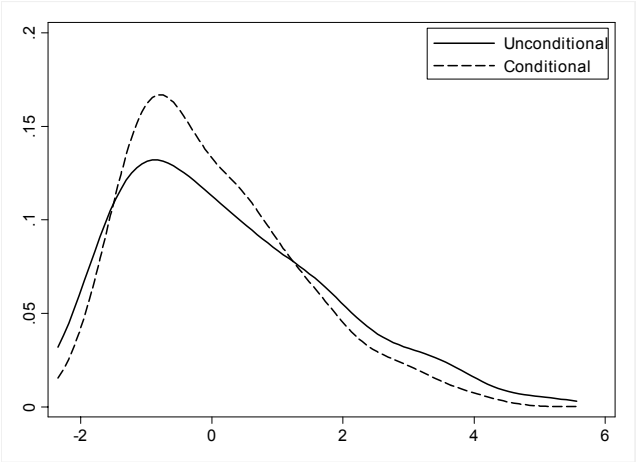


Figure 5: Unconditional and conditional densities of unemployment differentials (conditional on population change)

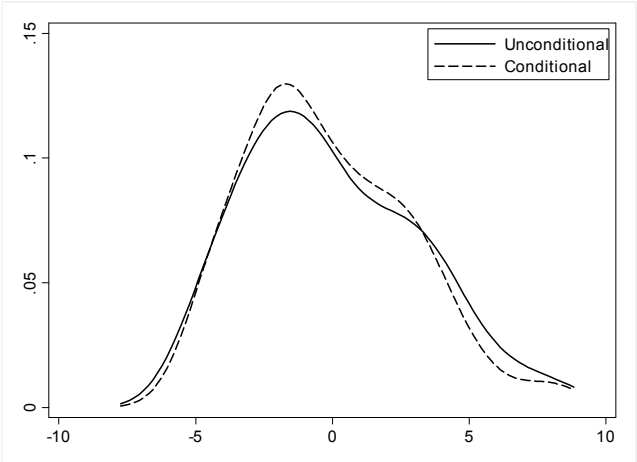
panel a: provincial unemployment in 1980



panel b: provincial unemployment in 2000



panel c: urban unemployment in 1980



panel d: urban unemployment in 2000

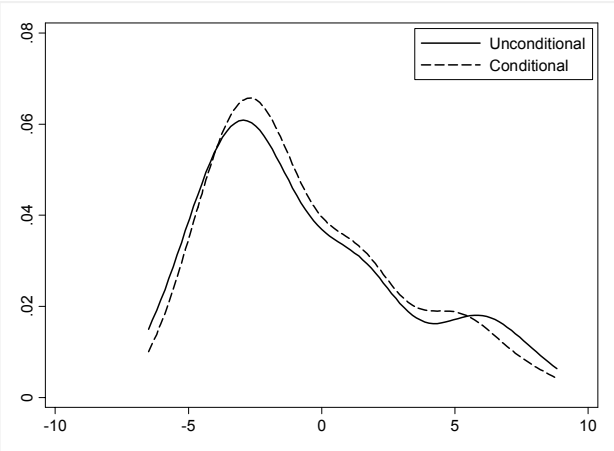
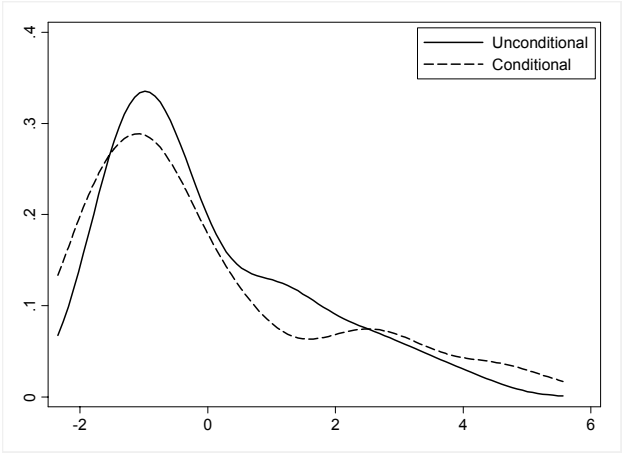
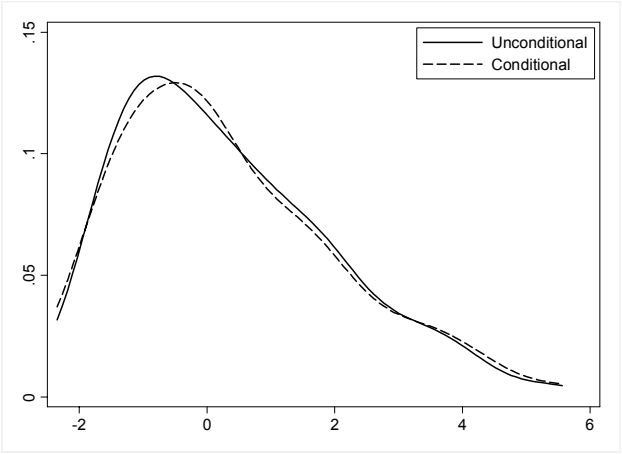


Figure 6: Unconditional and conditional densities of unemployment differentials (conditional on industry mix)

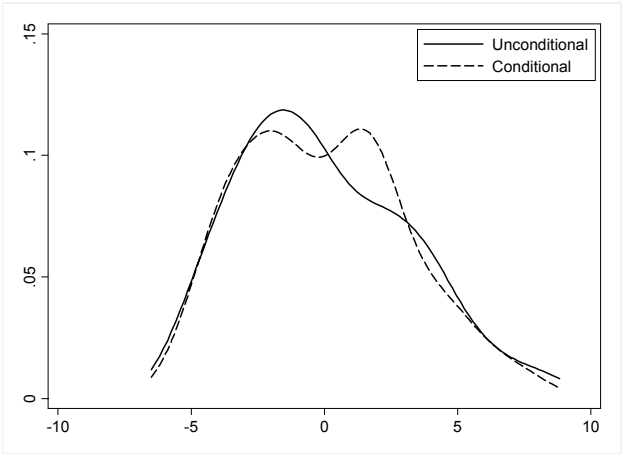
panel a: provincial unemployment in 1980



panel b: provincial unemployment in 2000



panel c: urban unemployment in 1980



panel d: urban unemployment in 2000

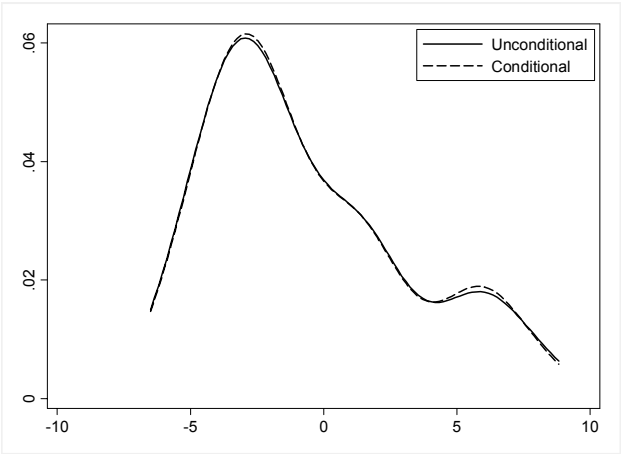
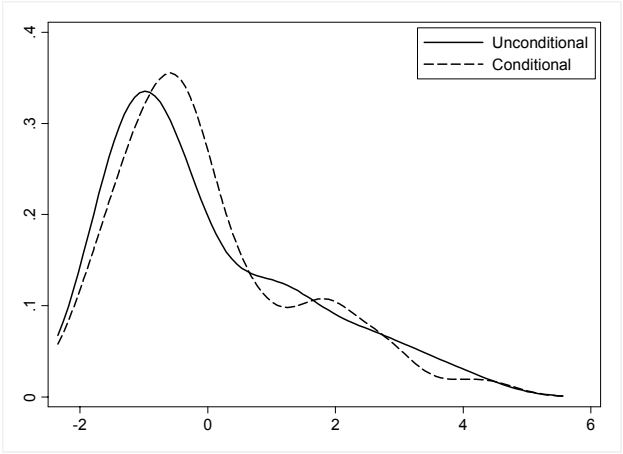
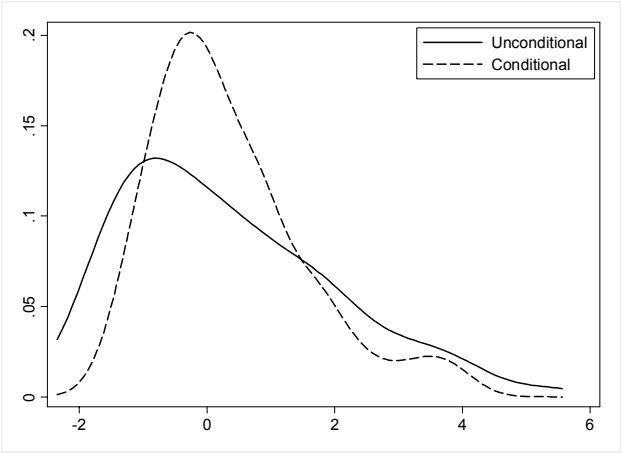


Figure 7: Unconditional and conditional densities of unemployment differentials (Conditional on skills)

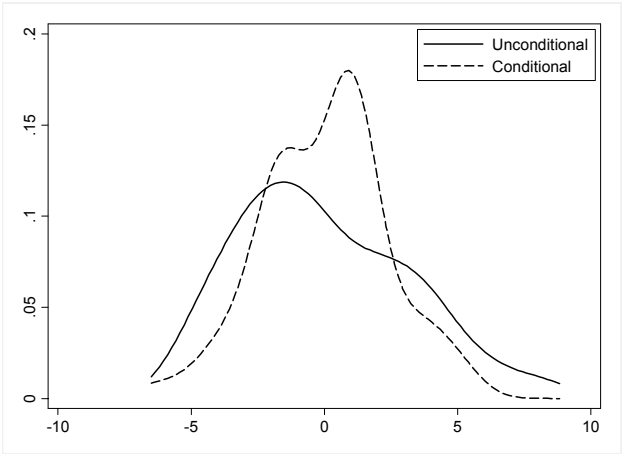
panel a: provincial unemployment in 1980



panel b: provincial unemployment in 2000



panel c: urban unemployment in 1980



panel d: urban unemployment in 2000

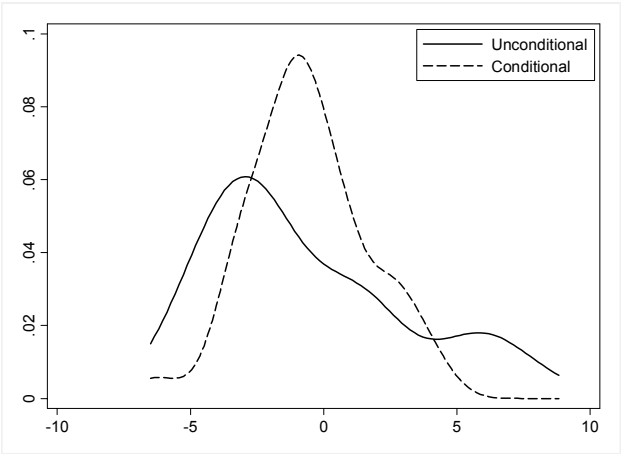
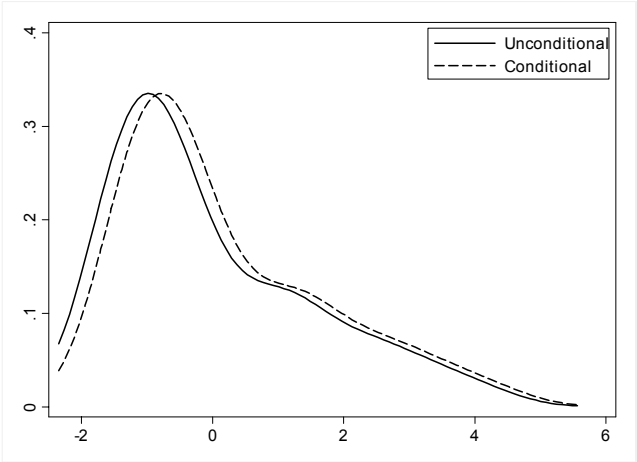
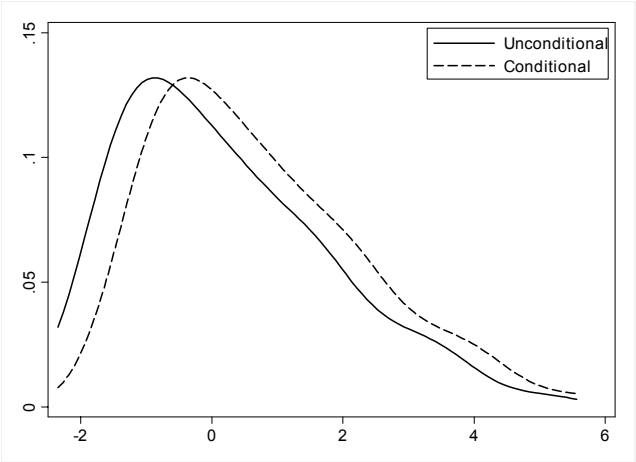


Figure 8: Unconditional and conditional densities of unemployment differentials (Conditional on market potential)

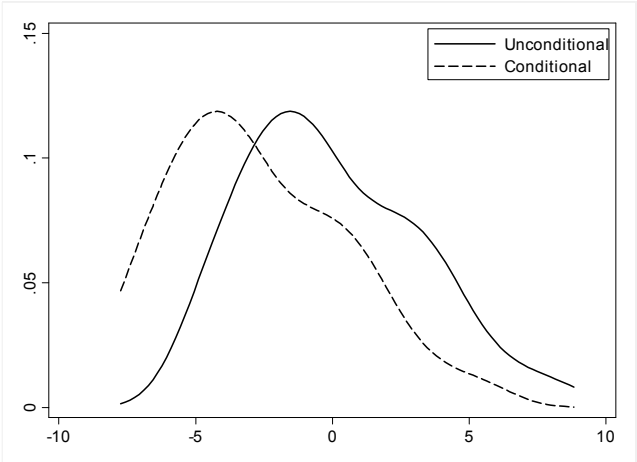
panel a: provincial unemployment in 1980



panel b: provincial unemployment in 2000



panel c: urban unemployment in 1980



panel d: urban unemployment in 2000