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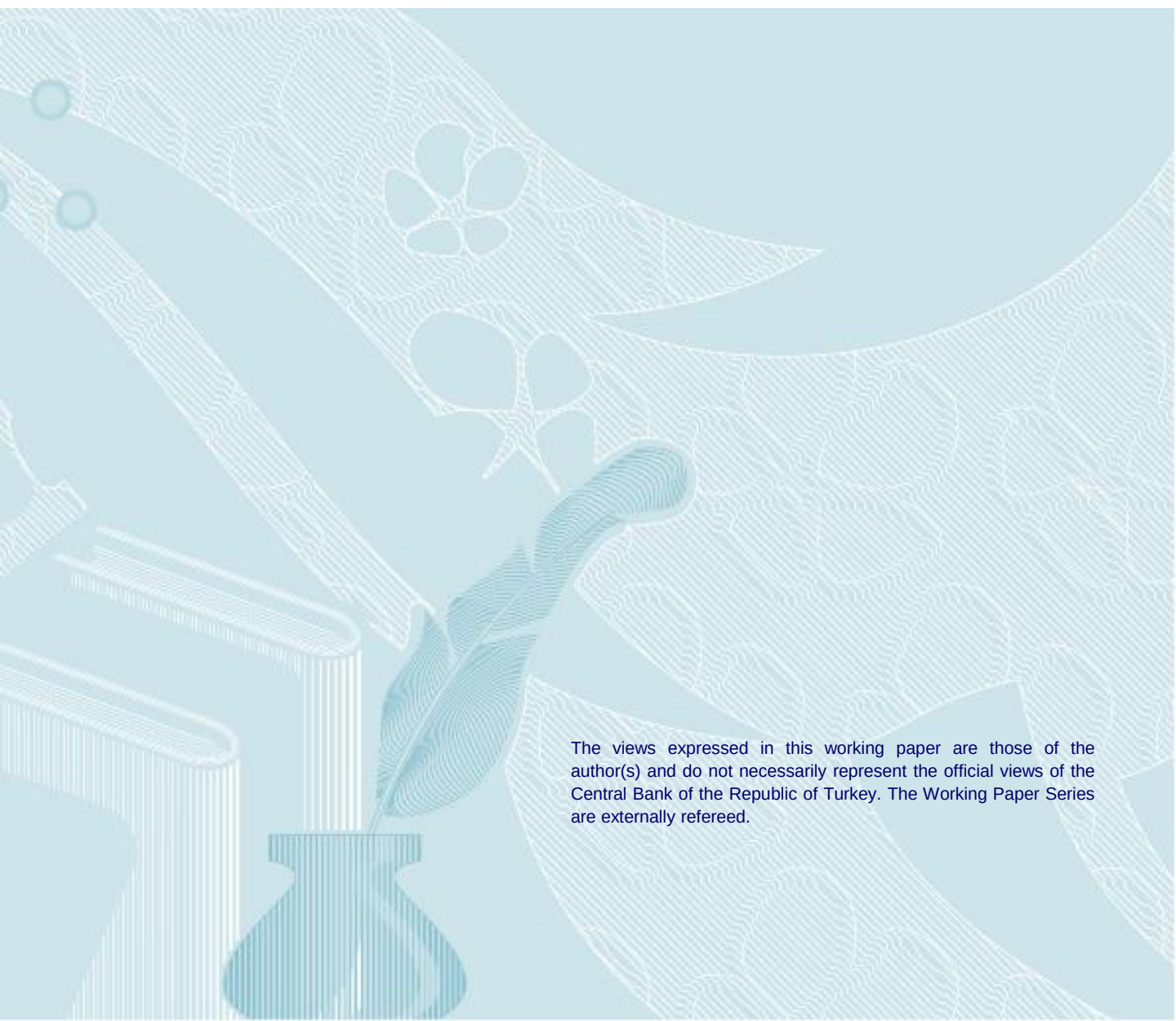

Real Wages and the Business Cycle in Turkey*

Altan Aldan † **H. Burcu Gürcihan Yüncüler** ‡

Abstract

We analyze the direction and the magnitude of the responsiveness of real wages to the business cycle in Turkey using longitudinal data covering the 2006-2012 period. We find that wages in Turkey are quite procyclical; a 1 percentage point increase in the unemployment rate induces a 0.8 percent decline in real wages. This result can be obtained only if individual heterogeneity is taken into account. We also document wage cyclicality for different groups such as young, low educated, informal workers and job movers. We find a weaker wage response for the low educated and a stronger response for job movers. We also document wage cyclicality along the wage distribution. We find that workers who earn around the minimum wage have acyclical wages. Binding minimum wage suppresses wage cyclicality. For the rest of the distribution wages are highly procyclical.

JEL codes: J30, E23, E26, E32.

Keywords: Turkey, real wages, real wage cyclicality.

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1 Introduction

Downward wage adjustment in the labor market is of interest as sticky wages are seen as a factor generating unemployment. Following the Great Recession, rising unemployment rates brought this issue to the fore once again (Verdugo, 2015). Wage response is not easily detectable from aggregate data due to change in the skill quality of labor during a cycle. Hence, measuring wage response requires an approach that controls for compositional shifts. With this issue in mind, we investigate the cyclicality of real wages in Turkey using individual level pooled four-year panels from 2006-2012. Despite being short, the period covers a full cycle and coincides with the Great Recession. Our main goal is to get a better understanding of the wage dynamics and labor market flexibility in the Turkish economy. In doing so, we discuss the composition bias inherent in the average wage data and review the impact of institutional rigidities on the wage dynamics. The institutional structure of the labor market in Turkey is classified as rigid in most part due to binding minimum wage and high severance payments, but there is not much evidence on the flexibility of wages (WorldBank, 2010, 2014). To what extent do wages reflect institutional rigidities is an open ended question.

The direction of the relation between real wages and the business cycle is a debated issue among macroeconomists. Whether real wages are countercyclical or procyclical depends on the extent of the shift in the labour demand and supply schedules during the spell of the business cycle. Early Keynesian thought postulates a stable labour demand schedule in the short run, and thus argues for countercyclical real wages. New Keynesian models with sticky wages can also generate real wages that vary inversely with output over the business cycle. On the other hand, real business cycle models with technology shocks, and the New Keynesian models with countercyclical mark-ups argue for procyclical wages.

Micro panel data based empirical evidence, which controls for compositional changes, supports more the view that real wages are procyclical. The evidence on real wage cyclicality is mostly documented for US.[1] This evidence points out to procyclical wages (see for example (Stockman, 1983; Coleman, 1984; Barsky and Solon, 1989; Solon et al., 1992; Pissarides, 2009) and countercyclical composition bias (Stockman, 1983; Barsky and Solon, 1989; Solon et al., 1992). Composition bias may arise due to changing skill quality of labour or, as first argued by Chirinko (1980), due to shift in economic activity among industries with different cyclical sensitivity. Countercyclical composition bias implies that skill quality of labour increases during downturns and decreases during upturns.

Abraham and Haltiwanger (1995) provide a thorough discussion of the micro data based analysis for US prior to 1995. Following these early studies, micro level analysis has been enriched along several dimensions. It has been argued that most of the procyclicality is due to

[1] Unless otherwise stated surveyed literature in the paper is on the US economy.

compensation (extras and bonuses) beyond straight time wages (see for example (Mather, 1987; Keane et al., 1988; Devereux, 2001; Swanson, 2007; Shin and Solon, 2007)). The variation of the wage response along the business cycle has also been analyzed. Martins (2007) for Portugal and Verdugo (2015) for the Eurozone points out to the fact that real wages tend to be more procyclical during downturns. Other dimensions studied include: the variation in wage response depending on workers mobility between jobs (see for example (Devereux, 2001; Shin and Solon, 2007; Carneiro et al., 2012; Martins et al., 2012); union membership (Grant, 2001); education status, income level and age (Swanson, 2007); gender (Solon et al., 1992) and race (Tremblay, 1990; Bils, 1985).[2]

There are few micro data based analysis on the wage structure in the Turkish economy. They estimate the association between wages and the unemployment rate focusing on the regional variation. Ilkkaracan and Selim (2003) and Konyali (2012) estimate a wage curve for Turkey. They find statistically significant negative correlation between wages and the regional unemployment rate. Similarly, using pooled cross section of household data and regional variation in the unemployment rate Baltagi et al. (2012) estimate a wage curve. In the follow up paper Baltagi et al. (2013) estimate wage curve for formal and informal workers separately. They find lower regional unemployment elasticity of real wages for the informal workers. Onaran (2002) estimates a wage equation using panel data at the industry level for the period 1963-1995, and finds that real wages were flexible during the post-1980 period characterized with growing integration with the world economy.

In this paper we investigate the cyclicality of real wages in Turkey using pooled four-year longitudinal micro data from the Survey on Income and Living Conditions (SILC) panels for the period 2006-2012. We estimate real wage cyclicality for full time employees and for subsamples including young, low educated workers, stayers and informal workers. To preview our findings, real wages in Turkey are quite procyclical. We estimate the elasticity of real wage to unemployment for all full time wage employees at around -0.8. This magnitude is close to those observed by Verdugo (2015) for the major Eurozone economies. There is significant countercyclical composition bias in the data. In line with the previous findings in the literature, compared to stayers, wage response of movers is much greater. Contrary to the findings of Swanson (2007) wages of low educated respond less to the cycle. Consistent with this finding, evidence suggests that adjustment along the wage distribution is not homogeneous. We find that wages at the low end of the wage distribution are acyclical and elasticity of wage growth increases as we move up the wage distribution. Moreover, wage cyclicality is lower for informal workers compared to formal workers. However the difference is statistically not significant. There is no significant difference between the wage response of young and old workers.

Our paper contributes to the literature in three ways. First, this is the first paper attempting

[2]Literature is discussed further in the results section.

to estimate wage cyclicality for Turkey using longitudinal micro data. As we will discuss, it is not possible to precisely identify the nature of wage cyclicality using aggregate data due to the presence of composition bias. Thus accounting for worker heterogeneity is crucial. With this study we bridge the gap on this issue. Second, the literature on real wage cyclicality is dominated by US evidence and there are limited number of papers for the other developed countries. We provide evidence from a developing country on the cyclicality of real wages and the composition bias. Third, real wage cyclicality has been studied on various dimensions but never for informal workers. We provide evidence on the informal wages.

The design of the study is as follows. In the next section, we present the data and some descriptive statistics. Section 3 explains our methodology, section 4 discusses the empirical results and section 5 concludes.

2 Data

The main data source in this study is the SILC published by Turkish Statistical Institute (TURKSTAT). SILC has a rotating panel structure. Each year, a quarter of the sample is replaced with new participants. Therefore, participants are surveyed in at most four consecutive years. We use SILC panel data sets between years 2006 and 2012. We only use the information of participants who were surveyed for at least 2 years. In the analysis, we exclude self-employed and unpaid family workers and only use observations of full-time wage earners.[3] As a result, we end up with an unbalanced panel of 37,581 observations.

In SILC, information on several income components, including wages, is collected on an annual basis, based on participant responses to income related questions in the questionnaire. The reference period for income is the previous calendar year of the survey. We compute real wages using the CPI of the respective reference year. Using the available data on the number of months spent in employment and usual weekly working hours we convert annual income into hourly wage. Wage here is the gross wage. Detailed decomposition of wages into net wage and extras are not available.

Even though the analysis period is short, it covers a full cycle and coincides with the Great Recession. The performance of the Turkish economy for the period under analysis can be separated into three phases (Figure 1, left panel). Prior to the financial turmoil, Turkish economy was characterized by high growth rates as a result of structural reforms in 2001 and the availability of global liquidity. The economy was hit by the financial turmoil with modest growth in 2008 and contraction in 2009. Nonetheless, the recovery was very fast; output gap returned to positive levels as of 2011 and remained positive afterwards. Likewise, the unemployment rate jumped in 2009 but declined rapidly afterwards to the pre-crisis levels.

[3] Full time wage earners refers to those working more than 35 hours per week.

Hence, although our sample is short, we have enough variation in the growth dynamics.

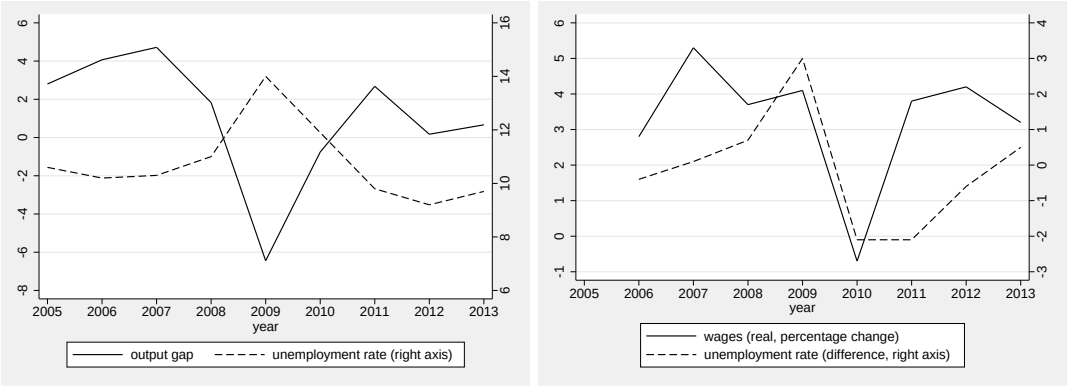

Figure 1: **Left panel: output gap and the unemployment rate. Right panel: Change in the unemployment rate and the hourly wage rate.** Source: TURKSTAT National Accounts and Household Labor Force Survey. Output gap is estimated using the HP Filter.

Average real wage and unemployment data of Household Labor Force Survey (HLFS) suggests no evidence of wage cyclicality (Figure 2, right panel). During the crisis years, average real wages kept on increasing at high rates despite the increase in the unemployment rate and declined in the early recovery period displaying a rather countercyclical pattern. However as we address in the following sections, this is an artifact due to the change in the composition of employees.

3 Econometric Model

Following Verdugo (2015), we estimate the relation between wages and unemployment rate with a fixed effects model. As in the previous studies, we use unemployment rate as a proxy of cyclical variations. The main parameter of interest is the coefficient of the unemployment rate. It is important to realize that unemployment rate is common in a year across all individuals. If errors are correlated within a year, then the estimate of the standard error of this coefficient would be biased. Solon et al. (1992) and Verdugo (2015) use a two-step methodology to cope with this bias. Unlike these studies we estimate the model in one step but instead we correct the standard errors for possible correlation. To do so, we use standard errors that are robust to clustering at a year level.[4] In summary, we estimate the following model

$$w_{i,t} = \beta_1 \cdot U_t + \beta_2 + \beta_3 \cdot Trend + \beta_4 \cdot Trend^2 + \alpha_i + \epsilon_{i,t}, \tag{3.1}$$

where $w_{i,t}$ is the logarithm of hourly real wage of individual i at year t and U_t is the un-

[4]Note that, consistency of clustered standard errors relies on the assumption that the number of years goes to infinity. Unfortunately, we have only seven years of observations.

employment rate at year t. In order to focus on the cyclical components of the wage and unemployment rate we include a quadratic time trend as in Solon et al. (1992). Individual fixed effects are captured by α_i and ϵ_{it} is an error term.

The OLS estimate of the equation 3.1 is subject to endogeneity bias. In order to have unbiased estimates in OLS, the individual fixed effects should be uncorrelated with the unemployment rate once observable individual characteristics are controlled for. This assumption is quite strong and is violated if individuals with lower wage profiles conditional on observed characteristics are more likely to become unemployed or leave the labor market. Therefore, reliable estimates can be obtained by utilizing a fixed effects panel data regression.

SILC has a rotating panel structure. Thus we have an unbalanced panel. However unbalanced nature of the panel that is due to rotation does not affect the consistency of our estimates. On the other hand, the unbalanced structure of our data can also come from sample attrition. If workers with low wage profile are more likely to drop out of the sample during periods of economic contraction (by either being unemployed or getting out of the labor force) then we might have a countercyclical wage bias. In the fixed effects regression, we are assuming that the probability of dropping out only depends on fixed individual characteristics (not time varying). In other words, we are assuming that the wage profile of individuals depend only on the fixed individual characteristics which are captured by α_i. Provided that this assumption is valid, our estimates are consistent (Cameron and Trivedi, 2005). Otherwise, they are downward biased. In summary, our results should be taken as a lower bound for the degree of wage cyclicality.

4 Results

In this section, we proceed with the estimation of equation 3.1.[5] The first column in Table 1, presents the OLS regression results of equation 3.1 without taking into account the panel dimension. We only include a quadratic time trend in the regression. This corresponds to the case of estimating wage response with the aggregate data. The coefficient estimate of the unemployment rate is positive and statistically significant. This is in line with the macro findings and earlier literature on the counter cyclicality of real wages. In column 2 , we present the results of fixed effects estimation of equation 3.1. In this case, the results show strong cyclicality of wages; a 1 p.p. increase in the unemployment rate is associated with a 0.775 p.p. decline in real wage growth.[6]

In summary, we find that real wages are sensitive to the state of the economy and the direction

[5] We also estimate the model in differences and obtain similar results.

[6] We also ran regressions using monthly wages in order to avoid any measurement error in the number of hours worked. The results do not change dramatically. OLS results with monthly wages point out to an acyclical wage response rather than a countercyclical response, suggesting that hours are procyclical. FE results with monthly wages gives a wage response similar in magnitude compared to the regression with hourly wages.

of response is procyclical. However, if we do not exploit the panel dimension of the data we cannot find a significant negative response of wages to unemployment.[7] These results suggest that monitoring aggregate wage data as a measure of demand pressures might be misleading for policy makers.

Dependent variable: real hourly earnings (natural log)		
	OLS	Fixed effect(FE)
Explanatory variables		
UR	0.525**	-0.775**
	(0.164)	(0.234)
# of Observations	37,581	37,581
R-squared	0.005	0.934

Table 1: **Real wage elasticity for the whole sample of fulltime employees**. ***, **, and * refer to 1 %, 5% and 10% significance levels respectively. Standard errors in the parenthesis are robust to clustering at a year level. All equations include a quadratic time trend.

Earlier studies find that procyclicality of wages may differ along several dimensions. First, wages may respond differently depending on whether the worker is mobile or not. Devereux (2001) states that procyclicality is lower for job stayers and even much lower for job stayers with no extra jobs. Using longitudinal data for Portugal, Carneiro et al. (2012) conclude that wages are procyclical and wage response of newly hired workers is slightly higher compared to existing workers. Findings that wages of movers have higher cyclicality have been criticized on the grounds that these people might be changing occupations along the cycle by moving to higher paying jobs in good periods and low skilled jobs in bad periods introducing a procyclical bias (Gertler and Trigari, 2009). Therefore, one should also control for the occupational changes. To confront this criticism, Martins et al. (2012), using data for Portugal, trace the wages paid to newly hired workers in a specific job and measure how these entry wages vary over the business cycle. And again entry wages response is found to be procyclical. Second, the direction and the magnitude of wage cyclicality may change across different subgroups. Swanson (2007) finds that wages of lower income, younger, and less-educated workers exhibit greater procyclicality in the US.

In line with the literature, we also estimate the cyclicality of wages across different subgroups using fixed effect regressions. Different subgroups cover; low vs. high skilled, young vs. old, informal vs. formal and job stayer vs. movers. Focusing on subgroups, we estimate four

[7]We ran OLS and FE models including control variables, namely industry and occupation fixed effects, gender, age and education group dummies, firm size, tenure, tenure squared and informal work dummy. Including controls in the OLS regression we obtain a negative coefficient estimate for the unemployment rate pointing out the pro cyclical nature of the real wages. However, the effect is smaller compared to FE estimation results. The drawback is that controls refer to the same year when the survey is conducted whereas reference period for income is the previous calender year. Hence using controls in a synchronized way shortens the period of analysis. We also observe that in the FE case including controls does not influence the results. Given that including controls has no impact in the FE case we continue the analysis without the controls.

equations using the following model

$$w_{i,t} = \gamma \cdot C_j + \beta_1 \cdot (U_t * C_j) + \beta_2 \cdot (U_t * (1 - C_j)) + \beta_3 \cdot Trend + \beta_4 \cdot Trend^2 + \beta_5 \cdot (Trend * C_j) + \beta_6 \cdot (Trend^2 * C_j) + \alpha_i + \epsilon_{i,t}, \quad (4.1)$$

where C_j is an indicator variable equal to one if individual belongs to $Category_j$ and zero otherwise. Subscript j stands for low skilled, young, informal and stayer. In the estimations we allow for different wage levels and trends within each category. The results are provided in Table 2. Accordingly, wages of low skilled workers are less procyclical than the wages of high skilled workers. Low skilled workers wages decrease by 0.58 as a result of a one p.p. decline in the unemployment rate whereas this decline is around 1 percent for high skilled workers. As depicted in the lower block of Table 2 the difference between these coefficients is statistically significant. Likewise in the formal-informal divide, informal workers (who are mostly low skilled) have lower wage cyclicality compared to formal workers although the difference is statistically not significant with a p-value close to 0.2. There is no difference between wage cyclicality of young and old. These results are in contrast with the earlier findings of Swanson (2007) who argues that wages of less skilled and younger workers have higher procyclicality. One possible explanation is that the less educated and informal workers experience more employment variation along the cycle and less variation in wages.[8] Another likely explanation is the binding minimum wage which we discuss below. Finally, we find that wages of job movers are much more procyclical then wages of stayers consistent with the literature.

As mentioned previously, based on an institutional analysis, labor market in Turkey is classified as rigid. On the contrary, the degree of wage flexibility points out to a flexible labor market similar to that in the European countries. Our results indicate that wages are less procyclical in Turkey with respect to US and UK but comparable with the estimates on Eurozone countries.[9]

From an institutional viewpoint labor market in Turkey is rigid mainly because of strict employment protection legislation and relatively high minimum wage (WorldBank, 2014). Minimum wage is binding in Turkey. Minimum wage to median wage ratio for the period under analysis is in the range of 70 to 80 percent (Gurcihan Yunculer and Yunculer, 2016).

Minimum wage is determined by a council composed of confederation of trade unions, confederation of employer associations and the government. As a third party, government has the

[8] De la Roca (2014) uses this argument for low level of wage cyclicality of women compared to men in Spain.

[9] Micro evidence for US point out to highly procyclical wages most of the time. In the empirical literature reported elasticities for all employees in US range between -0.7 and -2.4 (see Solon et al. (1992) and Pissarides (2009)). Same figure for UK is estimated to be around -1.7 in Devereux and Hart (2006). In a recent paper Verdugo (2015) estimates average elasticity for the eight Eurozone countries to be in the range of -0.6 to -1. (De la Roca, 2014) estimates an elasticity of -0.4 for Spain where labor market institutions are considered to be rigid.

Dependent variable: real hourly earnings (natural log)				
	$j = loweduc.$	$j = youth$	$j = informal$	$j = stayer$
Explanatory variables				
UR * $(Category_j)$	-0.581**	-0.840**	-0.547**	-0.516**
	(0.205)	(0.311)	(0.160)	(0.186)
UR * $(1 - Category_j)$	-1.01**	-.760**	-0.835**	-5.93**
	(0.280)	(0.212)	(0.254)	(1.650)
# of Observations	37,581	37,581	37,581	37,581
R-squared	0.934	0.934	0.934	0.936
Difference in response to UR				
$(Category_j = 1) - (Category_j = 0)$	0.427**	-0.0796	0.287	5.41**
	(0.154)	(0.175)	(0.205)	(1.540)

Table 2: **Cyclicality of Real Wages for Subsamples**. ***, **, and * refer to 1%, 5% and 10% significance levels respectively. Standard errors in the parenthesis are robust to clustering at a year level. Sample is restricted to wage earners that work more than 35 hours per week. In all estimations individual level data from SILC survey is used. Data is an unbalanced panel for the period 2006-2012. Low skilled refer to high school dropouts and below. Youth covers those between 15 and 30 years old. Stayers refer to employees that remain in the same job.

key role. Minimum wage applies nationwide; there is no differentiation by industry or region. Moreover, it is determined annually and announced at the end of the previous year.

Given that minimum wage is set exogenously, we would expect lower cyclical wage response for workers who earn around the minimum wage. To test this hypothesis, we estimate wage cyclicality along the (lagged) wage distribution. We partition the sample into four groups; workers who earn less than 80 percent of the minimum wage constitute group 1, workers who earn between 80 percent and 120 percent of the minimum wage constitute group 2, workers who earn between 120 percent and 300 percent of the minimum wage constitute group 3 and workers who earn more than 3 times the minimum wage constitute group 4.

The results show that wages around and below the minimum wage are acyclical and wage cyclicality comes from workers that earn more than the minimum wage (Table 3). Acyclical nature of wages for those who earn less than the minimum wage is not surprising since minimum wage is used as a reference for determination of wages of low income workers even if they work informally.[10] Another explanation might be that, measurement errors in wages and the hours worked for those workers are larger than the average workers. As we move up the wage distribution wages become more procyclical. Hence, we can argue that binding minimum wage suppresses wage cyclicality in Turkey. This result also suggests that minimum wage might be another explanation of lower wage cyclicality of low skilled workers, whose wages are more

[10]This is in line with the previous findings on the impact of the minimum wage (Gurcihan Yunculer and Yunculer, 2016; Khamis, 2013). A considerable share of workers in our sample (8 percent) earn well below the minimum wage due to informality.

Dependent variable: real hourly earnings (natural log)				
	Group 1	Group 2	Group 3	Group 4
	$w \leq minw * 0.8$	$minw * 0.8 < w \leq minw * 1.2$	$minw * 1.2 < w \leq minw * 3$	$w > minw * 3$
Explanatory variables				
UR	-0.354	0.0139	-0.892**	-1.40***
	(2.69)	(1.69)	(0.283)	(0.318)
# of Observations	1,580	3,508	9,031	5,506
R-squared	0.926	0.893	0.914	0.923

Table 3: **Cyclicality of Real Wages along the Wage Distribution** . ***, **, and * refer to 1 %, 5% and 10% significance levels respectively. Standard errors in the parenthesis are robust to clustering at a year level. Sample is restricted to wage earners that work more than 35 hours per week. In all estimations individual level data from SILC survey is used. Data is an unbalanced panel for the period 2006-2012. All equations include a constant and a quadratic trend. *minw* is an abbreviation for the minimum wage.

likely to be close to the minimum wage.

The degree of wage flexibility for the high wage groups is close to those documented for non-rigid labor markets. For wages above the minimum wage, elasticity ranges from -0.9 to -1.4. Why might this be the case? One likely explanation is the high informality rate. Informality rate in Turkey is quite high compared to developed countries which might neutralize the effects of rigid labor market institutions.[11] Existence of the option of hiring workers informally [12] might reduce the bargaining power of formal workers as well, which might reduce the downward stickiness of wages (Onaran, 2002). Hence, during downturns firms will be more flexible to lower wages of informal workers directly and formal workers indirectly through the threat of informality which in turn increases the procyclicality of wages.[13] But this might partially account for high wage cyclicality as informality is low among workers in the highest income group. Another possible explanation might be that employment protection through high severance payments as might be expected introduces employment rigidity but no wage rigidity.

5 Conclusion

In this paper, we estimate the degree of real wage response to the business cycle in Turkey using individual level panel data for the recent period 2006-2012. Empirical literature on wage cyclicality has focused on developed countries. We extend the literature with a developing country example.

[11] Around thirty percent of Turkish economy is estimated to be informal in 2007. This share doubles that of the OECD average (Schneider et al., 2010)

[12] Informal work refers to working without being registered with a social security institution.

[13] It would be an interesting exercise to check whether the overall cyclicality comes mainly from downturns or upturns. However, we do not have a long data set to do this exercise. Verdugo (2015) finds that wage cyclicality is higher in downturns, suggesting that most of the wage cyclicality is due to downturns.

Our results suggest that there is significant countercyclical composition bias inherent in the aggregate data and that wages in Turkey are procyclical when compositional changes during the cycle are accounted for. Results are reversed if we do not take into account worker heterogeneity. Therefore, macroeconomists and policy makers should consider the fact that aggregate wage figures might be misleading as a measure of demand pressure in the economy. For all employees 1 p.p. increase in the unemployment rate is associated with a 0.8 p.p. decline in real wage growth. Wage elasticity increases up to -1.4 for the high end of the wage distribution.

Looking at subgroups, we find that wages of low skilled workers are less responsive to unemployment, opposed to earlier findings. Higher degree of employment responsiveness of these groups and binding minimum wage might be the factors behind this result. Finally, in line with the previous literature, wages of job movers are strongly more procyclical compared to stayers.

It could be expected that wage response to business cycle to be low in Turkey as labor market institutions are considered to be rigid mainly due minimum wage and employment protection through high severance payments. Wage response at the low end of the wage distribution is consistent with this foresight. Wages are acyclical for low wage workers reflecting binding minimum wage. However, our findings suggest that overall, the degree of wage responsiveness is comparable with that of the European average. One possible explanation is that high level of informality reduces wage rigidity in the Turkish labor market. The impact of informality deserves further investigation with a wider data set covering many countries that vary in this respect. Another likely explanation is that high severance payments introduce employment rigidity rather than wage rigidity.

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