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Abstract

This paper examines the Turkish wage curve using individual data from the Household Labor Force Survey (HLFS) including 26 NUTS-2 regions over the period 2005 - 2008. When the local unemployment rate is treated as predetermined, there is evidence in favor of the wage curve only for younger and female workers. However, if the lagged unemployment rate is used as an instrument for current unemployment rate, we find an unemployment elasticity of -0.099. We also find a higher elasticity for younger, less educated, low experienced workers than for older, more educated and more experienced workers. Another important finding is that the wages of females in Turkey are significantly more responsive to local unemployment rates than their male counterparts.

JEL No. C26; J30; J60

Key Words: Wage Curve; Fixed Effects; Instrumental Variables; Two-Stage Least Squares

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1 Introduction

The relationship between real wages and unemployment rates has long been studied in economics. At the macro-level, starting with Phillips (1958), empirical studies have provided evidence of a negative correlation between the *growth* rate of wages and unemployment. Alternatively, at the micro-level, Blanchflower and Oswald (1990, 1994a, 1994b, 1995, 2000, 2005) show that the *level* of individual's wages is negatively correlated with the regional unemployment rates.

Blanchflower and Oswald also find that estimates for unemployment elasticities for different countries lie in the neighborhood of -0.1. One explanation in the literature for such a negative relationship is the efficiency wage theory by Shapiro and Stiglitz (1984). In this case, there may be less need for firms to pay efficiency wages to their workers as the outside options of workers would decrease with higher unemployment rates. Alternatively, a higher unemployment rate may lead to a decline in workers' reservation wages, as it may affect job-finding opportunities negatively when they are laid off, see Blanchflower and Oswald (1995).

The Turkish wage curve has been analyzed by Ilkkaracan and Selim (2003), who used unemployment variations across 7 geographic regions in Turkey in 1994. They provide evidence for the existence of a wage curve for most types of workers[3]. However, this is a cross-section of regions and as such cannot possibly control for unobserved regional differences. In fact, with such data, it is hard to distinguish whether the unemployment variations or other regional differences derive this result. Our study uses four surveys for 26 regions in Turkey and with this richer data set is able to control for region effects. In addition, our study uses hourly rather than annual earnings. The latter has been criticized for its potential to lead to misleading conclusions, see Card (1995). Ilkkaracan and Selim (2003) find no wage curve for females in Turkey in 1994, whereas our study finds strong evidence for a female wage curve in Turkey over the period 2005-2008. This is an important finding considering the constantly increasing number of female wage-workers and the decreasing number of females working in unpaid jobs in Turkey over the last two decades[4].

Our paper estimates a wage curve for Turkey using micro-level wage data, namely the TURKSTAT Household Labor Force Survey (HLFS), over the period 2005 - 2008. This rich individual level data set allows us to control for a large set of individual characteristics affecting individuals' wage responses to variations in regional unemployment rates. The sample used includes 292,168 individuals of whom 228,493 are males and 63,675 are females. We are able to investigate the existence of a wage curve for various types of workers: male vs. female, young vs. old, skilled vs. unskilled, etc.

We find evidence in favor of the wage curve in Turkey, with an overall estimated elasticity of -0.099. This is in line with the empirical findings of Blanchflower and Oswald for several countries. We also find that the unemployment elasticities are higher for individuals who are less experienced, less educated and young. An important finding is that the hourly wages of females in Turkey are much more sensitive to regional unemployment rates than their male counterpart. This effect is especially evident for younger, less-experienced and low-educated female wage-workers, whose number has been steadily increasing over the last two decades.

[3] Onaran (2002), on the other hand, uses macro data and estimates a -0.095 unemployment elasticity of *the change* in wage rates.

[4] See Dayioglu and Kirdar (2009) and the Worldbank (2009).

2 The model

Following Blanchflower and Oswald (1995) and Card (1995), we estimate the following wage curve model:

$$\log W_{irt} = \alpha + \beta \log U_{rt} + X'_{irt}\gamma + \mu_r + \lambda_t + \nu_{irt} \quad (1)$$

where W_{irt} is the real hourly wage rate of individual i observed in region r at time t. U_{rt} is the non-agricultural unemployment rate in region r at time t. X_{irt} represents the set of measured characteristics of individual i, μ_r is a region effect, λ_t is a time effect and ν_{irt} is the error term. Other control variables included in *all* specifications are the following: age, age squared, tenure, tenure squared, education, marital status, gender, occupation, industry, size of the employing firm, employed last year or not, duration of job (temporary vs. permanent), part-time status, registration status in the social security system, enrollment status, school attendance status, urban residency status, year and region fixed effects. See the Appendix for a detailed description of these variables.

3 Empirical results

Table 1 presents the estimation results for the unemployment elasticity of real wages β, for different types of workers using Equation (1) [5]. This is a standard fixed effects (FE) estimation with region and time fixed effects, but treating the regional unemployment rates as predetermined. With all individuals in our sample, the unemployment elasticity of real hourly wages is estimated as -0.022 and is significant at the 5% level. This specification gives significant wage curves for young workers, less experienced workers, females and workers in urban areas, whereas it gives insignificant elasticities for older workers, males, workers in rural areas, and more-experienced workers.

However, as suggested by Baltagi and Blien (1998), one may get an underestimate of (the absolute value of) the unemployment elasticities when the regional unemployment rates are not predetermined. In particular, if the regional unemployment rates and wages are simultaneously determined, the elasticities obtained with standard FE estimation would be biased and inconsistent. Therefore, we use the one year lagged value of the unemployment rate as an instrument for the unemployment rate at time t. The FE-2SLS estimates shown in Table 1 show that there is a significant wage curve for *all* worker groups, except for the workers in rural areas and workers with high years of tenure. In particular, the FE-2SLS specification yields an unemployment elasticity of real hourly wages equal to -0.099 for all individuals in our sample, which is consistent with elasticities reported by Blanchflower and Oswald (1994a) for various countries and dubbed as an '*empirical law*' in economics.

In terms of worker types, we find higher elasticity estimates for younger workers and workers with low education. This is consistent with the findings for other country studies. Wages of less skilled workers are depressed more during periods of high unemployment rates. We also find that the real wages of workers with more experience within a firm are insensitive to the unemployment rates. This is in line with the idea that a higher level of firm-specific human capital helps in smoothing wages over the business cycles[6]. In terms of urban vs. rural, we obtain similar point estimates for

[5] In order to save space, we only report β. However, the results on the other control variables are available upon request from the authors.

[6] See Oi (1962) and Card (1995).

Table 1: The Unemployment Elasticity of Real Hourly Wages By Worker Types

	All workers	Age		Gender	
		Young	Old	Male	Female
Fixed effects	−0.022	−0.047	0.010	−0.016	−0.057
	(0.010)**	(0.013)***	(0.015)	(0.011)	(0.023)**
R^2	0.59	0.57	0.59	0.58	0.65
FE-2SLS	−0.099	−0.108	−0.081	−0.069	−0.237
	(0.023)***	(0.031)***	(0.034)**	(0.025)***	(0.057)***
R^2	0.59	0.57	0.59	0.58	0.65
Obs.	292,168	159,606	132,562	228,493	63,675

	Location		Tenure		Education	
	Urban	Rural	Low	High	Low	High
Fixed effects	−0.030	−0.004	−0.037	−0.003	−0.011	−0.026
	(0.011)***	(0.024)	(0.013)***	(0.015)	(0.014)	(0.014)*
R^2	0.60	0.57	0.51	0.60	0.38	0.60
FE-2SLS	−0.101	−0.105	−0.175	−0.011	−0.086	−0.067
	(0.024)***	(0.066)	(0.032)***	(0.032)	(0.034)**	(0.030)**
R^2	0.60	0.57	0.51	0.60	0.38	0.60
Obs.	238,723	53,445	181,216	110,952	151,379	140,789

Notes:
a) See Appendix for sample coverage.
b) Robust standard errors in parentheses. *, ** and *** represent significance at 10%, 5% and 1%, respectively.
c) Young (old) refers to individuals younger (older) than sample mean value for years of age, which is 34.1. Low (high) tenure refers to individuals with tenure less (more) than the sample mean value, which is 6.94 years. Low (high) education refers to individuals with less than or equal to 8 years of schooling (more than 8 years of schooling). Settlements with a population of 20,001 and over are defined as Urban.
d) In FE-2SLS specification, the logarithm of non-agricultural unemployment rate by region in the previous year has been used as an instrument for the logarithm of non-agricultural unemployment rate by region at time t.

the unemployment elasticities. However, only the former is significantly different from zero.

We find that wages of females in Turkey are more sensitive to regional unemployment rates compared to their male counterparts. Previous findings by Card (1995) for the United States and Baltagi and Blien (1998) for West Germany show that female wages are less sensitive to the unemployment variations than males. In contrast, Baltagi et al. (2000) show more responsive elasticities for females than males in East Germany for 1993-1998. For Turkey, Ilkkaracan and Selim (2003), using the Labor Force Participation and Wage Structure Survey for 1994, report that the wage curve is significant only for males. They explain this finding with the procyclicality of labor force participation of low-skilled females in Turkey, implying that only high-skilled females with insensitive wages remain in the labor force during tight labor markets.

In Table 2, we show that females whose wages are sensitive to unemployment variations are the young, low-educated and less-skilled ones. Similar to Ilkkaracan and Selim (2003), the estimates for unemployment elasticities for females with more education or more experience are not significantly different from zero. This difference across time is consistent with the observed trend in the number of unpaid female workers and female wage-earners, where the former steadily decreases and the latter steadily increases. For example, while the ratio of the former to latter in the early 1990s was around

Table 2: The Unemployment Elasticity of Real Hourly Wages of Women By Worker Types

	Age		Tenure		Education	
	Young	Old	Low	High	Low	High
FE-2SLS	−0.243	−0.177	−0.309	−0.121	−0.632	−0.088
	(0.070)***	(0.094)*	(0.074)***	(0.081)	(0.132)***	(0.059)
R^2	0.63	0.68	0.57	0.63	0.30	0.63
Obs.	41,504	22,171	44,723	18,952	22,970	40,705

Notes:

a) Sample covers only the females. See Appendix for other issues in sample coverage.

b) Robust standard errors in parentheses. *, ** and *** represent significance at 10%, 5% and 1%, respectively.

c) Young (old) refers to individuals younger (older) than sample mean value for years of age, which is 34.1. Low (high) tenure refers to individuals with tenure less (more) than the sample mean value, which is 6.94 years. Low (high) education refers to individuals with less than or equal to 8 years of schooling (more than 8 years of schooling). Settlements with a population of 20,001 and over are defined as Urban.

d) In FE-2SLS specification, the logarithm of non-agricultural unemployment rate by region in the previous year has been used as an instrument for the logarithm of non-agricultural unemployment rate by region at time t.

3.5, it is around 1.0 in our sample period 2005-2008[7]. In other words, the emergence of the female wage curve for 2005-2008 is consistent with the recent trend in the decomposition of female workers in Turkey with respect to their payment status.

4 Conclusion

Using a rich individual level data set from the Household Labor Force Survey in Turkey, we show that the unemployment elasticity of hourly real wages in Turkey is in line with the international evidence. Our data set allows us to estimate different wage curves with respect to age, education, experience and gender groups and urban vs. rural. Our results indicate that the hourly wages of younger, less-experienced, less educated workers are more sensitive to the unemployment variations than older, more experienced, more educated workers. This confirms that workers with lower bargaining power due to their skill and/or seniority face higher wage sensitivity to labor market conditions. We also find that wages of females in Turkey are more sensitive to unemployment rates than wages of males for the period 2005-2008. This differs from the earlier findings of Ilkkaracan and Selim (2003) using data for 1994. However, this is consistent with the recent trends in the decomposition of female workers in Turkey with respect to their payment status.

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A Data Appendix

The data set used in this study is taken from the "Household Labor Force Survey" (HLFS) of TURKSTAT and covers the period 2005-2008. All private households who are living in the territory of the Republic of Turkey are covered by this annual survey[8].

[8] Residents of schools, dormitories, kindergartens, rest homes for elderly persons, special hospitals, military barracks and recreation quarters for officers are not covered by this survey. For more information about this survey, see the TURKSTAT website.

The final sample that we use covers individuals in TURKSTAT Household Labor Force Survey observed over the 2005-2008 period. Individuals younger than 15 years of age, agriculture sector workers, unpaid family workers, self-employed individuals or employers, have been excluded from the sample. We weight the individual data by the weights used by TURKSTAT, which are based on population projections.

The dependent variable is the log of hourly real wage, $\log W_{irt}$. This is obtained by dividing the monthly nominal after tax cash earnings by the total hours worked in the month. It is then deflated by regional prices, which are also obtained from TURKSTAT. All real wages are in 2008 prices.

The regional unemployment rates, U_{rt}, are gathered from TURKSTAT. Due to measurement problems for agricultural workers, we use non-agricultural unemployment rates. However, our results do not change much with the inclusion of agricultural workers in the sample. Other variables which are used to control for individual heterogeneity are listed below:

- Age. The survey provides eleven age categories in 5-year intervals.
- Gender. Female=1 and Male=0.
- Marital status. Married=1, and zero otherwise.
- Employment location. Urban=1 and Rural=0.
- Education. The variable *educ* is years of completed education, while the variable *enrolled* is a binary variable which takes the value 1 for individuals enrolled to a school, and zero otherwise. Variable *req_att* equals to 1 for individuals who are enrolled in a school that requires regular attendance, 0 otherwise.
- Social security registration: Binary variable which takes the value 1 if the individual is registered in the social security administration, and zero otherwise.
- The individual's years of tenure at the firm. This is calculated as the starting year at the current job subtracted from the survey year.
- Industry classification. This is a set of 7 binary variables categorized according to the NACE Rev.1 classification pertaining to the industry. They include mining, manufacturing, electricity, construction, transportation, and trade and finance.
- Occupational group. This is a set of 9 binary variables categorized according to the ISCO-88 classification. They include legislators, senior officials and managers; professionals; technicians and associate professionals; clerks; service workers and shop and market sales workers; skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers; and elementary occupations.
- Permanency of the job. This is a set of 3 mutually exclusive binary variables describing whether the job is *permanent*, *temporary* or *seasonal*.
- Employment type. Full-time=0 and part-time=1.
- Other activity to earn income. Yes=1 and no=0.

- Firm size. This is measured by the number of persons employed in the firm. These are summarized by 5 binary variables corresponding to the following categories: less than 10 employees, 10-24, 25-49, 50-249, 250-499, and 500 and more.
- Employment status in the same month of last year. Binary variable which takes the value 1 if the individual was working in the same month of last year, and zero otherwise.