

# THE FORMAL/INFORMAL EMPLOYMENT EARNINGS GAP: EVIDENCE FROM TURKEY\*

**Short Title:** Formal/Informal Earnings Gap

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## Abstract

This study investigates the formal/informal employment earnings gap in Turkey. We further examine the extent of earnings differentials that can be explained by observable characteristics and unobservable time-invariant individual heterogeneity. First, we estimate the standard Mincer earnings regressions using ordinary least squares (OLS), controlling for individual, household and job characteristics. In order to account for unobserved factors which might affect the earnings and the intrinsic heterogeneity within formal and informal sectors, panel data and the quantile regression (QR) technique are used. OLS results confirm the existence of an informal sector penalty almost half of which is explained by observable variables. We find that formal-salaried workers are paid significantly higher than their informal counterparts and of the self-employed confirming the heterogeneity within the informal employment. QR results show that pay differentials are not uniform along the earnings distribution and that in contrast to the mainstream literature which views informal self-employment as the *upper-tier* and wage employment as the *lower-tier*, the lower-tier informal employment corresponds to self-employment in the Turkish labor market. Finally, fixed effects regression estimation indicates that unobserved individual fixed effects combined with controls for observable characteristics explain the pay differentials between formal and informal employment entirely.

**Keywords:** Earnings gap; formal/informal employment; labor market dynamics; panel data; Turkey.

*JEL Classification:* J21, J31, J40, O17

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## 1. Introduction

Informal employment has traditionally been associated with inferior earnings, wage inequality and poverty in the mainstream literature. The traditional segmented labor markets theory explains this by positing that labor informality is nothing but a survivalist alternative for those rationed out of formal jobs (Fields, 1975; Mazumdar, 1976; Bernabe, 2002; Perry et al., 2007). Therefore, in a segmented labor market informal workers are subject to lower remuneration than similar workers in the formal sector, where wages are set above market clearing levels for institutional or efficiency-wage reasons (Günther and Launov, 2006). On the other hand, competitive labor markets theory argues that informal employment may equally well be voluntary based on private cost-benefit calculations of individuals and firms (Magnac, 1991; Pradhan and van Soest, 1995; Marcoullier et al., 1997; Maloney, 1999). In a competitive market setting, formal/informal pay inequalities tend to disappear, especially when compensating differentials are accounted for. In contrast to these two polar views, a third view originated by Fields (1990), postulates a heterogeneous informal sector consisting of an *upper-tier* which include those who are voluntarily informal; and a *lower-tier* which include those who cannot afford to be unemployed but have no hope of finding a formal job (Cunningham and Maloney 2001; Fields 1990, 2005; Henley et al., 2009). In this setting, the commonly accepted assumption is that the upper-tier often corresponds to self-employment, whereas the lower-tier segment consists mostly of informal wage workers.

In this study, we aim to discuss the relevance of these theories to the Turkish labor market using the formal/informal employment earnings differentials. Indeed, there exists an ample empirical

literature which purports to test the theory using estimation of formal/informal earnings gap. However, as with the theory, empirical evidence to date also seems to be mixed and inconclusive. Confirming the traditional segmented labor markets theory, most early studies find that formal sector workers are better rewarded for their earning-relevant characteristics than their informal sector counterparts (Mazumdar, 1981; Heckman and Hotz, 1986; Roberts, 1989; Pradhan and Van Soest, 1995; Tansel, 1999, 2000, 2001; Gong and Van Soest, 2002; Badaoui et al., 2008; Arias and Khamis, 2008). In contrast, several recent studies report that wage differentials between formal and informal sector may not be a stylized fact. For example, Pratap and Quintin (2006) find no difference between formal and informal earnings in Argentina after controlling for individual and employer characteristics. Also, Tannuri-Pianto and Pianto (2002) show that at high quantiles of the earnings distribution, the differences in returns to skills completely disappear in the Brazilian labor market.

Against this background, our motivation is to complement the existing literature by examining the earnings performances of formal and informal workers in Turkey. Given its demographic and economic dynamics, Turkey provides rich evidence for a large and heterogeneous informal labor market. A comprehensive diagnosis of pay differentials, its underlying factors and detailed decompositions across individual and job characteristics are of great importance in a developing country context. First and foremost, informal labor accounts for a substantial share of both urban and rural employment in most developing countries.<sup>1</sup> According to the Turkish Statistical Institute (TurkStat), the share of informal employment in the Turkish labor market stands high at 38.4 percent as of January 2012 (TurkStat, 2012). Evidently, an improved understanding of the

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<sup>1</sup> According to the International Labor Organization (ILO), informal employment accounts for one-half to three-quarters of nonagricultural employment in the developing countries: 48 percent in North Africa, 51 percent in Latin America, 65 percent in Asia, and 72 percent in Sub-Saharan Africa (ILO, 2002).

formal/informal pay gap is crucial for addressing its welfare, equity and poverty consequences. Second, the earnings gap is commonly used to test for the existence of segmented versus competitive labor markets. Large differentials are viewed as an evidence for institutional rigidities in the labor markets, thereby suggesting need for policy action. Third, disentangling the dynamics of formal/informal pay gap across wage-employment versus self-employment and along various quantiles of the earnings distribution enables addressing the heterogeneity within formal and informal sectors which is often an important issue in such earnings analyses.

We employ rich panel data and recently developed econometric methodologies to examine the following research questions: (1) Is there a formal/informal employment earnings gap in Turkey which implies the presence of segmentation in the Turkish labor market? (2) Is there an informal sector earnings penalty?? (3) How does the earnings distribution across formal and informal sectors alter when employment is further broken down into wage-employment and self-employment, i.e. formal wage workers, formal self-employed, informal wage workers, informal self-employed? (4) What are the main individual, household and employment characteristics driving the formal/informal earnings gap? (5) How does the formal/informal wage gap change across the quantiles of the earnings distribution? (6) To what extent can earnings differentials be explained by observable characteristics and unobserved time-invariant individual heterogeneity?

The empirical analysis consists of examining the earnings differentials along multiple dimensions, disentangling at formal/informal employment, wage/self-employment and mean/quantiles of the earnings distribution. First, we estimate standard Mincer earnings regressions at the mean using ordinary least squares (OLS), controlling for a rich set of

individual, household and job characteristics. However, as pointed out in several earlier studies, one must account for unobserved factors that are likely to affect the earnings and intrinsic heterogeneity within formal and informal sectors. To address the first one, we make use of the panel nature of the data, apply fixed effects estimation, thereby account for the time-invariant unobservables that may affect pay differentials. For the latter, we rely on quantile regression (QR) estimation which allows for a distributional analysis of the pay gap at various points of the earnings distribution, thereby acknowledging potential structural heterogeneity within sectors. The analysis is based on micro level panel data from the TurkStat Income and Living Conditions Survey (SILC) for the 2006-2009 period. To the best of our knowledge, this study will be the first to use the SILC data and its panel feature for analyzing formal/informal earnings gap.

The results reveal several important patterns. First, OLS in levels estimation of standard Mincer type earnings equations confirms the existence of an informal penalty, but also shows that almost half of this penalty can be explained by observable characteristics. Regarding formal/informal pay differences along wage/self-employment divide, formal-salaried workers are paid significantly higher than their informal counterparts. Moreover, self-employed are found to be subject to lower remuneration compared to those who are salaried which confirms the heterogeneity within informal employment. The quantile regression (QR) results show that pay differentials are not uniform along the earnings distribution, i.e. informal penalty decreases with the earnings level. A particularly important finding is that, in contrast to the mainstream literature which views informal self-employed as the *upper-tier* and wage earners as the *lower-tier*, the lower-tier informal employment corresponds to self-employment in the Turkish labor market. Finally, fixed effects regression estimation indicates that unobserved individual fixed

effects combined with controls for observables explain the pay differentials between formal and informal employment entirely.

The remainder of the paper is organized as follows: Section 2 describes the data and definition of the main variables used in the study along with a brief discussion of summary statistics. The econometric methodology and models are presented in Sections 3, and estimation results are reported in Section 4. Finally, Section 5 provides a summary of the main findings and conclusions.

## **2. The Data and Summary Statistics**

The data set used in this analysis is drawn from the Income and Living Conditions Survey (SILC), which has been conducted by the Turkish Statistical Institute (TurkStat) since 2006. The novel, nationally representative, rich, panel nature of the survey makes it unique for the aim and methodology of the study. The survey results are only recently released in micro data sets, thus to our knowledge have not yet been used in any other study.

SILC is designed as a rotating panel in which the sample of households and corresponding individuals are traced annually for four years. For the specific aim of the study, we use the panel samples which are modified in a way to comprise only the labor force between 15-64 years of age who are present in at least two consecutive years. This selection leaves an unbalanced panel of 6154 individuals who are present for two years; 3,910 individuals for three years; and 1394 individuals for four years. Excluding the cases with missing values for focal variables results in a sample of 23,668 observations. The empirical analysis is based on this pooled sample of two,

three and four year panel observations.

The SILC questionnaire allows us to decompose employment into employed/non-employed, salaried/self-employed and formal/informal. Along these lines, we identify four different labor market states: formal-salaried, informal-salaried, formal self-employed and informal self-employed. The questionnaire explicitly asks individuals whether they are registered at the Social Security Institution for their main job. Accordingly, employees working for a wage/salary are defined as formal-salaried if they are registered at the Social Security Institution for their current job, and informal-salaried if they are not. Own-account workers form the self-employed category, which is further divided into formal self-employed if registered at the Social Security Institution and informal self-employed if not. We exclude unpaid family workers whose earnings are difficult to measure and employers for whom the number of observations is insufficient to perform any reasonable analysis. By disaggregating the labor force into multiple subcategories, we are able to scrutinize the earnings gap across multiple dimensions.

As for the second important variable in the study, namely remuneration, SILC survey provides detailed information on individuals' annual income, months and hours worked on the main job. We construct our dependent variable, log real hourly earnings, first by calculating the hourly earnings then deflating it by 2006 Turkish Consumer Price Index (CPI). An advantage of SILC questionnaire is that wage earners and self-employed are asked different questions regarding their annual income, therefore measurement error in the analysis can be assumed as negligible. The reported earnings are net of taxes, thus we do not have to account for any overestimation that may stem from formal sector earnings being subject to tax deduction.

The data set also includes rich information on other variables that are associated with the level of earnings. For presentational brevity, we group these variables into three categories as individual, household and job characteristics. Accordingly, individual characteristics include gender, age, education; household characteristics include household size, marital status, whether the household have children, household head status, whether there is a formal worker in the household; and finally job characteristics comprise sector of economic activity, occupation, firm size and part/full-time status. A comprehensive list of variables used in the analysis and their definitions are provided in Appendix Table A.1.

Table 1 presents summary statistics of the main variables used in the analysis. The statistics are reported separately for the subsamples of formal and informal employment broken down into wage/self-employment. At first sight, the results clearly reveal a sizable earnings gap where earnings of formal workers are almost three times that of informal workers'. Moreover, when the gap is decomposed into wage/self-employment, we observe that wage employees earn more on average than the self-employed.

The gender variable implies that male workers dominate employment in all types. Females constitute only one fifth of each group of employment, except for the informal wage work category. In terms of age, we see that formal workers are on average younger than informal workers. Also notable, formal self-employed workers are mostly in the younger age groups, whereas informal self-employed workers tend to concentrate in the older age groups.

Education exhibits a positive (negative) relationship with formal (informal) employment. On average, formal workers are better educated than informal workers; especially those in wage employment. More specifically, almost 50 percent of those who are formally employed have a high school or above degree, whereas it remains at only 13 percent for informal employees. Considering the wage/self-employment divide, the self-employed tend to have significantly lower levels of education compared to wage workers. As for experience, the results reveal that informal workers have on average more years of experience in the labor market, especially those who are informal self-employed.

In terms of the household characteristics, summary statistics demonstrate that employment in all types are dominated by those married and have children. Being head of the household displays a stronger association with informal workers, whether wage or self-employed. Household size does not show any differentiable pattern.

Proceeding with employment characteristics, an initial look at the sector summary statistics displays two notable patterns. First, agricultural employment mostly prevails as informal self-employment and second, manufacturing is predominantly a formal sector. Except for these two large sectors, distribution of formality is quite dispersed for the other sectors. Specifically, informal employment is larger in construction and trade, whereas formal workers are often concentrated in energy, public administration and education. Across the wage/self-employment divide, a few points are worth to mention. Formal employment in construction and agriculture sectors, though only minimal when compared to that in informal employment, prevail mostly in the form of self-employment. The distribution of formality across different occupations does not

indicate any noticeable pattern. We also observe that informal employment is concentrated mostly in small firms; as compared to formal employment which is predominantly present in large firms. Finally, part-time job holders seem more likely to be informal.

Summary statistics, overall, indicate that formality/informality of jobs is associated with several observed and unobserved characteristics and is unlikely to be randomly assigned across different employment types. From an empirical standpoint, this fact constitutes the main challenge in estimating the existence of an earnings gap between the two sectors. In order to deal with such a potential sample selection bias, as it is called, we exploit the panel nature of the data to account for time-invariant unobservable effects and a rich set of individual and job characteristics as explanatory variables to control for the observable effects.

### **3. Empirical Methodology**

The main challenge in earnings gap analysis is to control possible sample selection bias which may result from either self-selection of individuals into different employment types or non-participation based on own cost-benefit calculations, or some methodological selection of researchers. In order to refrain from a selection bias associated with selection into employment or non-participation, we restrict our sample into employed individuals, following recent studies which take the same approach such as Bargain and Kwenda (2010) and Badaoui et al. (2008). Once an individual is employed, however, there is another potential selection bias which involves selection into different types of employment. Indeed, there are several observable and unobservable factors which affect both selection decision and the level of earnings. As shown in the summary statistics, formal and informal workers are not only different in terms of

remuneration, but also of personal and job characteristics. To this end, we take advantage of the rich information in the data set and control for several observable individual, household and job characteristics in the estimations. Whereas, for the unobservables, we rely on the panel nature of the data which enables isolating the time-invariant individual fixed effects, and thereby alleviates some of the concern regarding their influence on one's earnings. For gender-specific selection issues, we perform all estimations separately for male and female samples.

Following this line of approach, our empirical strategy consists of estimating the two different specifications of the formal/informal earnings gap, one at formal/informal divide and the other at the wage/self-employment divide, using OLS, quantile and fixed effects regressions. In this way, we are able to disentangle earnings differentials not only across formal/informal employment, but also across wage/self-employment and along different points of the earnings distribution.

The analysis is based on the seminal human capital earnings model of Mincer (1974). The model postulates that three main determinants of individual wages are education, work experience and its square. As with most studies, we extend the model by including a number of variables which are frequently used in the empirical literature to explain returns to human capital characteristics and earnings of individuals. In order to estimate the formal/informal earnings gap, we specify the following Mincer earning models:

$$w_{it} = \alpha + \beta I_{it} + \gamma X_{it} + \varepsilon_{it} \tag{1}$$

where  $i = \{1, \dots, N\}$  represents individual units and  $t = \{1, \dots, T\}$  time periods. The dependent

variable  $w_{it}$  refers to the log real hourly earnings;  $X_{it}$  denotes the set of individual, household and job characteristics of individual  $i$  observed at time  $t$ .<sup>2</sup> The different covariates include hours worked per week, experience, gender, age, education, household size, household head status, presence of children in the household, presence of a formal worker in the household, marital status, economic sector, occupation, firm size and part/full-time job status. The dummy variable  $I_{it}$  takes the value of one if individual is informal and zero otherwise. The estimated coefficient  $\hat{\beta}$  will be used to test whether there exists a wage penalty/premium for informal employment.

In the same manner, we then extend the analysis into wage/self-employment divide, in order to account for the heterogeneity within the formal and informal sectors. As defined in the previous section, we consider four employment types, and create a dummy variable for each as:  $FS_{it}$  for the formal-salaried;  $IS_{it}$  for the informal-salaried;  $FSE_{it}$  for the formal self-employed and  $ISE_{it}$  for the informal self-employed. For this empirical specification, we take the reverse approach to identify the informal-salaried as the base category. Along these lines, the extended model can be formulated as:

$$w_{it} = \alpha + \beta FS_{it} + \theta FSE_{it} + \delta ISE_{it} + \gamma X_{it} + \varepsilon_{it} \quad (2)$$

The estimated coefficients  $\hat{\beta}$ ,  $\hat{\theta}$  and  $\hat{\delta}$  are interpreted as the conditional earnings gap between the informal-salaried workers and formal-salaried, formal self-employed, informal self-employed workers, respectively.

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<sup>2</sup> For the definitions of the set of individual, household and job characteristics that are represented by  $X_{it}$ , see Appendix Table A.1.

First, standard earnings equations are estimated at the mean using OLS in levels on a pooled sample of workers over years. For this particular estimation, we specify the following wage equations:

$$w_{it} = \alpha + \beta I_{it} + \gamma X_{it} + \pi.time + \varepsilon_{it} \quad (3)$$

$$w_{it} = \alpha + \beta FS_{it} + \theta FSE_{it} + \delta ISE_{it} + \gamma X_{it} + \pi.time + \varepsilon_{it} \quad (4)$$

We start by estimating equations (3) and (4) using only the employment type dummies (i.e. formal or informal) and year dummies. A year dummy is intended to capture all effects that are common at a given point in time. However, as displayed in summary statistics, formality of jobs is related to several observable individual and job characteristics. Following this manner, we proceed the estimation by first including individual and household characteristics, then further extending it by introducing job characteristics. In this way, we aim to understand the extent to which observable characteristics explain the average earnings gap across formal/informal employment. Moreover, we conduct the analysis not only for the total sample, but also for male only and female only samples in order to take into account of the gender dynamics.

Considering the fact that estimations at the mean might conceal important information, we rely on quantile regressions (Koenker and Bassett, 1978) to estimate earnings gap on the pooled sample. Quantile estimation, as put by Nguyen et al. (2011), enables analyzing the earnings gap at different points of the earnings distribution. In this way, we aim to capture the heterogeneity in returns to observed characteristics along the conditional quantiles of the earnings distribution. We apply the following QR models which specify the  $q$ th conditional quantile of the log real

hourly wage ( $w_{it}$ ) distribution for individual  $i$  at time  $t$  as:

$$q_{\rho}(w_{it}) = \alpha_{\rho} + \beta_{\rho}I_{it} + \gamma_{\rho}X_{it} + \varepsilon_{it}, \quad \rho \in (0,1) \quad (5)$$

$$q_{\rho}(w_{it}) = \alpha_{\rho} + \beta_{\rho}FS_{it} + \theta_{\rho}FSE_{it} + \delta_{\rho}ISE_{it} + \gamma_{\rho}X_{it} + \varepsilon_{it} \quad (6)$$

where the set of coefficients demonstrate the estimated returns to the covariates at the  $\rho$ th quantile of the log real hourly wage distribution. In particular,  $\gamma_{\rho}$  in both QR specifications depict the effects of changes in the set of individual and job characteristics on the  $\rho^{\text{th}}$  quantile of  $w_{it}$ . In model (5),  $\beta_{\rho}$  measures the extent to which informal employment wage penalty/premium vis-à-vis formal employment wage remains unexplained at the various quantiles after controlling for individual and employment characteristics. Whereas, in model (6),  $\beta_{\rho}$ ,  $\theta_{\rho}$  and  $\delta_{\rho}$  refer to the earnings differentials at the  $\rho^{\text{th}}$  quantile between informal-salaried workers and formal-salaried, formal self-employed and informal self-employed workers, respectively. The quantile regression coefficients in model (5) and (6) are straightforward to estimate by minimizing:

$$\min_{\beta, \gamma} \left[ \sum_{i:w_{it} \geq \alpha + \beta I_{it} + \gamma X_{it}} \rho |w_{it} - \alpha - \beta I_{it} - \gamma X_{it}| \right. \quad (7)$$

$$\left. + \sum_{i:w_{it} < \alpha + \beta I_{it} + \gamma X_{it}} (1 - \rho) |w_{it} - \alpha - \beta I_{it} - \gamma X_{it}| \right]$$

Having controlled for several observable characteristics by using OLS and quantile regressions,

we next exploit the panel nature of the data set and estimate Fixed Effects OLS regressions.<sup>3</sup> In this way, we are able to account for the time-invariant unobservable factors that may be obscuring more accurate measures of the earning differentials. The FE models can simply be written as:

$$w_{it} = \alpha_i + \beta I_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it} \quad (8)$$

$$w_{it} = \alpha_i + \beta FS_{it} + \theta FSE_{it} + \delta ISE_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it} \quad (9)$$

where  $E[\varepsilon_{it} | \mu_i, X_{it}, I_{it}] = 0$  for all individuals  $i$  and periods  $t$ . In this panel specification,  $\mu_i$  denotes the time-invariant unobserved individual fixed effects and  $\varepsilon_{it}$  is normally i.i.d. stochastic term absorbing the measurement error. In model (8), the estimated coefficient  $\hat{\beta}$  measures the conditional informal employment earnings premium/penalty vis-à-vis formal employment. As follows, coefficient estimates  $\hat{\beta}$ ,  $\hat{\theta}$  and  $\hat{\delta}$  in the model (9) can be interpreted as the conditional earnings gaps between informal-salaried workers and respectively, formal-salaried, formal self-employed and informal self-employed workers.<sup>4</sup>

Before proceeding to estimation results, a few empirical points should be addressed. First and foremost, the issue of selection into employment is often accepted to be crucially important in such analysis. In order to alleviate potential sample selection bias, we restrict our sample to employed individuals as done in several other studies. Also taking account of the intrinsic

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<sup>3</sup> The choice of Fixed Effects panel specification over Random Effects panel specification is made based on the Hausman Test, the results of which imply that Fixed Effects is more appropriate given our data.

<sup>4</sup> For identification of these conditional earnings gaps, we verify that there is a sufficient number of *movers* in the sample who change their employment states over time as well as *stayers* who remain in their state.

differentials in male and female labor force participation rates, we run our estimations separately for male and female subsamples. And most importantly, we assume that the panel nature of the data which allows controlling for time-invariant unobservables affecting earnings also controls for selection. Finally, we define our dependent variable as the log real hourly earnings, i.e. real hourly wage rates for the wage workers and their equivalent for the self-employed.

## **4. Estimation Results**

### **4.1. Pooled Ordinary Least Squares (OLS) Estimation of the Earnings Gap**

#### **4.1.1. Across Formal/Informal Employment**

First, we estimate the formal/informal employment earnings gap using OLS in levels. We begin with a model which includes only the informal worker dummy and year dummies. The results, reported in the first column of Table 2, indicate a significant wage penalty for informal employment amounting to 53.9 percent. However, as we have mentioned previously, differences in earnings can be attributed to several observable and unobservable factors. Following this line of thought, we introduce a number of individual and household characteristics into the earnings model, and re-estimate the earnings gap. The results, given in the second column of Table 2, show that informal earnings penalty indeed decreases considerably to 31.8 percent, implying that almost half of the earnings differences between formal and informal employment can be explained by the observable individual and household characteristics. Further extending the model by incorporating the job aspects, we detect a still significant but further lower informal

earnings penalty of 21.5 percent. In brief, OLS analysis confirms the existence of an informal sector earning penalty, but also shows that more than half of this pay difference is explainable by observable factors.

When we re-estimate OLS in levels separately for male and female subsamples<sup>5</sup>, we see that female workers suffer a substantially higher level of informal earnings penalty. More specifically, we find that the raw earnings penalty stands at -0.707 for female subsample, whereas it is quite lower at -0.505 for the male sample. When controlled for individual and household characteristics, despite decreases in magnitude, there still remains a considerable unexplained informal pay penalty of 25 and 45 percent for males and female workers, respectively. Put differently, women still appear to experience a wage penalty almost twice of those born by male workers. This finding suggests that returns to personal attributes constitute an important determinant of male workers' earning differentials, whereas for female workers they are less significant. This result may be interpreted as a reflection of discrimination against women. However, once all observable characteristics are introduced into the model, the negative informal premium for females also falls substantially, and becomes almost equal to that for male workers. This finding may be a reflection of the fact that women are mostly employed in jobs which are intrinsically informal in its nature.

#### **4.1.2. Across Formal-Salaried, Informal-Salaried, Formal Self-employment and Informal Self-employment**

A further breakdown of the formal/informal earnings gap including salaried/self-employment

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<sup>5</sup> See Table 2 columns (4) through (9).

divide is expected to disseminate a more detailed portray given that both of these sectors embody sizable heterogeneity. For this analysis, however, we choose to identify informal-salaried workers as the base category and interpret the estimation results accordingly. The implications of the results do not change.

Considering the raw earnings differentials, estimation results in the first three columns of Table 3 confirm the traditional theory that informal-salaried workers on average earn significantly less than those who are formally employed, whether salaried or self-employed. In particular, wage workers who are formally employed earn approximately 56 percent higher than those who are informally employed. Once controlled for personal attributes, as reported in column two of Table 3, formal premium decreases to around 30 percent, but still remains to be significant. With the introduction of job characteristics, formal/informal wage differentials exhibit a notable fall down to 18 percent. Overall, the results suggest a positive pay premium for formal wage workers compared to their informal counterparts. This evidence is in line with the conventional wisdom that informal wage employment is on average subject to lower remuneration.

An interesting result can be observed for the earnings differentials of informal-salaried and formal self-employed. In particular, the size of earnings gap, which is around 32 percent, appears to remain robust against the inclusion of additional explanatory variables. Put differently, personal and job characteristics explain the pay differences to only a minimal extent. This finding is mostly likely the result of informal-salaried and formal self-employed jobs and workers being utterly different in nature, thereby rendering the earnings gap unexplained.

Also noteworthy is the comparison of the earnings gap between different types of informal employment. As per se, informal self-employed are observed to be significantly worse-off than informal-salaried workers but only when individual and job characteristics are introduced to the Mincer equation. Indeed, the initial raw estimate though having a negative is not significant, but becomes significant as observables are controlled for. To this end, one can claim that informal-salaried workers on average have better observable characteristics than their self-employed counterparts, and once returns to these attributes are considered they are in fact significantly lower paid.

We next replicated our analysis separately for the male and female subsamples. We find that the picture somewhat alters but the changes are mostly limited to earning differentials within informal employment itself. In particular, pay gap between informal wage and self-employment is almost insignificant for male workers. Whereas for the female subsample, the coefficient of informal self-employment is highly significantly negative under all specifications of the model. In particular, informal self-employed female workers are paid around 40 percent less than their salaried counterparts. It is also interesting to note that the earnings penalty increases sharply to 70 percent if individual and household effects are controlled. This finding implies the monetary returns to similar personal attributes being considerably lower in informal self-employment compared to informal wage employment. The penalty falls back to 40 percent when job attributes are also incorporated into the model. Overall, these results indicate that females are more prone to hold lower-tier informal jobs which have inferior earnings in contrast to males clustering at higher-tier informal jobs where pay differentials between wage/self-employment are insignificant.

## **4.2. Pooled Quantile Regression (QR) Estimation of the Earnings Gap**

### **4.2.1. Across Formal/Informal Employment**

Estimations at the mean are generally insufficient when covariates affect not only the location of the conditional distribution of wages, but also its dispersion. Therefore, one has to go beyond a simple mean estimation model and apply quantile regression for a more comprehensive and informative analysis. Along these lines, we extend the empirical analysis by estimating conditional quantile regression (QR), as given in equations (5) and (6), on the pooled sample. This exercise allows for tracking the earnings gap along various conditional quantiles of the earnings distribution, thereby unveil more complex dynamics pertained to pay differentials.

The quantile regression estimates, reported in Table 4, depict that informal employment earnings penalty is larger at lower quantiles but decreases significantly in higher quantiles, after controlling for several observable individual and job characteristics. In particular, the coefficient of informal variable which is -0.593 in the 5<sup>th</sup> quantile gradually falls as we move along the distribution and eventually emerges as insignificant around 90<sup>th</sup> quantile. More interestingly, the informal earnings gap becomes significantly positive at the top quantile. The large earnings penalty in the lower quantiles may be thought of as affirming the traditional segmentation theory which views informal employment as an inferior state. However, confirming the basic premise of a heterogeneous informal sector, the earnings gap is in fact not uniform along the distribution and turns into a premium at the top. The last finding reveals that upper-tier informal jobs which are voluntarily chosen by workers given their preferences, personal attributes and competing

earning prospects are concentrated in the upper income levels. In order to further scrutinize the underlying dynamics of these findings, we will re-estimate the earnings gap considering not only formal/informal but also wage/self-employment divide in the following section.

The results of the gender decomposition of the QR are qualitatively similar to the analysis of the entire sample and changes are quantitatively small. The estimation results for male and female subsamples are presented respectively, in Tables 5 and 6. More specifically, both female and male informal workers are found to experience significant earnings penalties at the lower quantiles. One also notes that formal/informal earnings differences for female workers become insignificant at the 75<sup>th</sup> quantile and display a significantly positive sign at the top quantile. Whereas for male workers, the informal sector penalty disappears at the 90th quantile and is statistically insignificant afterwards. This is a particularly interesting result since it shows that upper-tier informal jobs are considerably and in relative terms more rewarding for female workers.

#### **4.2.2. Across Formal-Salaried, Informal-Salaried, Formal Self-employment and Informal Self-employment**

A further breakdown of formal/informal earnings gap by incorporating wage/self-employment dimension empowers a more thorough examination. The first row in Table 7 confirms the conventional wisdom that within salaried employment, formal workers have significantly higher earnings than informal workers, given identical personal and establishment characteristics. However, this formal sector premium for salary workers decreases gradually with the earnings

level, and eventually becomes negative at the top. The results point to the dual nature of informal sector, with upper-tier jobs carrying an earnings premium that may compensate the benefits of formal wage work and lower-tier jobs being largely penalized. One may also claim that formal-salaried workers have better unobservable skills compared to their informal counterparts considering the fact that results are obtained by controlling for only observable characteristics. To further investigate this, we will next apply the fixed effects estimation to earnings gap which allows for controlling unobservable heterogeneity.

Turning to earnings differentials between formal self-employed and informal-salaried workers, as reported in the second row of Table 7, we detect a significantly positive gap at all quantiles. Put differently, formal self-employed are better-off along the whole distribution, though size of their earnings premium falls with increased income levels. This finding may be due to either better unobserved skills of formal self-employed workers or pure intrinsic premium in the formal self-employment.

A comparison which deserves particular interest is the pay gap between informal salary vis-a-vis self-employed workers. The QR estimates in the third row of Table 7 demonstrate that informal self-employed suffer a significant earnings penalty but only at the lower end of the distribution of the 5<sup>th</sup>, 10<sup>th</sup> and 25<sup>th</sup> quantiles. Afterwards, the gap becomes insignificant for the upper half. Overall, the evidence clearly demonstrates the heterogeneity within informal sector; where the lower end corresponds to segmented and upper quantiles to competitive labor markets theories. In contrast to the mainstream literature which views informal self-employed as the upper-tier and wage earners as the lower-tier, our findings suggest that lower-tier informal employment

corresponds to self-employment in the Turkish labor market.

The estimation results for male and female only subsamples are provided in Tables 8 and 9, respectively. For male workers, the significantly positive formal wage premium decreases with earnings level and disappears at the 90<sup>th</sup> quantile. Formal self-employed male workers are associated with relatively higher earnings compared to informal-salaried throughout the entire distribution. For the lower end, formal self-employment premium amounts to 40 percent, but halves to approximately 20 percent for 25<sup>th</sup> and higher quantiles. The earnings gap between informal-salaried and informal self-employed reveals a somewhat ambivalent picture, as reported in the third row of Table 8. Only at the lowest quantile, male informal self-employed suffer a 10 percent penalty compared to male informal wage workers. This result confirms the segmentation theory and our previous finding that self-employed form the lower-tier informal employment. For higher quantiles, however, this earnings penalty disappears and becomes significantly positive at the 75<sup>th</sup> quantile. The implications are twofold: informal self-employed workers at the upper end of the earnings distribution may have better unobserved skills and thus earn higher monetary returns, or informal self-employment jobs at the upper quantiles may have better earnings prospects than informal-salaried positions by their nature.

The distributional pattern of earnings gap becomes even more discernible when the analysis is limited to female subsample. The first thing to notice in Table 9 is that the formal wage premium at the lower half of the earnings distribution completely vanishes at the upper half. This result provides evidence for the presence of labor market segmentation at the lower end, but also shows that this may not apply to workers at the top. Indeed, the results show that the 48 percent formal-

salaried wage premium at the lowest quantile turns into a 42 percent penalty at the top. Comparing with the corresponding figure for male workers which is only 8 percent, this result is particularly intriguing. One can argue that this may be solely due to better unobserved skills of informal-salaried individuals at the 95th quantile which are rewarded with higher pay. However, such a result is often taken to be an evidence of heterogeneity in the informal sector, lower-tier being subject to worse pay conditions in contrast to upper-tier having better remuneration. Turning to the earnings gap between formal self-employed and informal-salaried female workers, we do not observe any pronounced pattern as was found in the male subsample. This is most likely due to female formal self-employment being almost negligible in the Turkish labor market. Last but not least, we observe that informal self-employed female workers are consistently worse-off than their salaried counterparts throughout the earnings distribution. In contrast to the results for total and male only samples, the coefficient of informal self-employment does not become positive at the top quantiles. This finding is also of particular importance as it clearly demonstrates that informal self-employment constitutes the lower end for female workers, where remuneration is always worse than salary work.

### **4.3. Fixed Effects Estimation of Earnings Gap**

#### **4.3.1. Across Formal/Informal Employment**

Time-invariant unobserved individual heterogeneity is accepted to play an important role in explaining the formal/informal earnings gaps, even after controlling for a rich set of observable individual- and job-level characteristics. El Badaoui et al. (2008) claim that there are often

several unobservable factors which affect both selection decision into the formal/informal employment and wages, thereby if not taken into account will lead to biased estimates of the earning gaps. Following this line of thinking, we exploit the panel nature of the data and rely on fixed effects estimation to purge such unobservables, thereby isolate their effect on earnings differences. The estimation results for the two model specifications, equations (8) and (9), are provided in Tables 10 and 11, respectively.

Overall the results are quite remarkable: when accounted for time-invariant unobservables, formal/informal earnings differentials are not found as statistically significant. Put differently, unobserved individual fixed effects when combined with controls for observable personal, household and job characteristics explain pay differences entirely. By examining male workers, however, one finds evidence that there still remains a 10 percent informal penalty that is statistically significant at 10 percent. Female workers do not experience any statistically significant earnings differential across formal/informal employment after controlling for observable and unobservable factors which are likely to determine the level of earnings. The implications of results are threefold. Segmentation may not be a stylized fact of the Turkish labor market as commonly believed once unobserved individual effects are accounted for. Secondly, formal sector workers on average have better unobserved characteristics, as well as better observable attributes. Once these factors are accounted for, the informal employment earning penalty entirely disappears.

#### **4.3.2. Across Formal-Salaried, Informal-Salaried, Formal Self-employment and Informal**

## **Self-employment**

When replicated for the second Mincer specification, equation (9), results are qualitatively similar to previous findings. Specifically, the fixed effects estimation displays that there is no statistically significant earnings gap between formal- and informal-salaried workers. Whereas, for male wage earners, we find a 10 percent formal premium. Though not statistically significant, the coefficient of formal-salaried emerges as negative for female wage workers, implying a formal penalty. Formal self-employed workers appear to be significantly better-off than informal-salaried, even after controlling for individual fixed effects. However, further breakdown of the sample show that this finding loses relevance when sample is restricted to females only. As for within informal employment earnings differentials, we find no statistically significant gap once we control for unobservable factors using fixed effects regression. Again for the females, however, it is statistically significantly negative, implying the existence of an earning penalty for the informal self-employed when compared to their salaried counterparts.

## **5. Concluding Remarks**

In this study, we examine the formal/informal sector earnings differentials in the Turkish labor market in terms of its prevalence, magnitude and underlying dynamics. For this purpose, we employ detailed econometric methodologies and a novel panel data set drawn from the 2006-2009 Income and Living Conditions Survey (SILC) which subsumes a rich set of information on individual, household and employment characteristics; income and labor market states. In particular, we test if there is evidence of traditional segmented labor markets theory which

postulates that informal workers are typically subject to lower remuneration than similar workers in the formal sector. Moreover, we address the heterogeneity within formal and informal employment by further decomposing the analysis into wage and self-employment. The empirical analysis consists of examining the earnings gap along multiple dimensions, disentangling at formal/informal sector, wage/self-employment, and at the mean/quantiles of the earnings distribution. All of the analyses are also replicated for male and female subsamples separately.

First, we estimate standard Mincer earnings equations at the mean using OLS on a pooled sample of workers. Across formal/informal divide, the results indicate a significant raw penalty for informal workers, which tends to decrease as other earnings-related variables (i.e. individual, household and job attributes) are included in the regression. Overall, the analysis confirms the existence of an informal penalty, but also shows that almost half of this penalty can be explained by observable variables. We also find that the unexplained informal penalty for female workers is twice of that for the male workers when only individual characteristics are controlled for. This finding demonstrates that the returns to personal attributes are comparatively lower for female workers than for male workers. This implies the presence of discrimination against women. However, once job variables are also introduced to the model, informal penalty for female workers is at parity with that for male workers. Turning to formal/informal pay differences along wage/self-employment divide, the results are in line with the traditional theory that formal-salaried workers are paid significantly higher than their informal counterparts. Confirming the heterogeneity within informal employment, we find that self-employed are often subject to lower remuneration compared to those who are salaried.

Acknowledging the fact that earnings at the mean are not so informative, we next estimate quantile regressions on the pooled sample. The results show that pay differentials are not uniform along the earnings distribution. More specifically, we find that informal penalty decreases with the earnings i.e., it is significant at the lower quantiles but either becomes insignificant or even turns into a premium at the top. The results, overall, confirm the basic premise of a heterogeneous informal sector comprising of an upper-tier jobs carrying a significant premium that may compensate the benefits of formal wage work and a lower-tier jobs being largely penalized. An important finding revealed by the distributional analysis is that, in contrast to the mainstream literature which views informal self-employed as the upper-tier and wage earners as the lower-tier, the lower-tier informal employment indeed corresponds to self-employment in the Turkish labor market. The distributional pattern of earnings gap becomes even more discernible when the analysis is limited to female workers. Most notably, the 48 percent formal-salaried wage premium vis-a-vis informal-salaried at the lowest quantile turns into a 42 percent penalty at the top. This result also affirms the dual nature of informal sector.

Finally, we estimate fixed effects regressions exploiting the panel nature of the data in order to take into account of the time-invariant unobservable characteristics that are also important determinants of earnings levels. The results show that unobserved individual fixed effects when combined with controls for observable individual and employment characteristics explain the pay differentials between formal and informal employment entirely. The implication is particularly remarkable, that formal/informal segmentation may not be a stylized fact of the Turkish labor market as previously thought. Indeed, further breakdown by gender also displays only a slightly significant informal wage penalty for male workers and no statistically significant informal pay gap for female workers. When FE model is extended to incorporate salaried versus

self-employment divide, we observe three noticeable patterns. First, there is no evidence of a statistically significant earnings gap between formal and informal wage earners, but only for the male sample which displays a slightly significant 10 percent formal premium. Second, formal self-employed workers display earnings premiums of 15 and 21 percents, respectively for the total and male only samples. As for within informal employment, earnings differentials in favor of salaried work against self-employment ceases to exist when one accounts for time-invariant unobservables. The 40 percent earnings penalty for female informal self-employed, however, confirms the prior evidence that self-employment rather corresponds to lower-tier informal employment even after controlling for observable and unobservable factors.

To conclude, the analysis provides a comprehensive and detailed diagnosis of formal/informal pay differentials in the Turkish labor market. Using a panel data set and several econometric approaches, we indeed detect an informal sector penalty, but once controlled for observable and unobservable effects the gap disappears entirely.

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**TABLES**

**Table 1**

**SUMMARY STATISTICS**

<i>Variable</i>	<b>Formal Employment</b>			<b>Informal Employment</b>		
	<b>All employment <i>Mean</i></b>	<b>Wage Workers <i>Mean</i></b>	<b>Self- employed <i>Mean</i></b>	<b>All employment <i>Mean</i></b>	<b>Wage Workers <i>Mean</i></b>	<b>Self- employed <i>Mean</i></b>
Log hourly earnings	0.97	1.03	0.44	0.31	0.67	0.17
Hours worked (pw)	53.01	51.63	54.88	52.99	60.93	50.94
<b>Gender</b>						
Male	0.82	0.80	0.81	0.81	0.96	0.82
Female	0.18	0.20	0.19	0.19	0.04	0.18
<b>Age</b>						
Age15to24	0.11	0.13	0.25	0.14	0.03	0.03
Age25to34	0.36	0.39	0.28	0.22	0.23	0.17
Age35to44	0.34	0.33	0.24	0.25	0.36	0.27
Age45to54	0.16	0.14	0.17	0.24	0.29	0.32
Age55to64	0.02	0.01	0.06	0.14	0.09	0.22
<b>Education</b>						
Illiterate	0.01	0.00	0.06	0.08	0.02	0.11
Nograde	0.01	0.01	0.07	0.08	0.03	0.10
Primary	0.34	0.29	0.53	0.57	0.61	0.61
Secondary	0.14	0.14	0.19	0.14	0.11	0.09
High	0.14	0.15	0.08	0.06	0.10	0.04
Vocational	0.14	0.15	0.05	0.05	0.08	0.04
University	0.22	0.25	0.03	0.02	0.05	0.02
Experience	15.15	13.93	15.00	20.06	22.12	25.54
<b>Household</b>						

Single	0.20	0.22	0.28	0.19	0.06	0.10
Married	0.80	0.78	0.72	0.81	0.94	0.90
nochild	0.24	0.25	0.20	0.25	0.23	0.29
child	0.76	0.75	0.79	0.75	0.77	0.71
hhead	0.66	0.63	0.56	0.66	0.83	0.77
hhsiz	4.26	4.18	5.15	5.08	4.72	5.00
otherf	1.00	1.00	0.23	0.19	1.00	0.16
<b>Sector</b>						
Agriculture	0.07	0.01	0.13	0.39	0.40	0.66
Mining	0.01	0.01	0.01	0.00	0.00	0.00
Manufacturing	0.26	0.29	0.18	0.12	0.07	0.05
Energy	0.01	0.01	0.00	0.00	0.00	0.00
Construction	0.05	0.05	0.21	0.12	0.02	0.02
Trade	0.15	0.12	0.14	0.14	0.30	0.15
Hotels	0.04	0.04	0.07	0.05	0.05	0.02
Transportation	0.06	0.05	0.07	0.06	0.09	0.05
Finances	0.07	0.08	0.03	0.02	0.03	0.01
PublicAdmin.	0.11	0.13	0.03	0.02	0.00	0.00
Education	0.09	0.10	0.01	0.01	0.00	0.00
Health	0.05	0.06	0.01	0.00	0.01	0.00
OtherServices	0.04	0.04	0.11	0.07	0.03	0.03
<b>Occupation</b>						
Legislators	0.08	0.05	0.03	0.06	0.26	0.10
Professionals	0.13	0.14	0.01	0.01	0.03	0.01
Technicians	0.10	0.11	0.02	0.02	0.02	0.01
Clerks	0.09	0.11	0.03	0.01	0.00	0.00
ServiceWorkers	0.12	0.13	0.18	0.10	0.04	0.02
SkilledAgricult	0.06	0.00	0.01	0.32	0.40	0.66
Craftsmen	0.14	0.15	0.29	0.19	0.12	0.08
PlantOperators	0.15	0.16	0.12	0.09	0.11	0.06
ElementaryOper	0.12	0.13	0.31	0.19	0.02	0.06
<b>Firm Size</b>						
small	0.34	0.22	0.74	0.86	1.00	1.00
medium	0.25	0.30	0.20	0.10	0.00	0.00
large	0.41	0.48	0.06	0.03	0.00	0.00
<b>Job Type</b>						
fulltime	0.98	0.99	0.89	0.87	0.97	0.86
parttime	0.02	0.01	0.10	0.12	0.03	0.14
<b>Year</b>						
2006	0.17	0.17	0.21	0.21	0.17	0.21
2007	0.28	0.28	0.31	0.31	0.27	0.30
2008	0.32	0.32	0.29	0.28	0.33	0.28
2009	0.22	0.22	0.19	0.20	0.23	0.22
#observations	17397	14804	6350	12217	2593	5867

**Table 2**

**POOLED OLS MINCER EARNINGS REGRESSION (ACROSS FORMAL/INFORMAL EMPLOYMENT)**

	ALL			MALE			FEMALE		
	(1) Pooled OLS	(2) Pooled OLS	(3) Pooled OLS	(4) Pooled OLS	(5) Pooled OLS	(6) Pooled OLS	(7) Pooled OLS	(8) Pooled OLS	(9) Pooled OLS
Informal	0.539***	0.318***	0.215***	0.505***	0.256***	0.196***	0.707***	0.456***	0.181***
Controls for ind. & hhold chars.	no	yes	yes	no	yes	yes	no	yes	yes
Controls for employment chars.	no	no	yes	no	no	yes	no	no	yes
Controls for year	yes	yes	yes	yes	yes	yes	yes	yes	yes
No. of observations	23668	23667	23656	19414	19413	19403	4254	4254	4253

SOURCE: Own calculations based on SILC 2006-2009 (Panel observations only).

NOTE : <sup>1</sup>For variable definitions, see Appendix Table A.6. <sup>2</sup>Dependent variable: Log real hourly earnings

<sup>3</sup>Independent variable base category: Formal, Male, Age15to24, Primary education, Not student, Single household, Not household head, No other formal household member, Manufacturing sector, Professional occupation, Small firm, Year 2006.

\* for p<.05, \*\* for p<.01, and \*\*\* for p<.001

**Table 3**

**POOLED OLS MINCER EARNINGS REGRESSION (ACROSS FORMAL/INFORMAL SALARIED/SELF-EMPLOYMENT)**

	ALL			MALE			FEMALE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
Formal Salaried	0.561***	0.299***	0.183***	0.547***	0.256***	0.180***	0.619***	0.357***	0.142**
Formal Self-employed	0.323***	0.328***	0.249***	0.321***	0.306***	0.261***	0.328**	0.331**	0.133
Informal Self-employed	-0.00124	0.0704**	0.0899**	0.0633*	0.0303	0.0162	-0.432***	-0.705***	-0.451***
Controls for ind. & hhold chars.	no	yes	yes	no	yes	yes	no	yes	yes
Controls for employment chars.	no	no	yes	no	no	yes	no	no	yes
Controls for year	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	23668	23667	23656	19414	19413	19403	4254	4254	4253

SOURCE: Own calculations based on SILC 2006-2009 (Panel observations only).

NOTE : <sup>1</sup>For variable definitions, see Appendix Table A.6. <sup>2</sup>Dependent variable: Log real hourly earnings

<sup>3</sup>Independent variable base category: Informal Salaried, Male, Age15to24, Primary education, Not student, Single household, Not household head, No other formal household member, Manufacturing sector, Professional occupation, Small firm, Year 2006.

\* for p<.05, \*\* for p<.01, and \*\*\* for p<.001

**Table 4**

**POOLED QUANTILE MINCER EARNINGS REGRESSIONS (ACROSS FORMAL/INFORMAL EMPLOYMENT)**

	<b>5th quantile</b>	<b>10th quantile</b>	<b>25th quantile</b>	<b>50th quantile</b>	<b>75th quantile</b>	<b>90th quantile</b>	<b>95th quantile</b>
<b>All Sample</b>							
Informal	-0.593***	-0.452***	-0.277***	-0.167***	0.0892***	0.000798	0.129**
Controls for ind. & hhold chars.	yes	yes	yes	yes	yes	yes	yes
Controls for employment chars	yes	yes	yes	yes	yes	yes	yes
Controls for year	yes	yes	yes	yes	yes	yes	yes
N	23656						
<b>Male Sample</b>							
informal	-0.476***	-0.404***	-0.232***	-0.161***	-0.137***	-0.0359	0.0359
Controls for ind. & hhold chars.	yes	yes	yes	yes	yes	yes	yes
Controls for employment chars	yes	yes	yes	yes	yes	yes	yes
Controls for year	yes	yes	yes	yes	yes	yes	yes
N	19403						
<b>Female Sample</b>							
informal	-0.450***	-0.435***	-0.300***	-0.167***	-0.0462	0.151	0.351**
Controls for ind. & hhold chars.	yes	yes	yes	yes	yes	yes	yes
Controls for employment chars	yes	yes	yes	yes	yes	yes	yes
Controls for year	yes	yes	yes	yes	yes	yes	yes
N	4253						

SOURCE: Own calculations based on SILC 2006-2009 (Panel observations only).

NOTE: <sup>1</sup>For variable definitions, see Appendix Table A.6. <sup>2</sup>Dependent variable: Log real hourly earnings

<sup>3</sup>Independent variable base category: Formal, Male, Age15to24, Primary education, Not student, Single household, Not household head, No other formal household member, Manufacturing sector, Professional occupation, Small firm, Year 2006.

\* for p<.05, \*\* for p<.01, and \*\*\* for p<.001

Table 5

POOLED QUANTILE MINCER EARNINGS REGRESSIONS (ACROSS FORMAL/INFORMAL SALARIED/SELF-EMPLOYMENT)

	5th quantile	10th quantile	25th quantile	50th quantile	75th quantile	90th quantile	95th quantile
<b>All Sample</b>							
Formal Salaried	0.559***	0.429***	0.268***	0.159***	0.0754**	-0.0291	-0.154**
Formal Self-employed	0.490***	0.417***	0.238***	0.217***	0.240***	0.168***	0.161*
Informal Self-employed	-0.318***	-0.217***	-0.0991***	-0.0203	0.0396	0.0743*	0.0826
Controls for ind.& hhold chars.	yes	yes	yes	yes	yes	yes	yes
Controls for employment chars	yes	yes	yes	yes	yes	yes	yes
N	23656						
<b>Male Sample</b>							
Formal Salaried	0.446***	0.387***	0.232***	0.155***	0.118***	0.0156	-0.0877
Formal Self-employed	0.390***	0.392***	0.221***	0.217***	0.268***	0.212***	0.224***
Informal Self-employed	-0.134**	-0.0609	-0.00963	0.0154	0.0842**	0.136**	0.131*
Controls for ind.& hhold chars.	yes	yes	yes	yes	yes	yes	yes
Controls for employment chars	yes	yes	yes	yes	yes	yes	yes
N	19403						
<b>Female Sample</b>							
Formal Salaried	0.481***	0.401***	0.308***	0.150***	-0.00263	-0.200	-0.421***
Formal Self-employed	0.0466	0.255	0.121	0.286**	0.195*	-0.0441	-0.372*
Informal Self-employed	-0.670**	-0.455*	-0.618***	-0.400***	-0.267***	-0.275**	-0.288
Controls for ind. & hhold chars.	yes	yes	yes	yes	yes	yes	yes
Controls for employment chars	yes	yes	yes	yes	yes	yes	yes
N	4253						

SOURCE: Own calculations based on SILC 2006-2009 (Panel observations only).

NOTE: <sup>1</sup>For variable definitions, see Appendix Table A.6. <sup>2</sup>Dependent variable: Log real hourly earnings

<sup>3</sup>Independent variable base category: Informal Salaried, Male, Age15to24, Primary education, Not student, Single household, Not household head, No other formal household member, Manufacturing sector, Professional occupation, Small firm, Year 2006.

\* for p<.05, \*\* for p<.01, and \*\*\* for p<.001

**Table 6****FIXED EFFECTS REGRESSION (ACROSS FORMAL/INFORMAL EMPLOYMENT)**

	<b>ALL (1) Fixed Effects</b>	<b>MALE (2) Fixed Effects</b>	<b>FEMALE (3) Fixed Effects</b>
Informal	-0.0697	-0.106*	0.0741
Controls for ind. & hhold chars.	Yes	Yes	Yes
Controls for employment chars	yes	yes	Yes
N	23656	19403	4253

SOURCE: Own calculations based on SILC 2006-2009 (Panel observations only).

NOTE : <sup>1</sup>For variable definitions, see Appendix Table A.6. <sup>2</sup>Dependent variable: Log real hourly earnings

<sup>3</sup>Independent variable base category: Formal, Male, Age15to24, Primary education, Not student, Single household, Not household head, No other formal household member, Manufacturing sector, Professional occupation, Small firm, Year 2006.

\* for p<.05, \*\* for p<.01, and \*\*\* for p<.001

**Table 7****FIXED EFFECTS REGRESSION (ACROSS FORMAL/INFORMAL SALARIED/SELF-EMPLOYMENT)**

	<b>ALL (1) Fixed Effects</b>	<b>MALE (2) Fixed Effects</b>	<b>FEMALE (3) Fixed Effects</b>
Formal salaried	0.0518	0.0952*	-0.0951
Formal self-employed	0.156*	0.211**	-0.183
Informal self-employed	0.00756	0.0608	-0.402*
Controls for ind.& hhold chars.	Yes	Yes	Yes
Controls for employment chars	yes	yes	Yes
N	23656	19403	4253

SOURCE: Own calculations based on SILC 2006-2009 (Panel observations only).

NOTE : <sup>1</sup>For variable definitions, see Appendix Table A.6. <sup>2</sup>Dependent variable: Log real hourly earnings

<sup>3</sup> Independent variable base category: Informal Salaried, Male, Age15to24, Primary education, Not student, Single household, Not household head, No other formal household member, Manufacturing sector, Professional occupation, Small firm, Year 2006.

\* for p<.05, \*\* for p<.01, and \*\*\* for p<.001

## APPENDIX

**Table A.1: List of Definitions**

<i>Variable Name</i>	<i>Definition</i>
<b><i>Formality Status</i></b>	
Formal	1 if registered to the Social Security Institution; 0 otherwise
Informal	1 if not registered to the Social Security Institution; 0 otherwise
Formal-salaried	1 if employee working for a wage/salary and registered to the SSI; 0 otherwise
Informal-salaried	1 if employee working for a wage/salary and not registered to the SSI; 0 otherwise
Formal self-employed	1 if own-account worker and registered to the SSI; 0 otherwise
Informal self-employed	1 if own-account worker and not registered to the SSI; 0 otherwise
logwagem	Real hourly logged wages calculated using a wage-worker's income, hours worked in the main job, the Turkish CPI
	Real hourly logged wages calculated using a self-employed's earnings, hours worked in the main job, the Turkish CPI
Hourspw	Weekly hours worked in the main job
<b><i>Individual Characteristics</i></b>	
Male	1 if male; 0 otherwise
Female	1 if female; 0 otherwise
Age15to24	1 if in age range; 0 otherwise
Age25to44	1 if in age range; 0 otherwise
Age45to64	1 if in age range; 0 otherwise
exper	total number of years the individual has worked for since he/she first started working
Illiterate	1 if illiterate; 0 otherwise
None	1 if did not attend school; 0 otherwise
Primary	1 if completed primary school; 0 otherwise
Secondary	1 if completed secondary school; 0 otherwise
High	1 if completed high school; 0 otherwise
Vocational	1 if completed vocational school; 0 otherwise
University	1 if completed university; 0 otherwise
student	1 if currently enrolled as a student; 0 otherwise
<b><i>Household Characteristics</i></b>	
Single	1 if not married; 0 otherwise
Married	1 if married; 0 otherwise
nochild	1 if the household do not have any children; 0 otherwise
child	1 if the household has children; 0 otherwise
hhead	1 if head of the household; 0 otherwise
hhsiz	total number of members in the household
otherf	1 if there is another formally employed household member; 0 otherwise
<b><i>Employment/Job Characteristics</i></b>	
Regular employee	1 if employed as a regular employee; 0 otherwise
Casual employee	1 if employed as a casual employee; 0 otherwise
Employer	1 if employer; 0 otherwise

Own-account worker	1 if own-account worker; 0 otherwise
Unpaid Family worker	1 if unpaid family worker; 0 otherwise
Agriculture	1 if employed in agriculture; 0 otherwise
Mining	1 if employed in mining; 0 otherwise
Manufacturing	1 if employed in manufacturing; 0 otherwise
Energy	1 if employed in energy; 0 otherwise
Construction	1 if employed in construction; 0 otherwise
Trade	1 if employed in trade; 0 otherwise
Hotels	1 if employed in hotels; 0 otherwise
Transportation	1 if employed in transportation; 0 otherwise
Finances	1 if employed in finances; 0 otherwise
Public Administration	1 if employed in public administration; 0 otherwise
Education	1 if employed in education; 0 otherwise
Health	1 if employed in health; 0 otherwise
Other	1 if employed in other services; 0 otherwise
Legislators	1 if employed as a legislator; 0 otherwise
Professional	1 if employed as a professional; 0 otherwise
Technicals	1 if employed as a technician; 0 otherwise
Clerks	1 if employed as a clerk; 0 otherwise
Service workers	1 if employed as a service worker; 0 otherwise
Skilled agricultural workers	1 if employed as a skilled agricultural worker; 0 otherwise
Craftsmen	1 if employed as a craftsmen; 0 otherwise
Plant operators	1 if employed as a plant operator; 0 otherwise
Elementary operations	1 if employed as a elemenatry opr. worker; 0 otherwise
small	1 if firm size is between 1 to 10; 0 otherwise
medium	1 if firm size is between 11 to 49; 0 otherwise
large	1 if firm size is 50 or more; 0 otherwise
full-time	1 if employed as full-time; 0 otherwise
part-time	1 if employed as part-time; 0 otherwise

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