Exploring different measures of wage flexibility in a developing economy context: The case for Turkey

İpek İlkkaracan, Haluk Levent, Sezgin Polat

giam

GALATASARAY ÜNIVERSITESI
İKTISADİ ARAŞTIRMALAR MERKEZİ

working papers

Exploring different measures of wage flexibility in a developing economy context:
The case for Turkey

İpek İlkkaracan[*]

Istanbul Technical University

Haluk Levent

Galatasaray University

Sezgin Polat[**]

Galatasaray University

Abstract

In this paper we use Turkish household labor force data to address a number of conceptual issues pertaining to the wage curve, an empirically derived negative relationship between the real wage level and the local unemployment rate. First, we estimate the wage curve using various definitions of the unemployment rate including discouraged and marginally attached workers, or the long-term unemployment rate to explore the most relevant measure of local labor market tension in the wage setting process. We find that broader definitions of unemployment provide a more effective reference point in measuring wage flexibility for women, whose attachment to the labor market is substantially weak in the Turkish context; while in the case of men, long-term unemployment rate yields the highest elasticity. Second, we show that particularly in the case of developing economies where labor markets are segmented by skill level, local unemployment rate disaggregated by education provide more accurate measures of the degree of group-specific wage competition. Finally, using quantile regression we show that wage responsiveness to unemployment can not be assumed to be constant along the wage distribution. In the Turkish case, we find a higher unemployment elasticity of wages around the median segment of wage distribution.

[*] İpek İlkkaracan (ilkkaracan@itu.edu.tr); İstanbul Technical University, Faculty of Management, Maçka 34357, İstanbul, TURKEY

[**] Haluk Levent (hlevent@gsu.edu.tr) and Sezgin Polat (spolat@gsu-giam.net); Galatasaray University, Economics Research Institute, Faculty of Economics and Administrative Sciences, Beşiktaş, İstanbul, TURKEY.

I. Introduction

The extensive literature on the so-called wage curve has explored the variety of issues around the responsiveness of wages to local unemployment in different labor markets and time periods (Blanchflower and Oswald 1994; 2005). These studies have shown that the unemployment elasticity of wages varies substantially across regions, industries and time, depending on factors such as the institutional structure of wage bargaining or product market conditions, as well as across different groups of workers by skill level, age or gender. They also show that the results are sensitive to the estimation method as well as the specification of the unemployment measure not only in terms of magnitude but also sign and statistical significance.

This paper presents several improvements of the wage curve analysis in the context of a developing economy labor market, namely Turkey and makes a number of conceptual and methodological contributions. Foremost is the appropriate specification of the rate of unemployment. We explore whether and to what extent wage responsiveness to local unemployment varies by different measures of the extent of labor market tension, beyond the usual one of the official rate of unemployment. Most wage curve studies take into account the active search criteria (i.e. the official definition of unemployment) as the relevant measure of local unemployment influencing the wage bargaining process. It might be misleading, however, to define local labor market tension only by active search criteria, particularly in the case of developing economies where labor markets suffer from substantial regional disparities as well as from local institutional imperfections. Hence in the proceeding analysis we experiment with different definitions of unemployment including *discouraged workers*, *marginally attached workers* or *long-term unemployed* and explore whether measures of labor market flexibility differ across these different definitions of unemployment. We find that it is primarily with women workers that these different definitions matter.

In addition, following Card (1995), we take note of the fact that wages may respond to skill-based, group specific unemployment rates rather than the labor market wide unemployment rate. Particularly, in developing countries, labor market segmentation in terms of skill or education supports such a concern. Hence we use local unemployment rates disaggregated not only by region but also by skill level, which we argue are more accurate indicators of local labor market tension experienced by different groups of workers.

Finally, we drop the assumption of a linear wage-unemployment relationship generally adopted in most wage curve specifications and use the quantile regression method to explore how the unemployment elasticity of wages varies along the wage distribution. We find that the unemployment elasticity of wages is substantially higher in the middle of the wage distribution than in the lower or upper deciles, and that this effect is more pronounced in the case of women.

II. A Conceptual Framework

Theoretical explanation of the wage curve relation is grounded in two major models, namely bargaining and efficiency wage models. In the former model, wages are determined through a bargaining process between the firm and the workers. The collective wage bargaining of workers is carried out by the trade unions which make a trade-off between

employment of their members and the real wage premium (share of the surplus). Here local unemployment emerges as a threat to workers and it modifies their bargaining power over value added. In an environment of high unemployment, the trade union would revise its preferences and would give more weight to unemployment aversion and would be more willing to consent to a lower wage premium. In other words, the higher the rate of joblessness in the region, the lower the bargaining power of workers vis a vis employers. One limitation of this model, however, is that it assumes collective bargaining and thus it fails to provide an appropriate framework for most developing economies where unionization is weak and considerable size of informal sector undermines the labor market institutions. For most less-developed labor markets, minimum wage regulations keep the wages to stabilize at a lower bound and individual bargaining practices reign where collective wage negotiations are lacking (Freeman 2009).

The efficiency wage model provides an alternative framework to explain the wage bargaining process at the individual level even when collective practices are absent. Here, the high rate of unemployment is assumed to act as a worker disciplining device, dampening the efficiency incentives to be rewarded by a higher wage premium. In this case, the trade-off of the worker is between the local unemployment rate and efficiency wage premium. A higher rate of regional unemployment, rather than a higher efficiency wage premium, will induce workers not to shirk and thus accept a more competitive wage rate. The bargaining power of workers depends also on the qualifications of the worker as represented, for instance, by their level of education.

In both models, local labor market tension plays a crucial role and lack of local jobs acts as an outside threat to employed workers undermining their bargaining power over wages. Yet different studies use various measures of the degree of wage competition as an outside threat. In the wage curve literature pioneered by Blanchflower and Oswald (1994), the most commonly used indicator is the *official* rate of unemployment which is defined on the basis of active job searchers.[1] Pannenberga and Schwarzea (1998) replicate the wage curve exercise for Germany with a job search rate including active participants of labor market which can proxy the search intensity. Carlsen, et.al. (2006) use transition rates from unemployment as a proxy for labor market pressure instead of the official unemployment rate. Carlsen and Johansen (2005) use subjective measures of regional employment opportunities to explain regional variations in Norwegian manufacturing wages. If, however, most workers do not use public channels (employment offices) and find it sufficient to search through their networks or individual means[2], then it would not be safe to assume that the perception of local tension shared by the workers and firms hinges only on public information released. Moreover, it is also possible that not only the active job searchers but also those who we can call 'the passive unemployed', i.e. those who are ready to work although they are not actively searching for a job, would have an impact in shaping the intensity of local labor market tension.

Given these shortcomings of the official unemployment rate as a not necessarily accurate measure of local labor market tension, we use three alternative definitions of unemployment. The first two combine indicators of passive search criteria with the usual

---

1 According to the official definition of unemployment, the unemployed are those: i. who are not employed during the reference week of the household labor force survey; ii. have actively searched for a job in the two weeks prior to the survey; iii. state that they are ready to start work in maximum 15 days if offered a job.
2 For a discussion see Pellizzari (2010)

unemployment definition which are compatible with the Bureau of Labor Statistics (BLS) and the International Labor Office (ILO) definitions. One is a broad definition of unemployment which includes so-called 'discouraged workers', whom the ILO defines as those who are not in the labor force but who want and are available for a job, but are not in active labor market job search because they believe there are no jobs available or there are none for which they would qualify. The second definition of unemployment that we employ is a broader one that includes the so-called 'marginally attached workers', whom the BLS defines as those who are not in the labor force, yet who want a job and are available for work, but are not in active labor market job search for any reason.[3] Hence discouraged workers are a subset of marginally attached workers. Finally we also use the rate of long-term unemployment (the ratio of those who have been in unemployment for one year or longer) as an alternative indicator of job seekers with intensive job search effort. This is based on the assumption that as the duration of job search becomes prolonged, alternative means of income are depleted (such as unemployment insurance or personal savings/borrowing) and hence the longer the job search, the higher the tension perceived by the job searchers.

We can justify the inclusion of passive searchers (i.e. the discouraged or marginally attached) in our measure of local labor market tension on two grounds. First, there are several studies which provide evidence that active search criterion is too narrow a definition of labor market attachment or labor market activity, which differ across countries given that labor markets show considerable heterogeneity. Jones and Riddell (1999) find that marginal attachment and non-attachment are distinct states and passive job search cannot be seen as a refrain from labor market attachment. Gray, et. al. (2005) show that the marginally attached workers form a behaviorally distinct group and it emerges as a different category besides others. Garrido and Toharia (2004) conclude for Spain that although passive job seekers are behaviourally different than active seekers, they cannot be counted as inactive. Confirming the results of Jones and Riddell (1999) for Canada, Brandolini et. al. (2006) concludes that the marginally attached form a distinct group situated at what they call the "gray area" of labor market activity for Italy.

Second argument is related to the reason for not seeking a job. Within the framework of the job search model, any change of the individual characteristics and/or economic environment that can influence the gains and costs of job search has a potential impact on discouragement effect. For instance, it might emerge as a result of any idiosyncratic shock specific to regions. The regional variation of discouraged workers might indicate that following the shock, formerly active job seekers are exhausted by the prolonged search and quit the labor market based on the reasoning that there would not be any jobs available even if they have searched for. This argument rightly fits the usual case where discouragement is countercyclical and emerges as a reflection of the local business cycle. Moreover, discouragement may also be related to the information structure in the labor market. It is plausible to relate the thickness of the labor market to the existence of information imperfections about job openings. As the size of the labor market gets smaller, the information about job opportunities becomes more apparent, i.e. the degree of imperfection diminishes, making job search less costly, thus demanding less effort. In such a case, participation in the labor force can be defined more dominantly on the basis of 'ready to work', rather than active search. Depending on the cross-regional variation of the size of the

3 The precise BLS definition of marginally attached workers is: Persons not in the labor force who want and are available for work, and who have looked for a job sometime in the prior 12 months (or since the end of their last job if they held one within the past 12 months), but were not counted as unemployed because they had not searched for work in the 4 weeks preceding the survey. Discouraged workers are a subset of the marginally attached (see BLS Glossary, 2012).

local labor market then, it is possible that broader measures of unemployment including passive searchers would show a different pattern of cross-regional dispersion than that of the official unemployment rate.

The distinction between passive seekers such as discouraged workers and active job seekers in the labor market, could also be expected to work through labor rationing or signalling based on qualification. Knowing that the rationing/signalling rule would favor more skilled ones, lower skilled workers are less eager to engage in an active job search, and hence keep themselves at the end of the job line. In other words, they are crowded out active search by the skilled workers.

It is already acknowledged in the wage curve literature that wage competition is dissimilar for different groups of workers and hence the unemployment elasticity of wages can vary (Card 1995). Specific skill group wage responsiveness can result from within skill group competition. Hence various wage curve studies have preferred to use unemployment rates for different group of workers, such as unemployment rates disaggregated by occupation or industry rather than the labor market wide unemployment rate. This might be particularly relevant for developing economies, which are characterized by segmented labor markets based on qualification as proxied by the workers' level of schooling. Wage competition would be more contestable among workers belonging to similar skill/education levels, since there is complementarity of skills rather than substitution among different workers. A university graduate in a less developed region would be hardly replaced by a worker having secondary or lower education. It is unlikely that the unemployment of unskilled workers would be an outside threat to skilled workers and vice versa. Hence the use of local unemployment rates disaggregated not only by region but also by education level, would provide a more accurate indicator of local labor market tension experienced by different groups of workers.

Tables 1 and 2 show the variations across different measures of unemployment through time as well as by education level for our period of analysis. There is an increase in all measures of unemployment, except for long-term unemployment, first starting in 2008, reaching a peak in 2009 and a relative decrease in 2010 but still above their pre-crisis levels. The divergence between the official unemployment rate and the broader measures of unemployment which include passive searchers is striking for lower education groups. Note, for instance that the official unemployment rate is almost the same for the lowest and highest education groups (10.9% for less than secondary school and 10.3% for tertiary graduates), while a differential emerges when discouraged workers are included (13.3% broad unemployment rate for less than secondary school and 11.2% for tertiary graduates). Moreover, we observe that the cross-regional and longitudinal variation in broader measures of unemployment is stronger than that of official unemployment for the lower education groups.[4] For instance, the standard deviation for broad unemployment including discouraged workers is as high as 5.66 for the lowest education group, while it is 2.9 for the highest education group. These differences across education levels seem to support the view that wage competition takes place within similar skill levels rather than between different skill levels.

[Tables 1 and 2]

---

4 Although we do not present the data on cross-regional variation of unemployment rates in this table, it would be worthwhile to note that we observe greater divergence between the official unemployment rate and the broader measures of unemployment in the less-developed regions than in the developed regions.

It is possible that the passive search effect is more dominant amongst women. Given their relatively weaker attachment to the labor market, women are known to absorb unemployment shocks. Ammermuller et al. (2010), for instance, confirm for Italy that female labor market participation is very volatile and serve as a buffer against household shocks. Turkey like (more than) Italy has the highest rate of discouraged workers compared to the labor force in OECD countries. However, the figures in Table 1 show that the share of women in broader unemployment measures is not much higher than their share in the official unemployment measure and it does not change too much over time except for the year 2010 (during the recovery after the crisis) when we observe a slight increase.

III. The Turkish Case

For the Turkish case, there have been two studies on the wage curve so far by İlkkaracan and Selim (2003) and Baltagi et.al. (2012).[5] Both studies find wages are sensitive to regional unemployment in the Turkish labor market. The former reports an elasticity of 0.088%, while the latter finds 0.099%, a magnitude similar to that reported for other countries (around 0.1%) by Blanchflower and Oswald (1994) as well as a series of other country-specific studies.[6] Disaggregating the analysis for different groups of workers, however, Ilkkaracan and Selim (2003) find that while wages of *male private* sector workers demonstrate a much higher sensitivity to regional unemployment (0.164%), this is not the case for women workers. Baltagi et. al. (2012) report, on the other hand, an even higher unemployment elasticity of women's wages (0.237%) than men's (0.069%). They reconcile the difference in their results from the previous study by the different time periods of estimation.

Indeed, the analysis in İlkkaracan and Selim (2003) entails estimation of micro level individual wage data for the manufacturing, electricity, gas and water, and mining and quarrying industries for seven regions for the year 1994. While their data set is rich in terms of institutional variables enabled by a unique employer-employee matched data set, it is limited by its cross-sectional nature and is unable to capture the longitudinal dimension in the wage-unemployment relationship. Baltagi et. al. (2012) presents the first-time longitudinal and economy-wide estimate of the unemployment elasticity of pay for Turkey using household labor force survey data for the period 2005-2008 which can be characterized as a boom period in the Turkish economy, including the upward segment of the business cycle following the 2001 economic crisis and ending just as the global crisis hits in the second half of 2008. This paper presents a longitudinal and economy-wide estimate of the unemployment elasticity of pay for Turkey using pooled cross-section micro-data for a longer and more recent time period between 2005 and 2010. This entails a time period which covers the full upswing as well as the downswing of a business cycle and hence eliminates any bias that may originate from estimating labor market flexibility based only on an upswing or a downswing period and captures the full longitudinal effect.

---

5 Onaran (2002) studies the effect of unemployment in wage determination in Turkey through a wage bargaining model by using macro data to estimate the relationship between change in real unit labor costs and change in the unemployment rate in three periods of different economic policies. She finds that at the macro level the wage rate is hardly responsive to the changes in unemployment in the import-substitutionist pre-1980 period where the Turkish economy was relatively a closed economy; while in the post-1980 period of global economic integration, wages start displaying a substantially higher responsiveness to unemployment changes.

6 See Montuengo-Gomez and Ramos-Parreno (2005) for a survey of the wage curve studies on different countries.

We avoid two additional shortcomings of the previous longitudinal analysis: First, the Baltagi et. al. (2012) study uses regional non-agricultural unemployment rates, which is problematic. The non-agricultural unemployment rate is calculated by the Turkish Statistical Institute (TurkStat) by subtracting those who are looking for a job in the qualified agricultural occupation from the numerator (total unemployed – unemployed who are looking for a job in the agricultural sector) and those who are working in the agricultural sector are subtracted from the denominator. The household labor force surveys, however, perform poorly in identifying the main job of the worker especially when the agricultural sector is involved due to the substantial share of self-employed and unpaid family workers in small-scale family farming. Given the dominance of small-scale family farming, the agricultural sector provides a significant buffer against negative shocks in the labor market for unskilled workers. This bias produces hikes in regional unemployment rates particularly in less-developed regions and increases the variation across years.[7] Since 2009, Turkstat no longer releases non-agricultural unemployment rates at regional level and provides figures only at the national level.

Second we conduct the analysis only for private sector workers which is where we expect the unemployment factor to play a role in wage negotiations, while the Baltagi et. al. (2012) study fails to eliminate the public sector workers whose wages are subject to nationwide central bargaining.[8,9] Public sector share in paid employees is substantial, approximately a quarter (24.6%) of all wage and salary workers in the period of analysis (it decreases from 25.1% of all paid workers in 2005 to 20.6% in 2010). Note also that this share varies substantially across regions and by education level with a standard deviation of 0.07 for workers with less than secondary schooling, and as high as 0.14-0.18 for secondary and tertiary level workers (Table 3). The public jobs mostly hire more educated workers and in some regions it dominates the labor market by more than 90% (for university graduates). Hence the failure to exclude public sector workers in an estimation of wage responsiveness to local unemployment in the Turkish case is likely to produce unreliable results.

[Table 3]

As far as the private sector is concerned, the wage setting process can be characterized as largely decentralized. The only official data available on unionization rates is by the Ministry of Labor which reports as high as over 50 percent union membership, yet these official unionization figures are commonly accepted as a gross overestimation. More realistic estimations range between 10 to 18 percent unionization and approximately 25 per cent collective bargaining coverage including the public sector (Ilkkaracan 2005); yet these rates are substantially lower in the private sector. The dominant level at which the bargaining takes place in the private sector is at the firm level; and to the extent that collective bargaining takes place it is on a industry scale entailing only formal sector workplaces. Unionization and collective bargaining is prevalent primarily in the manufacturing sector, and has been on the decline in the past two decades of economic liberalization policies.

---

[7] Moreover, non-agricultural unemployment is a misleading measure in the sense that it implies an industry-specific definition. Yet the question posed to the respondents in the household labor force survey pertains to "the occupation in which they are seeking a job"; hence it is impossible to deduce any kind of the industry-specific unemployment rate.

[8] Public sector wages workers are less responsive to the regional unemployment (Blank (1994), Turunen (1998) and Sanz-de-Galdeano and Turunen (2006). Yet, for the Turkish case, another concern would be the compensating wage premiums of public jobs in less developed regions which would justify the exclusion of public sector.}

[9] The information on public employees in HLFS became publicly available since 2009. However for the former years, the question about the type of your workplace (Q.35) could be used to generate public employee dummy thanks to the support of Turkstat officials. The missing values for that question indicate the public employees if the individual is employed.

IV. Data and the estimation method

We use pooled cross-section individual level micro data from the annual Household Labor Force Survey (HLFS) of Turkey for the period 2005-2010. The local labor market is disaggregated by 26 NUTS2 regions. We restricted the sample to wage and salary earners in the private sector in the 20-64 age group with positive earnings and working hours.

The model is specified in the following standard log linear form of the wage curve regression equation:

$$\ln W_{iert} = \alpha \ln U_{ert} + \beta X_{iert} + DE + DR + DT + u_{iert}$$

The dependent variable W_{iert} stands for the real hourly wage of individual i having an education level e, living at region r in year t. The nominal hourly wage is divided by the regional consumer price index to derive the real hourly wage rate, expressed in 2004 prices.

As a measure of local labor market tension, we use various measures of unemployment as described above to explore which one serves as a more effective reference point relevant to the wage bargaining process. Hence U_{ert} is defined in the following alternative forms:

- the official unemployment rate which is the standard narrow definition based on the active job search criterion;
- the broad unemployment rate including discouraged workers, those who state that they are willing to work but do not actively seek a job because they believe there are no available jobs in the region (the ILO based measure);
- a more inclusive broad unemployment rate which includes the marginally attached workers, those who state that they are willing to work but do not actively seek a job regardless of the reasons behind, and state that they were engaged in job search activity in the previous year, (the BLS based measure);
- the long-term unemployment rate which is the ratio of the long-term job seekers (those who have been in job search for at least a year or more) to the total labor force.

All these unemployment measures are disaggregated for three education levels e in region r in year t. The education levels are defined roughly as people with less than secondary schooling, workers with secondary and tertiary schooling. This entails a total of 468 labor market indicators observed for 3 education levels in 26 regions for 6 years. X, entails the set of measured personal characteristics of the worker and her job, namely age, gender, marital status, occupation and industry, size of workplace. DE, DR and DT stand for a set of education level, region and year dummies, and u is the error term. The analysis is conducted for the overall sample as well as for women and men workers separately in order to explore any variations in their unemployment elasticity of wages given the gender disaggregated nature of the Turkish labor market.

We employ the various methods proposed in the literature to address different estimation problems in wage curve studies; namely clustered OLS estimation, two-stage least squares (2SLS) and quantile regression. Clustered OLS estimation addresses the common methodological criticism in wage curve studies, which pertains to the downward bias in measurement of standard errors as discussed in Moulton (1990), when micro level data (individual wages) is regressed on aggregate data (the regional unemployment rate). The

2SLS estimation addresses possible endogeneity bias which might emerge from any reverse causality from the wage rate to the level of unemployment in a given period. We use region by year clustered 2SLS estimation to address this bias. One-year lag of regional unemployment rates are used as an instrumental variable

For the final step, we use the quantile regression method to investigate whether the unemployment elasticity varies along the wage distribution. The standard specification of the wage curve is a log-linear form whereby it is assumed that the unemployment elasticity of wages is constant across the wage distribution. Yet this assumption is questioned and alternative non-linear specifications are suggested. Ilkkaracan (2001), for instance, argues that the unemployment elasticity of wages will be higher in the middle of the wage distribution but lower on the upper and lower ends. She explains the lower elasticity on the lower end of the wage distribution, as the resistance of wages further decreases despite any unemployment shocks as they will be reaching the subsistence or the reservation wage limit as embodied in the minimum wage; while on the upper end, there will be upward wage rigidity in the face of declining unemployment rates as the firm's profit margin will impose an upper limit to further wage premiums. The fact that standard OLS regression focuses on the mean, it only provides a partial view of the relationship between the regressors and the dependent variable. Quantile regression analysis gives a more complete picture since it provides information about the linkage between the outcome variable (in our case wages) and the regressors at different points of the conditional wage distribution. Using quantile regression to estimate the wage curve for Germany and Italy, Ammermuellera et al. (2010) confirm that the responsiveness of wages to unemployment varies significantly along the distribution, being more sensitive around the median quantiles. They suggest a number of accounts for the lower unemployment elasticity of wages in the lower quantiles: monosony and collective bargaining being more prevalent for this segment of the labor market is one explanation. They also suggest that in cases where informal sector employment is an option, a negative shock to unemployment may result in increasing informal jobs rather than lowering wages further down. For the upper quantiles, they argue that higher mobility and education of this group of workers acts to dampen the effects of unemployment shocks on wages. Sanz-de-Galdeano and Turunen (2006) find for the euro-area, on the other hand that wages of workers at the bottom of the distribution are more responsive to the local unemployment rate and suggest wage curve elasticity decreases along the wage distribution. Devicienti et al. (2008) using data for Italy find lower wage sensitivity in the middle range of the distribution, following an inverse U-shape along the wage distribution.

V. Results

We first report the usual regional wage curve estimation at 26 NUTS2 regions using the local unemployment rate but not disaggregated by education level in order to enable a general comparison with the other longitudinal study on Turkey by Baltagi et.al. (2012). Our non-clustered OLS estimates (Table 4) for the overall sample is very similar to that of Baltagi et al (2012) (-.023 ours versus -.022) although they use the non-agricultural unemployment rate rather than the overall labor market wide unemployment rates. Using the 2SLS estimation to correct for endogeneity, however, unlike the previous study, we do not find any evidence of a wage curve relation using the overall unemployment rate. This divergence can be partly attributed to the sensitivity of estimated wage elasticity to the time period of analysis. Our data entails two additional years of 2009 and 2010. In 2009 the effect of the global recession

on Turkey became apparent with unemployment rates in each category reaching a peak, but in 2010 there was a non-negligible recovery in the national context (see Table 2). Yet given the lingering effects of the global crisis and its expansion into the neighbouring EU countries, the partial recovery in the national unemployment rate in 2010 can be said to have only limited impact on wage negotiations, indicative of upward wage rigidity immediately following a deep negative shock.

[Table 4]

We also note that the divergence in our results from the previous study shows that estimated elasticity is also sensitive to the exact specification or level of disaggregation of the local unemployment rate. While we use the regional usual unemployment rate in the estimation reported in Table 4, Baltagi et.al (2012) use the regional *non-agricultural* unemployment rate. It is not possible to replicate the analysis using regional non-agricultural unemployment rate for the period after 2008 because as discussed in Section II above, this definition of the regional unemployment rate is no longer reported by TUIK due to the deficiencies in its accurate measurement. When we employ the regional unemployment rates disaggregated by education level, however, we do find a wage curve even when we correct for the endogeneity bias. Table 5 reports the results of our OLS clustered and 2SLS estimations for the total sample as well as for men and women separately, using various measures of the unemployment rate disaggregated by education group. Regional unemployment rates disaggregated by three education/skill levels (less than secondary education, secondary education and tertiary education) provides more robust results of the wage curve analysis (Table 5) than the estimation using non-disaggregated regional unemployment rates (Table 4).

[Table 5]

The clustered OLS estimations reported in the first column of Table 5 for each sample group, carry corrected estimated standard errors using clustering on NUTS2 regions. This addresses the common methodological criticism of the downward bias in measurement of standard errors when micro level data (individual wages) is regressed on aggregate data (the regional unemployment rate) as discussed in Section IV above. We find an elasticity of -0.05 for private sector men and -0.042 for private sector women workers. For men the estimated elasticity hardly varies with the different measures of the unemployment rate. For women, on the other hand, it is substantially higher when broader measures of unemployment are used, for instance for unemployment including marginally attached workers, we find that the elasticity of female wages goes up to -0.07.

In order to correcting for endogeneity bias, we include in the analysis of the one year lag of regional unemployment rates as an instrumental variable. We find that 2SLS results are consistent for most part for the overall sample and for men. Only when the long-term unemployment rate is used, we find that elasticity for the overall sample and for men is significantly enhanced to -0.070 and -0.068 respectively. For the broader measures of unemployment, however, we do not find a statistically significant coefficient using the 2SLS estimation for men. The reverse is true for women workers whose wages once again seem to respond particularly to the broadest measure of unemployment including marginally attached workers. The fact that we find women's wages to be sensitive particularly to the broader unemployment measure confirms our expectation that given the very low levels of female labor force participation and women's tenuous attachment to the labor market, marginal attachment is likely to provide a stronger measure of job queues for typically female jobs.

Also unlike men, women's wages show no significant responsiveness to long-term unemployment rate, which can be explained due to their secondary earner status. Finally, we observe a generally higher unemployment elasticity of women's wages, a finding that is consistent with the previous longitudinal study on Turkey. This can be attributed to a number of factors that result in women's weaker bargaining position relative to men, such as lower representation in unionized sectors as well as their secondary earner status in the household.

The results of the quantile regression are reported in Table 6 and Figure 1 which shows the plotted coefficient estimates for each decile of the wage distribution. Our findings show a distinctly U-shaped distribution of wage flexibility along the wage distribution for both men and women. The unemployment elasticity of wages is higher around the middle of the wage distribution, and lower at the lower and upper deciles. This finding is similar to those of Ammermuellera et al. (2010) for Germany and Italy mentioned earlier. The variation of wage flexibility along the wage distribution is particularly pronounced for women. The unemployment elasticity of women's wages reaches the highest levels in the median deciles (peaking at -0.106 in the 50% decile for the broad unemployment rate) and becomes much less sensitive at the poles. This variation in sensitivity of women's wages to local unemployment is particularly pronounced once again in the case of unemployment in its broad definition including the marginally attached workers.

[Table 6 and Figure 1]

For the Turkish case, the fact that lower deciles are less responsive can be explained by the strong downward rigidity at low levels of wages, presumably levelling down to a kind of subsistence threshold or to any kind of lowest fair wage which prevents further decreases. This can be considered to be particularly the case for women, for whom exiting the labor market into traditional roles in non-market activity remain as socially viable, acceptable and widely practiced options. For the upper deciles, the common explanation discussed in section IV above applies also to the Turkish case: the upper end of the wage distribution is dominated by highly educated and skilled workers who are relatively more insulated from unemployment pressures in their wage bargaining process.

VI. Conclusions

This paper has taken advantage of a rich household labor survey data source from a developing economy context, i.e. Turkey, to make a number of contributions to the analyses of labor market flexibility, more particularly the wage curve relationship, which is by now accepted as an empirical law of economics. First, we have shown that the measure of the unemployment elasticity of pay can be sensitive to the definition of unemployment used. While the wage curve studies commonly use the official rate of unemployment which is a narrow definition based on the active search criterion, broader measures including passive searchers including discouraged and marginally attached workers, or more specific measures such as long-term unemployment can serve as more relevant reference points in the wage bargaining process. In the case of Turkey, we found that broader unemployment measures provide a more robust analytical framework in analyzing the reaction of women's wages to local unemployment, while men's wages are relatively more sensitive to long-term unemployment.

Second, we have shown that particularly in a developing economy context, high degree of segmentation of the labor market by skill levels, might create an environment where wage competition takes places strictly within skill groups and hardly across. Our findings for Turkey have shown that the variations through time and across regions in the local unemployment rate disaggregated by three education levels (as a proxy for job market skill/qualification) differ substantially. Hence the use of local unemployment rates disaggregated by education provides more robust results in the wage curve analysis than estimations using of the overall unemployment rate.

Finally, using the quantile regression method, we have also shown that the wage-unemployment relationship is one that varies along the wage distribution confirming and enriching findings of a limited number of earlier studies from other countries also for Turkish labor market data. In our case, we show that the elasticity is high in around the middle of the wage distribution, but decreases considerably on the lower and upper ends. This pattern is much more pronounced in the case of women. We explained the lower elasticity in the lower end of the wage dispersion can be explained as a downward rigidity of low subsistence level wages in face of increasing U rates. We also suggested alternative accounts of the lower rigidity at the higher end; a downward rigidity of wages due to relative insulation of high skilled workers from the unemployment threat and/or an upward rigidity whereby an already generous wage premium impinges on the limits imposed by firm profitability.

References

Ammermüller, A., C.Lucifora, F. Origo and T. Zwick. 2009. Wage Flexibility in Regional Labor Markets: Evidence from Italy and Germany. *Regional Studies* 44, no. 4: 401-421.

Baltagi, B. H., Y. S. Baskaya and T. Hulagu. 2012. The Turkish wage curve: Evidence from the Household Labor Force Survey. *Economics Letters* 114: 128–131

Blanchflower, D.G., and A.J. Oswald. 1994. *The Wage Curve*. Cambridge and London: The MIT Press.

Blank, R. 1994. Public sector growth and labour market flexibility: the US versus the UK. In *Social protection vs. economic flexibility: Is there a trade-off?*, ed. R. Blank, 223-264. Chicago: University of Chicago Press.

Bureau of Labor Statistics. BLS Glossary. US Department of Labor. http://www.bls.gov/bls/glossary.htm#M

Brandolini, A., P. Cipollone and E. Viviano. 2006. Does ILO Definition capture all unemployment? *Journal of the European Economic Association* 4, no.1: 153–179

Büttner, T. and B. Fitzenberger. 1998. Central wage bargaining and local wage flexibility: evidence from the entire wage distribution. ZEW Discussion Papers 98-39, ZEW - Zentrum für Europäische Wirtschaftsforschung / Center for European Economic Research.

Card. D. 1995. The Wage Curve: A Review. *Journal of Economic Literature* 33, no. 2: 785-799

Carlsen,F. and K.Johansen.(2005)"Regional wages and subjective measures of employment opportunities", The Journal of Socio-Economics 34,377–400

Carlsen, F., Johansen,K and Roed K. 2006. Wage formation, regional migration and local labour market tightness. *Oxford Bulletin of Economics and Statistics* 68: 423–444.

Devicienti, F., A. Maida, L. Pacelli. 2008. The resurrection of the Italian wage curve. *Economics Letters* 98: 335-341.

Garrido, L. and L. Toharia. 2004. What does it take to be (counted as) unemployed? The case of Spain. *Labour Economics* 11, no.4: 507-523.

Gray, M, A. Heath and B. Hunter. 2005. The labour force dynamics of the marginally attached. *Australian Economic Papers* 44, no.1: 1-14.

Freeman, R. 2009. Labor regulations, unions, and social protection in developing countries: Market distortion or efficient institutions. In *Handbook of Development Economics*. North Holland: Elsevier.

Ilkkaracan, I. and R. Selim. 2003. The role of unemployment in wage determination: Further evidence on the wage curve in Turkey. *Applied Economics* 35, no.14: 1589-99.

Ilkkaracan, I. 2001. An alternative non-linear model of the wage curve and some empirical evidence from the U.S. Discussion Paper, Center for Economic Policy Analysis, New School for Social Research, New York.

Ilkkaracan, I. 2005. Wage centralization and coordination in Turkey from an international perspective. Paper presented at the 9th National Social Sciences Conference, Turkish Social Science Association, Middle Eastern Technical University, Ankara.

Jones, S.R.G. and W. C. Riddell, 1999. The measurement of unemployment: An empirical approach. *Econometrica* 67, no.1: 147-162.

Montuenga-Gómez, V.M. and J. M. Ramos-Parreño. 2005. Reconciling the wage curve and the phillips curve. *Journal of Economic Surveys* 19, no.5: 735-765.

Moulton, B.R. 1990. An illustration of a pitfall in estimating the effects of aggregate variables on micro units. *Review of Economics and Statistics* 72: 334-338.

Onaran, O. 2002. Measuring wage flexibility: The case of Turkey before and after structural adjustment. *Applied Economics* 34: 767-81.

Pannenberg, M. and J. Schwarze. 1998. Labor market slack and the wage curve. *Economics Letters*. 58, no. 3: 351-354.

Pellizzari, M. 2010. Do friends and relatives really help in getting a good job?. *Industrial and Labor Relations Review* 63, no.3: 494-510.

Sanz-de-Galdeano, A. and J.Turunen. 2006. The euro area wage curve. *Economics Letters* 92: 93–98

Turunen, J., 1998. Disaggregated wage curves in the United States: evidence from panel data of young workers. *Applied Economics* 30, no. 12: 1665–1677.

Tables and Figures:

Table 1: Unemployment by different measures and share of women (2005-2010)

	2005	2006	2007	2008	2009	2010
Unemployment (Narrow)	**10.64**	**10.23**	**10.28**	**10.97**	**14.03**	**11.88**
Share of Women	26.89	28.24	27.79	28.1	28.22	31.46
Unemployment + Discouraged Workers	**12.53**	**12.63**	**12.59**	**13.2**	**16.57**	**14.27**
Share of Women	29.1	31.1	29.75	30.23	30.49	33.44
Unemployment + Marg. Attached Workers	**11.89**	**11.91**	**11.98**	**12.53**	**15.55**	**13.3**
Share of Women	25.67	26.13	25.62	26.02	26.53	29.5
Long-term Unemployment (>= 12 mo.)	**4.16**	**3.63**	**3.08**	**2.93**	**3.53**	**3.38**
Share of Women	31.78	34.82	35.7	35.9	35.96	40.51

* Authors' own calculations (HLFS 2005-2010)

Table 2: Regional unemployment by education level (26 NUTS2 regions, 2005-2010)

	Less than Secondary				Secondary				Tertiary			
	mean	min	max	sd	mean	min	max	sd	mean	min	max	sd
Unemployment (Narrow)	10.9	2.7	20.9	4.04	13.8	5.9	26.6	3.49	10.3	4.1	20.9	2.61
Unemployment + Discouraged Workers	13.3	4	35	5.66	16	9.4	35.7	5.08	11.2	5.2	25.1	2.9
Unemployment + Marg. Attached Workers	12.5	3.9	27.4	4.53	15.1	10	25.4	3.54	11	6.2	18.3	2.02
Long-term Unemployment (>=12 mo.)	2.9	0.4	9.2	1.37	5.1	1.6	16.3	2.24	3.8	1	9.1	1.43

* Authors' own calculations (HLFS 2005-2010)

Table 3: Regional variation in share of public employment (26 NUTS2 regions, 2005-2010)

The share of Public employment by education level (2005-2010)				
	Mean	Std. Dev.	Min	Max
Less than Secondary	0.1058	0.0708	0.0266	0.4327
Secondary	0.2570	0.1359	0.0739	0.6966
Tertiary	0.5918	0.1785	0.2523	0.9443
Total	0.2464	0.2217	0.0266	0.9443

* Authors' own calculations (HLFS 2005-2010)

Table 4: Wage curve in Turkey by regional unemployment (2005-2010) abc

Public and Private Sector

	Total		Men		Women	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
log Ur	-0.023***	0.008	-0.029***	-0.001	-0.004	0.042
	(0.006)	(0.012)	(0.006)	(0.013)	(0.014)	(0.030)
No. Obs.	423,924	423,924	331,126	331,126	92,798	92,798
Adj. R2	0.600	0.600	0.588	0.588	0.654	0.654

a- Robust standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels
b- OLS and 2SLS regressions include gender, tenure and its square, formal employment, marital status, urban, full-timework, age categories, 3 education, 9 skill, 6 firm size, 9 industry categories. We control for region and year effects in all estimations. The reference category is old, elementary skilled, lower educated working in the small-size firm (< 25 employees) in the agricultural sector at the 1st NUTS2 region, year 2010
c- In 2SLS model, one-year lag of regional unemployment rate is used as the instrumental variable for the current regional unemployment rate.

Table 5: Wage curve in Turkey by regional and educational unemployment (2005-2010)[a,b,c]

Private Sector

dv: log hourly wage	Total		Men		Women	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
log(U)	-0.056***	-0.055**	-0.050***	-0.049**	-0.042*	-0.027
Unemployment (Narrow)	(0.013)	(0.019)	(0.013)	(0.019)	(0.020)	(0.031)
Adj. R2	0.434	0.434	0.422	0.422	0.501	0.501
log(Ulng)	-0.051***	-0.070***	-0.050***	-0.065***	-0.026	-0.036
Long-term Unemployment (>= 12 mo.)	(0.009)	(0.016)	(0.009)	(0.016)	(0.014)	(0.026)
Adj. R2	0.434	0.434	0.422	0.422	0.501	0.501
log(Ud)	-0.060***	-0.047*	-0.053***	-0.042	-0.052**	-0.022
Unemployment + Discouraged Workers	(0.014)	(0.024)	(0.014)	(0.024)	(0.019)	(0.037)
Adj. R2	0.434	0.434	0.422	0.422	0.501	0.501
log(Um)	-0.059***	-0.049*	-0.044*	-0.028	-0.070**	-0.068*
Unemployment + Marg. Attached Workers	(0.017)	(0.022)	(0.017)	(0.022)	(0.025)	(0.034)
Adj. R2	0.434	0.434	0.422	0.422	0.502	0.502
No. Obs.	309,736	309,736	244,329	244,329	65,407	65,407

a- Robust standard errors clustered (region by year) in parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels
b- OLS and 2SLS regressions include gender, tenure and its square, formal employment, marital status, urban, full-timework, age categories, 3 education, 9 skill, 6 firm size, 9 industry categories. We control for region and year effects in all estimations. The reference category is old, elementary skilled, lower educated working in the small-size firm (< 25 employees) in the agricultural sector at the 1st NUTS2 region, year 2010
c- In 2SLS model, one-year lag of regional unemployment rate is used as an instrument for the current regional unemployment rate.

Table 6: Unemployment elasticity of wages along the wage distribution: quantile regressions (2005-2010)[a,b]

	Q=0.1	Q=0.2	Q=0.3	Q=0.4	Q=0.5	Q=0.6	Q=0.7	Q=0.8	Q=0.9
	Men (Private Sector)								
logU	-0.034	-0.045	-0.05	-0.051	-0.053	-0.05	-0.047	-0.043	-0.043
	-0.006	*-0.005*	*-0.004*	*-0.004*	*-0.005*	*-0.005*	*-0.005*	*-0.006*	*-0.008*
logUlng	-0.04	-0.045	-0.048	-0.048	-0.048	-0.047	-0.044	-0.042	-0.042
	-0.004	*-0.003*	*-0.003*	*-0.003*	*-0.003*	*-0.003*	*-0.003*	*-0.004*	*-0.006*
logUd	-0.042	-0.051	-0.054	-0.056	-0.057	-0.056	-0.051	-0.042	-0.038
	-0.007	*-0.006*	*-0.005*	*-0.005*	*-0.005*	*-0.005*	*-0.005*	*-0.006*	*-0.009*
logUm	-0.029	-0.042	-0.048	-0.049	-0.055	-0.048	-0.038	-0.03	-0.04
	-0.008	*-0.006*	*-0.006*	*-0.006*	*-0.006*	*-0.006*	*-0.007*	*-0.008*	*-0.011*
No. Obs.	244,329	244,329	244,329	244,329	244,329	244,329	244,329	244,329	244,329
	Women (Private Sector)								
logU	-0.048	-0.05	-0.072	-0.083	-0.08	-0.081	-0.074	-0.076	-0.06
	-0.013	*-0.01*	*-0.009*	*-0.009*	*-0.009*	*-0.009*	*-0.009*	*-0.011*	*-0.015*
logUd	-0.059	-0.054	-0.073	-0.085	-0.082	-0.083	-0.072	-0.078	-0.066
	-0.013	*-0.01*	*-0.009*	*-0.009*	*-0.01*	*-0.01*	*-0.01*	*-0.012*	*-0.016*
logUm	-0.076	-0.064	-0.095	-0.105	-0.106	-0.103	-0.089	-0.091	-0.076
	-0.017	*-0.013*	*-0.012*	*-0.011*	*-0.012*	*-0.011*	*-0.01*	*-0.014*	*-0.019*
No. Obs.	65,407	65,407	65,407	65,407	65,407	65,407	65,407	65,407	65,407

a- All estimates are significant at 1% , standard errors are given in italics

b- Quantile regressions include gender, tenure and its square, formal employment, marital status, urban, full-timework, age categories, 3 education, 9 skill,6 firm size, 9 industry categories. We control for region and year effects in all estimations. The reference category is old, elementary skilled, lower educated working in the small-size firm (< 25 employees) in the agricultural sector at the 1st NUTS2 region, year 2010

Figure 1: Unemployment elasticities along the wage distribution (2005-2010)