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# Economic and Demographic Determinants of Overtime in the Turkish Private Sector

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Abstract: Overtime is an important labor market phenomenon, which is generally influenced by demographic, economic, and organizational factors. In this study, factors affecting work overtime in the private sector in Turkey were examined by using the Household Labour Force Survey data of the Turkish Statistical Institute (TurkStat) between 2014 and 2017. Factors affecting individuals' overtime in the private sector were analyzed by using the Tobit Model with demographic variables, other variables that are related to working conditions, and two macroeconomic variables namely per capita gross domestic product (GDP) and inflation. Results indicated that men work more overtime than women. Married people work more overtime than singles, and overtime decreases as the level of education and experience increases. The rate of overtime work is higher for those who are not registered with the Social Security Institution (SSI) and in the status of informal employment. Employers, unpaid or family workers, or self-employed workers are working more overtime than paid employees. The impact of GDP per capita on overtime is negative. Overtime decreases as per capita income increases. Therefore, the contraction in the economy and the decrease of the purchasing power of individuals lead them to overtime.

Keywords: Working Time, Overtime, Tobit Model, Turkish Private Sector.

# Determinantes económicos e demográficos das horas extras no setor privado turco

Resumo: As horas extras é um fenômeno importante do mercado de trabalho, geralmente influenciado por fatores demográficos, económicos e organizacionais. Neste estudo, os fatores que afetam as horas extras de trabalho no setor privado na Turquia foram examinados usando os dados da Pesquisa de Força de Trabalho Doméstica do Instituto de Estatística da Turquia (TurkStat) entre 2014 e 2017. Fatores que afetam as horas extras de indivíduos no setor privado foram analisados usando o Modelo Tobit com variáveis demográficas, outras variáveis relacionadas com as condições de trabalho e duas variáveis macroeconómicas, nomeadamente PIB (Produto Interno Bruto) per capita e inflação. Os resultados indicaram que os homens trabalham mais horas extras do que as mulheres. Pessoas casadas trabalham mais horas extras do que solteiras, e as horas extras diminuem à medida que o nível de educação e a experiência aumentam. A taxa de trabalho extraordinário é maior para quem não está inscrito no Instituto de Segurança Social (SSI) e na situação de emprego informal. Os empregadores, os trabalhadores não remunerados ou familiares ou os trabalhadores independentes fazem mais horas extras do que os empregados remunerados. O impacto do PIB per capita nas horas extras é negativo. As horas extras diminuem à medida que a renda per capita aumenta. Portanto, a contração da economia e a diminuição do poder aquisitivo dos indivíduos os levam a horas extras.

Palavras-chave: Horário de Trabalho, Horas Extras, Modelo Tobit, Setor Privado Turco.

## 1. Introduction[1]

Theoretical and empirical studies show that overtime work is dependent upon economic, demographic, and institutional factors. Working hours differ in several countries depending on the level of industrialization, development, unemployment rates, and legal regulations.

In this study, factors affecting work overtime in the private sector in Turkey were examined by using the Household Labour Force Survey data of the Turkish Statistical Institute (TurkStat) between 2014 and 2017. We start with the literature that will form the basis of our study on overtime is briefly summarized and then testable hypothesis are presented.

In a significant number of empirical studies on overtime work is dependent upon demographic variables such as, gender, age, education, being a part of ethnic group, marital status, experience, status at work (occupational status), tenure, and not being registered to a social security institution. Bauer and Zimmermann (1999) studied the factors affecting overtime by using German Socio-economic Panel household data from 1984 to 1997. The results revealed that age, education, and experience have been shown to reduce overtime work hours. Anxo and Karlsson (2019) have compared Spain, Romania, Turkey, United Kingdom, Denmark, and Germany. In the study overtime is determined by respondent's age, gender, skill-level, industries, sector, and company sized. Similarly Ünlü etal. (2019) used individual-level overtime hours in the Turkish private sector by applying Tobit analysis with demographic variables. The data obtained from the Household Labor Force survey conducted by the Turkish Statistical Institute in 2015 were used. The results of showed that when the age of the person increases, overtime decreases and it has a concave appearance; as the level of education increases, the individual's overtime period decreases.

Based on above given literature that the worker works less overtime if she is better educated, we obtain the first hypothesis as follows:

***H1: Workers with more education work less overtime than workers with less education***

Persons, who work informal, may be forced to work overtime by their employers. Informal workers do not have employment and income security, and their income is lower than formal workers (Gong & Soest, 2002; Nopo, 2012). Therefore, their income is uncertain and irregular. From this point of view, in informal employment, workers often face poor working conditions with low wages and long working hours. Moreover, in this form of employment long working hours and overtime are common, and informal workers lack the right to be paid for working overtime (ILO, 2020, p.59). According to the research titled "The Condition of the Working Class in Turkey" that was carried out by the Confederation of Progressive Trade Unions of Turkey, the overtime rate is much higher among low-wage, unionized, and non-covered workers (workers without Social Security Institution registration). While 39% of workers without SSI registration work overtime, 28% of non-unionized workers work overtime. Among unionized workers, the rate of those who work overtime decrease to the level of 13,4%. Based on the discussion of depending on whether the worker is registered with the social security institution or not, we derive the second hypothesis as:

*1 This paper was presented in The 19th International MEEA (Middle East Economic Associaton) Conference. The Conference was held online from October 9-11, 2020 by Piri Reis University, Istanbul, Turkey. We thank for useful comments made by Professor İnsan Tunalı to improve this version of our paper.*

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***H2: Workers without SSI registration work more overtime than the workers with SSI registration.***

Ünlü and Üçdoğruk Birecikli (2019) performed the sector based overtime analysis. They concluded that especially in the service and the mining sector and when the number of employees is between 10 to 20, and those whose wages are below the average wage are doing more overtime. Based on Anxo and Karlsson (2019) and on Ünlü and Üçdoğruk Birecikli (2019) regarding a company size we wanted to test the third hypothesis as follows:

***H3: Workers in small workplaces work more than workers in large workplaces***

Weekly overtime hours vary by sector. Due to the nature of the service sector, the demand for the service is relatively changeable and uncertain. Demand can vary significantly, not only by years, seasons, and months but also by days and even hours in a day. So, it is not always possible to balance the amount of service provided and requested. Demand can go beyond average daily working hours (Gärtner & Kundi, 2005). Therefore, overtime is required to meet demand. Following previous discussion on service sector, we derived the fourth hypothesis:

***H4: Workers who are employed in the service sector work more overtime than workers in the other sectors.***

Overtime is more common among lower-wage earners. Generally, people living in rural areas are expected to work more overtime. Since individuals living in these regions obtain lower wage income in general, they can work more hours that satisfy their own, or their employers' wishes. Apart from this, people may prefer to work overtime as they need more income for a better life and for living in big cities or metropolitan areas. Therefore, we added regions into our analysis as one of the determinant of overtime. In the following discussions we summarized the relationship between gross domestic product (GDP) and Inflation as two important macroeconomic variables.

The development of technology and research and development (R&D) processes that are used in production, as well as income effect and substitution effect, increase GDP per capita and decrease working hours. An indication that there is no positive relationship between these variables is that the number of hours worked worldwide has decreased and GDP per capita increased by 877% during two centuries from 1820 to 2003 (Schein & Haruvi, 2017, p.318; Maddison, 2007.p.382).

Depending on a general belief, that inflation has a positive effect on overtime. Accordingly, the increase in the inflation level causes more overtime. If the constriction in the economy has occurred along with inflation, nominal income does not decrease, but real income decreases. In other words, the purchasing power of individuals and their spending decrease, and economic contraction occurs. Therefore, when individuals earn less income in real terms during the same working time, this decrease in income causes the individual's demand for goods and services to decrease. Depending on the decrease in income, the individual will consume less leisure time and will tend to increase own income or purchasing power by working more (Biçerli, 2019, p.395).

Having been motivated by the literature given above, this paper analyses the overtime work with a special focus on the Turkish private sector. This study aims to determine the factors affecting work overtime which were examined by using the Household Labour Force Survey data of the Turkish Statistical Institute (TurkStat) between 2014 and 2017. Factors affecting individuals' overtime in the private sector were analyzed by using the Tobit Model. In the first step, the demographic variables such as gender, age,



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education, marital status, experience, status at work, not being registered to Social Security Institution (SSI) are included. In the second stage, institutional factors such as the scale of the enterprise in terms of the number of workers, economic sectors, household size, region, and finally macro variables, namely inflation and GDP per capita are added[2]. In the overtime literature it is not used macroeconomic variables before. To our knowledge first time we used GDP and inflation as determinants of Turkish work overtime which is a contribution to the empirical literature.

The rest of the study is organized as follows: In the second section, the legal background of overtime is presented and in the third section previous empirical studies are summarized. Then, the data and the empirical model are defined in section four. Section five provides empirical results and Section six concludes.

## 2. Legal Background

In this subsection, we aimed to define overtime in the international context and then to give the definition valid in Turkey. Overtime refers to actual working hours worked above the standard contract hours. In a country where weekly working hour is determined as 45, a worker having worked 50 hours is entitled to 5 hours of overtime. This may include weekday or only weekend work. For the majority of workers, overtime is paid at a different rate than the standard hours. It usually refers to a premium consisting of a fixed multiple of the standard hourly wage. According to the OECD, "overtime is time worked in addition to hours worked during normal periods of work, and which are generally paid at higher than normal rates" (OECD, 18.09.2019). According to the ILO, all working hours above normal working hours are expressed as overtime (ILO, 18.09.2019). According to Eurofound, "overtime hours are working above a certain threshold of working time and which attract enhanced compensation for the worker, either in the form of an increased rate of pay or time off in lieu" (Eurofound, 18.09.2019). Paid overtime hours are the working hours of a worker arising out of the contract or working outside the normal or weekly normal working hours, where the worker has the right to salary, compensation, or leave (Eurofound, 2012, p.10).

According to the Turkish Labour Law numbered 4857, overtime work is defined as any work exceeding 45 hours per week. Maximum daily working time must not exceed 11 hours and the average weekly working time over 2 months must not exceed the maximum weekly working time. The wage for each hour of overtime is paid by increasing the amount of normal working wage per hour by 50%. If an employee is works overtime, he/she is entitled to use 1 hour and 30 minutes of leisure time for every hour of overtime, instead of the wage. The employee has the right to use the leisure time within 6 months, within working hours, and without any cut in his wages (Turkish Labour Law Nr: 4857, Article 41). Furthermore, overtime pay may be exchanged for time off in lieu, overtime requires the employee´s consent and the maximum total overtime work is 270 hours per year.

According to the European Union (EU) data, the weekly working hours in Turkey were 48.5 in 2019, (see table 1) while the average of overtime in EU28 countries is 41.1 hours. As such, weekly working hours in 2019 in Turkey is 7.4 hours more than the average of EU28 countries (Eurostat, 17.10.2021).

[2] *In the Household Labour Force Survey of the Turkish Statistical Institute (TUİK), there is no available information about membership of a union and overtime wages of a person. Therefore, these variables are not included in the model.*



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**Table 1. Average Overtime Hours of Countries**

| TIME | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| European Union - 28 countries | 41.8 | 41.7 | 41.6 | 41.6 | 41.6 | 41.5 | 41.5 | 41.4 | 41.4 | 41.3 | 41.2 | 41.1 | : |
| Belgium | 40.9 | 41.0 | 41.2 | 41.4 | 41.4 | 41.7 | 41.4 | 41.4 | 41.4 | 41.3 | 41.0 | 41.1 | 40.9 |
| Czechia | 42.7 | 42.6 | 42.5 | 42.2 | 42.1 | 41.9 | 41.8 | 41.8 | 41.7 | 41.7 | 41.7 | 41.5 | 41.3 |
| Denmark | 38.9 | 38.8 | 38.8 | 38.9 | 38.8 | 38.8 | 38.8 | 39.0 | 38.7 | 38.7 | 38.6 | 38.4 | 38.4 |
| Germany | 41.7 | 41.9 | 41.8 | 41.9 | 41.9 | 41.7 | 41.5 | 41.4 | 41.3 | 41.2 | 41.0 | 41.0 | 40.5 |
| Spain | 41.8 | 41.7 | 41.7 | 41.5 | 41.5 | 41.7 | 41.6 | 41.4 | 41.2 | 41.0 | 40.9 | 40.6 | 40.4 |
| France | 41.0 | 41.1 | 41.1 | 41.2 | 41.1 | 40.7 | 40.5 | 40.4 | 40.5 | 40.4 | 40.4 | 40.5 | 40.4 |
| Italy | 41.0 | 40.7 | 40.6 | 40.4 | 40.3 | 40.4 | 40.5 | 40.6 | 40.6 | 40.7 | 40.7 | 40.7 | 40.3 |
| Netherlands | 41.0 | 41.1 | 41.0 | 40.9 | 40.8 | 40.7 | 40.9 | 40.9 | 40.9 | 40.8 | 40.8 | 40.7 | 40.5 |
| Austria | 44.0 | 43.8 | 43.6 | 43.5 | 43.4 | 43.1 | 43.0 | 42.9 | 42.8 | 42.7 | 42.5 | 42.4 | 42.1 |
| Portugal | 41.6 | 41.4 | 41.3 | 42.4 | 42.6 | 42.7 | 42.8 | 42.4 | 42.1 | 42.0 | 41.8 | 41.7 | 41.3 |
| Sweden | 40.9 | 40.9 | 40.9 | 40.8 | 40.8 | 40.8 | 40.8 | 40.7 | 40.7 | 40.7 | 40.6 | 40.7 | 40.4 |
| Norway | 39.2 | 39.1 | 39.0 | 39.0 | 39.1 | 39.0 | 39.1 | 38.9 | 39.0 | 39.0 | 38.9 | 38.8 | 38.7 |
| Switzerland | 42.7 | 42.5 | 43.3 | 43.2 | 43.1 | 43.1 | 43.0 | 43.0 | 43.0 | 42.9 | 42.9 | 42.8 | 42.7 |
| United Kingdom | 43.0 | 42.8 | 42.8 | 42.7 | 42.8 | 42.8 | 43.0 | 42.9 | 42.8 | 42.6 | 42.5 | 42.5 | : |
| Turkey | 53.6 | 53.2 | 53.2 | 52.9 | 52.4 | 52.0 | 51.4 | 50.9 | 50.0 | 49.6 | 48.9 | 48.5 | 48.3 |

**Source:** *Eurostat (17.10.2021)*



## 3. Previous Empirical Studies

Many studies in the literature examine factors affecting overtime work by using different econometric methods such as the Tobit model, probit model, multinomial logit model, and the two-stage Heckman method. The data are mostly socio-economic panel data and individual-level data from the household earnings surveys. In the following paragraphs, we summarized several empirical studies to understand the different determinants of overtime work regarding the effect of union power, employment status, demographic factors such as such as, gender, age, education, being a part of ethnic group, marital status, experience, status at work (occupational status), tenure, not being registered to Social Security Institutions and gender pay gap and inequalities.

Several studies have investigated the effects of changes in union power and wage rates on overtime hours worked. Very pioneering research in this area was performed by Trejo (1993). He examined the effect of unionization on overtime hours and wages using US data. Being a member of a union reduces overtime hours and increase overtime wages. Hart and Bell (1999) examined overtime hours and wages in the unregulated labour market in the UK. In contrast to Trejo (1993), they have found that hourly wages, weekly working hours, and working in public institutions harm overtime. In another successive study, Bell and Hart (1999) analysed the British labour market and found that low-paid workers work more overtime than high-paid workers. In fact, the negative impact of low hourly wage on weekly earnings is partly offset by a rise in overtime hours. The research results also show that job classifications, low productivity, high hourly wages, non-union membership had a positive effect on unpaid overtime. Another work on the same line, Kalwij and Gregory (2005) examined the effects of the basic wage rate, standard working hours, and unionization on paid overtime work in Britain. They also showed that the GDP cycle has a significant impact on overtime work.

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Tsai et al. (2016) analysed overtime and its determinants in Japan, South Korea, Taiwan, and China by testing hypotheses that specify the distinctive influences of employment status and job contracts on work hours. In Japan, overtime is positively associated with occupational prestige, while a reverse pattern operates in China. Contract workers in the private sector in South Korea and China also have longer over time when compared to public sector employees

In a significant number of empirical studies show that the incidence of overtime work is dependent upon demographic variables such as, gender, age, education, being a part of ethnic group, marital status, experience, status at work (occupational status), tenure, not being registered to Social Security Institutions. Bauer and Zimmermann (1999) studied the factors affecting overtime by using German Socio-economic Panel household data from 1984 to 1997. The results also revealed that age, education, and experience have been shown to reduce overtime work hours.

Hübler et al. (2000) compared overtime hours on gender in the UK and Germany. The results showed that overtime is more common in the UK than in Germany. Besides, men do more overtime than women. Hart and Ma (2010) analysed the relationship between tenure, experience, and overtime. In their study, job tenure refers to the total amount of time the employee has worked in the current workplace. The result showed increase in overtime with job tenure in the current workplace may results from a labour productivity.

The gender pay gap and gender inequalities are also significant issues in the labor market as a part of the discussion, particularly overtime. Bell and Hart (2019) investigate the decline of overtime working in Britain. The study searches this decline focussing on full-time and part-time males and females together with overtime pay effects that include the implications for the gender pay gap. Anxo and Karlsson (2019) have compared Spain, Romania, Turkey, United Kingdom, Denmark, and Germany. They have found that in Turkey, like other countries, in the research, the overtime rate was low among the single workers and younger cohabiting couples without children, while larger household size causes more over time, especially among men. Chung and Van der Horst (2020) examines flexible working arrangements that are associated with an increase in unpaid overtime hours of workers in the UK using the Understanding Society data from 2010 to 2015. The results showed that flexible working arrangements can bring out gender inequalities in the labour market by enabling men to commit more time to their jobs, while for women, especially full-time working mothers.

There is also a study investigating how overtime works in rural and urban areas. Gralla et al. (2017) showed that people living in the developed parts of Germany work more overtime than those in rural areas. But on the other hand, people living in rural areas are expected to work more overtime. Since individuals living in these regions obtain lower wage income.

## 4. Method

### 4.1. Data Description

The data used are taken from the Household Labour Force Survey which is implemented regularly since 1988 by TurkStat. All private households who are living in the territory of the Republic of Turkey are included in the data. Questions on labour force status are asked for persons 15 years old and over. We used pooled data covering the 2014 - 2017 period. The number of observations totals 285,785 that represent individuals



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over 18 who are employed in the private sector[3]. The dependent variable is the overtime hour of an individual working over 45 hours a week. In the Household Labour Force Surveys implemented in the 2014-2017 period, the working hours are determined weekly. Weekly working hours vary between 0-99 hours in the data set. In the transformed overtime variable, it can be said that a person works 45 hours, works zero-hours overtime; a person works 50 hours, works five hours' overtime.

According to Article 8 of overtime regulations regarding Labour Law in Turkey, overtime is prohibited to workers under the age of 18. So the age variable is categorized as :18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65 years and older (base category), and each category is represented with dummy variable. When gender is used, women are determined as the base category. A total of six dummy variables were created for their educational status which is of uneducated, primary, secondary, high school, faculty, graduate school (base category). According to marital status, the four dummy variables were created which are married (base category), single, widowed (wife/husband dead), and divorced. The size of the household and experience are also employed in the analysis. Here, the experience refers to the total time spent actively in the labour market since the completion of full-time education. Employment status has four categories as paid salaries or casual (base category), employer, self-employed, and unpaid family worker. The number of people working in the workplace is categorized as 10 or fewer workers, more than 10 workers, between 11-19 workers, between 20-49 workers, and 50+ workers (base category). The real median wage is used in our analysis.[4] The interaction variable, which is the product of the number of people working in the workplace, and the median wage of the employee, is created. Sectors are also included in the model as the manufacturing sector (base category), service sector, mining sector, building trade, and agricultural sector. Registration to Social Security Institution has two categories namely, unregistered and registered (base category). For job status, the following four dummy variables are created: Professionals (Base category), Managers, Technicians and Associate Professionals, Clerical Support Workers, Services and Sales Workers, Skilled Agricultural. Forestry and Fishery Workers, Craft and Related Trades Workers, Plant and Machine Operators and Assemblers and finally Elementary Occupations. The Regions variable is represented by four dummy variables created as İstanbul, West Marmara, East Marmara, Aegean (Base category), West Anatolia, Mediterranean, Middle Anatolia, West Blacksea, East Blacksea, Northeast Anatolia, and Middleeast Anatolia.

In the empirical literature, GDP, inflation, macroeconomic indicators, such as the regional unemployment rate, are also found related to the impact of the business cycle on overtime ours (Böckerman, 2002; Kalwij & Gregory, 2005; Schein & Haruvi, 2017). Following the empirical literature, Gross Domestic Product (Turkish Lira) per capita and inflation (the base year 2003) are included in our model. To demonstrate the year effect in the model, the impact of the inflation on overtime hours in Turkey is measured by the interaction term.



*[3] In the study, since overtime work by individuals working in the private sector is examined, workers who were employed in the public sector were excluded from the data set.*

*[4] We converted nominal wages into real wages with the base year 2014. When we compare mean and median wage income, the median is below the mean (mean = 501.187, median = 460.59). This shows an income distribution inequality in Turkey.*

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**Table 2. Descriptive Statistics**

| Variable | Mean | Std. Deviation |
|---|---|---|
| Overtime | 10.952 | 10.932 |
| Under Median Wage | 0.3668 | 0.4819 |
| **Gender** | | |
| Male | 0.7884 | 0.4083 |
| Female | 0.2115 | 0.4083 |
| **Size of Household** | 3.86 | 1.7890 |
| **Age Groups** | | |
| Between 18-24 | 0.1405 | 0.3475 |
| Between 25-29 | 0.1311 | 0.3376 |
| Between 30-34 | 0.14692 | 0.3540 |
| Between 35-39 | 0.14940 | 0.3564 |
| Between 40-44 | 0.13935 | 0.3463 |
| Between 45-49 | 0.1104 | 0.3135 |
| Between 50-54 | 0.0793 | 0.2703 |
| Between 55-59 | 0.0491 | 0.2162 |
| Between 60-64 | 0.0294 | 0.1689 |
| 65+ (Base Category) | 0.0240 | 0.1533 |
| **Educational Status** | | |
| Uneducated | 0.0571 | 0.2321 |
| Primary School (5 years) | 0.3842 | 0.4864 |
| Secondary School (8 years) | 0.2060 | 0.4044 |
| High School | 0.2341 | 0.4234 |
| University | 0.1114 | 0.3146 |
| Graduate School (Base Category) | 0.0069 | 0.0833 |
| **Marital Status** | | |
| Married | 0.2279 | 0.4194 |
| Divorced | 0.7376 | 0.4399 |
| Widowed | 0.0256 | 0.1581 |
| Single (Base Category) | 0.0087 | 0.0931 |
| **Registration to Social Security Institution** | | |
| Unregistered | 0.2934 | 0.4553 |
| Registered (Base category) | 0.7065 | 0.4553 |
| **Experience** | 9.5 | 10.054 |
| **Employment Status** | | |
| Paid. salaried or casual (Base category) | 0.6598 | 0.4737 |
| Employer | 0.0671 | 0.2502 |
| Self-Employed | 0.1962 | 0.3971 |
| Unpaid Family Worker | 0.0767 | 0.2661 |
| **Number of People Working in the Workplace** | | |
| 10 or fewer workers | 0.6000 | 0.489 |
| More than 10 workers | 0.0040 | 0.0634 |
| Between 11-19 workers | 0.0563 | 0.2305 |



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| | | |
|---|---|---|
| Between20-49 workers | 0.1266 | 0.3325 |
| 50+ workers (Base category) | 0.2129 | 0.4093 |
| **Sector** | | |
| Manufacturing Sector (Base category) | 0.2431 | 0.4289 |
| Service Sector | 0.4688 | 0.4990 |
| Mining Sector | 0.0070 | 0.0835 |
| Building Trade | 0.1054 | 0.3071 |
| Agricultural Sector | 0.1757 | 0.3805 |
| **Job Classification** | | |
| Professionals(Base category) | 0.0299 | 0.1703 |
| Managers | 0.0541 | 0.2263 |
| Technicians and Associate Professionals | 0.0472 | 0.2121 |
| Clerical Support Workers | 0.0523 | 0.2226 |
| Services and Sales Workers | 0.2153 | 0.4110 |
| Skilled Agricultural. Forestry and Fishery Workers | 0.1408 | 0.3479 |
| Craft and Related Trades Workers | 0.1831 | 0.3867 |
| Plant and Machine Operators. and Assemblers | 0.1203 | 0.325 |
| Elementary Occupations | 0.1566 | 0.3634 |
| **Regions** | | |
| İstanbul | 0.1162 | 0.3205 |
| West Marmara | 0.0748 | 0.2631 |
| East Marmara | 0.1018 | 0.3024 |
| Aegean(Base category) | 0.1454 | 0.3525 |
| West Anatolia | 0.1154 | 0.3195 |
| Mediterranean | 0.1098 | 0.3126 |
| Middle Anatolia | 0.0543 | 0.2268 |
| West Blacksea | 0.0802 | 0.271 |
| East Blacksea | 0.0420 | 0.2007 |
| Northeast Anatolia | 0.0394 | 0.1945 |
| Middleeast Anatolia | 0.0467 | 0.2111 |
| Southeast Anatolia | 0.0733 | 0.2607 |
| **GDP Per Capita** | 30168.72 | 3204.571 |
| **Inflation** | 8.2551 | 0.8374 |

It can be seen in Table 2 that 21% of those, who work 45 hours or more per week, are women and 79% are men. The proportion of those between the ages of 18-24 and those in their 30s is around 14%. Overtime decreases after age 45. Considering the educational level of individuals, the proportion of primary school graduates (5 years) is approximately 39%. This rate decreases as the level of education increases. It is seen that married individuals do more overtime than single people. 66% of individuals work as paid, salaried or casual employees. Approximately 73% of low-wage individuals work more overtime. It is seen that 70% of overtime workers are registered to SSI. More than 12% of employees are located in western Anatolia according to the variable describes the region described by the Turkish Statistical Institute's Classification of Region Units Level 1. There

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is an average of 4 people in individuals' households. 47% of those who work overtime are in the service sector. The average GDP per capita in the period is 30,168.72 TL. The annual average inflation rate in the period is 8.25%.

### 4.2. Tobit regression model

The Tobit models are used when the dependent variable takes limited values. In those models, the dependent variable can be censored or truncated (Amemiya, 1985, p.360). The Tobit model can be expressed as follows:

$$\begin{aligned} y_t^* &= \mathbf{X}_t\boldsymbol{\beta} + u_t \quad \text{if} \quad \mathbf{X}_t\boldsymbol{\beta} + u_t > 0 \\ y_t &= 0 \qquad \text{if} \quad \mathbf{X}_t\boldsymbol{\beta} + u_t \le 0 \end{aligned}$$

where $t = 1,...,N$ is the number of observations, $y_t$ is the dependent variable, $\mathbf{X}_t$ is the vector of explanatory variables, $\boldsymbol{\beta}$ is the vector of coefficients and $u_t$ is the independent Normally distributed error term with the mean zero and variance $\sigma^2$ (Mcdonald & Moffitt, 1980, p.318).

The log-likelihood function for the censored regression model is:

$$\ln L = \sum_{y_t>0} -\frac{1}{2}\left[\ln(2\pi) + \ln\sigma^2 + \frac{\left(y_i - \mathbf{x_i'}\boldsymbol{\beta}\right)^2}{\sigma^2}\right] + \sum_{y_t=0}\ln\left[1 - \Phi\left(\frac{\mathbf{x_i'}\boldsymbol{\beta}}{\sigma}\right)\right].$$

This function consists of two parts; the continuous part that expresses the unlimited observations, and the discrete part that expresses the limited observations. With $\gamma = \beta/\sigma$ and $\theta = 1/\sigma$ transformations, the log-likelihood function can be expressed as (Greene, 2018: 936)

$$\ln L = \sum_{y_t>0} -\frac{1}{2}\left[\ln(2\pi) + \ln\theta^2 + \left(\theta y_i - \mathbf{x_i'}\boldsymbol{\gamma}\right)^2\right] + \sum_{y_t=0}\ln\left[1 - \Phi\left(\mathbf{x_i'}\boldsymbol{\gamma}\right)\right].$$

Since the dependent variable is censored at 45 hours, it is appropriate to use the Tobit model. The Tobit regression model offers a way of coping with left-censored data and can be viewed as a linear regression model where the response variable is incompletely observed. In this study, working hours that exceed 45 hours per week are examined and the data was censored at 45 hours. Therefore, it is best to examine the data with the Tobit model (Trejo, 1993; Bauer & Zimmermann, 1999; Bell & Hart, 1999; Hübler et. al., 2000; Jirjahn, 2008; Kim & Chung, 2016; Tsai et. al., 2016; Gralla et. al., 2017). Our model can be defined as follows:

$$\text{Overtime} = \begin{aligned} y_t^* &= \boldsymbol{\beta}^T\mathbf{X}_i + \varepsilon_i \quad \text{if} \quad \boldsymbol{\beta}^T\mathbf{X}_i + \varepsilon_i > 45 \\ y_t &= 0 \qquad \text{if} \quad \boldsymbol{\beta}^T\mathbf{X}_i + \varepsilon_i \le 45 \end{aligned}$$

where the dependent variable *overtime* refers to the share of overtime hours concerning the individual *i*. Some other methods can be seen in the literature such as Heckman model (Kalwij & Gregory, 2005), fixed effect panel regression (Chung & van der Horst, 2018; Riedy et. al., 2021), hierarchical regression (Ko & Choi, 2019; Chen et. al., 2020), logistic regression (Rivard et. al., 2020), linear regression analysis (Kikuchi et. al., 2020), meta



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analysis (Liu et. al., 2019; Wong et. al., 2019), ANOVA (Beckers et. al., 2008; Stimpfel et. al., 2019) for the studies related to overtime.

## 5. Empirical Results

Table 3 reports the estimated coefficients of the Tobit model. Since in the standard Tobit analysis, the estimated coefficients cannot be interpreted directly aside from the sign, marginal effects are included in our Tobit regression (Wooldridge, 2003). Therefore, we report both conditional and unconditional average marginal effects of overtime for a one-unit change in the independent variable.

**Table 3. Tobit Estimates and Marginal Effects of Overtime**

| Dependent variable: Overtime | Coefficient | Conditional Average Marginal Effects | Unconditional Average Marginal Effects |
|---|---|---|---|
| **Gender** (Female) | | | |
| Male | 2.7788* | 1.6341* | 2.1777* |
| **Size of Household** | 0.3358* | 0.1975* | 0.2631* |
| **Age** (65+) | | | |
| Between 18-24 | 2.9468* | 1.7329* | 2.3094* |
| Between 25-29 | 2.6477* | 1.5571* | 2.0750* |
| Between 30-34 | 2.2979* | 1.3513* | 1.8008* |
| Between 35-39 | 2.2608* | 1.3295* | 1.7718* |
| Between 40-44 | 2.0549* | 1.2084* | 1.6103* |
| Between 45-49 | 2.2565* | 1.3270* | 1.7684* |
| Between 50-54 | 1.9048* | 1.1202* | 1.4927* |
| Between 55-59 | 1.6089* | 0.9461* | 1.2608* |
| Between 60-64 | 0.8904* | 0.5236* | 0.6978* |
| **Educational Status** (Graduate School) | | | |
| Uneducated | 6.9008* | 4.0582* | 5.4081* |
| Primary School | 6.0635* | 3.5658* | 4.7519* |
| Secondary School | 5.5637* | 3.2719* | 4.3602* |
| High School | 4.3373* | 2.5507* | 4.3602* |
| University | 2.2461* | 1.3209* | 1.7602* |
| **Marital Status** (Single) | | | |
| Married | 0.1559** | 0.0917** | 0.1221* |
| Divorced | 0.7956* | 0.4679* | 0.6235* |
| Widowed | 0.3125 | 0.1838 | 0.2449 |
| **Registration** (Registered) | | | |
| Unregistered | 0.6739* | 0.3963* | 0.5281* |
| **Experience** | -0.0627* | -0.0369* | -0.0491* |
| **Employment Status** | | | |
| Employer | 5.5119* | 3.2414* | 4.3197* |
| Self-Employed | 4.5021* | 2.6476* | 3.5283* |
| Unpaid Family Worker | 5.3680* | 3.1568* | 4.2068* |



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| Dependent variable: Overtime | Coefficient | Conditional Average Marginal Effects | Unconditional Average Marginal Effects |
|---|---|---|---|
| **Median Wage x Number of People Working in the Workplace** | | | |
| Median Wage×10 or fewer workers | 1.6959* | 0.9973* | 1.3291* |
| Median Wage×More than 10 workers | 3.1092* | 1.8284* | 2.4366* |
| Median Wage×Between 11-19 workers | 0.8695* | 0.5113* | 0.6814* |
| Median Wage×Between 20-49 workers | 0.0110 | 0.0065 | 0.0089 |
| **Sector** (Manufacturing Sector) | | | |
| Service Sector | 3.7497* | 2.2051* | 2.9386* |
| Mining Sector | 2.7289* | 1.6048* | 2.1386* |
| Building Trade | 1.8870* | 1.1097* | 1.4788* |
| Agricultural Sector | 3.6462* | 2.1442* | 2.8575* |
| **Job Classification** (Professionals) | | | |
| Managers | 5.0947* | 2.9961* | 3.9927* |
| Technicians and Associate Professionals | 1.3573* | 0.7982* | 1.0637* |
| Clerical Support Workers | 0.326*5 | 0.1920* | 0.2559** |
| Services and Sales Workers | 5.2832* | 3.1069* | 4.1404* |
| Skilled Agricultural, Forestry and Fishery Workers | 0.0984 | 0.0578 | 0.0771 |
| Craft and Related Trades Workers | 1.7963* | 1.0563* | 1.4077* |
| Plant and Machine Operators. and Assemblers | 3.1548* | 1.8553* | 2.4724* |
| Elementary Occupations | 1.5069* | 0.8862* | 1.1809* |
| **Area of Residence** (Aegean) | | | |
| Istanbul | 0.4157* | 0.2444* | 0.3257* |
| West Marmara | 2.2461* | 1.3209* | 1.7602* |
| East Marmara | 0.2170** | 0.1276* | 0.1700** |
| West Anatolia | 1.4646* | 0.8613* | 1.1477* |
| Mediterranean | 1.5308* | 0.9002* | 1.1997* |
| Middle Anatolia | 1.0676* | 0.6278* | 0.8366* |
| West Blacksea | 3.5071* | 2.0625* | 2.7485* |
| East Blacksea | -0.7341* | -0.4317* | -0.5753* |
| Northeast Anatolia | 7.2449* | 4.2606* | 5.6778* |
| Middleeast Anatolia | 3.9772* | 2.3389* | 3.1169* |
| Southeast Anatolia | 4.3086* | 2.5338* | 3.3766* |
| **Macro Variables** | | | |
| GDP Per Capita | -0.0004* | -0.0002* | -0.0002* |
| Inflation*Trend | 0.0505* | 0.0297* | 0.0395* |

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| Dependent variable: Overtime | Coefficient | Conditional Average Marginal Effects | Unconditional Average Marginal Effects |
|---|---|---|---|
| **Constant** | 0.6208** | | |
| var(Overtime) | 131.8904 | | |
| Number of Observations | 276,121 | | |
| **Left-censored** | 44,658 | | |
| **Uncensored** | 231,463 | | |
| **Right-censored** | 0 | | |

*Notes: significance levels are *p<0.01, **p<0.05. The standard errors of the Tobit model are robust. Reference categories are given in brackets. The trend shows the years 2014-2017.*

### 5.1. Interpretation of estimated coefficients of the Tobit Model

***Gender***

We have found that men are working more overtime than women which concurs with other studies done on overtime (Böckerman, 2002; Chiang, 2012; Tsai et al., 2016; Anxo & Karlsson, 2019; Disk-Ar, 2020).

***Age***

It is observed that young workers work more hours than those aged 50 and over. Workers in 18-24, 25-29, 30-34 age groups are most likely to put in extra hours at overtime work.

***Education***

In our study the hypothesis "the level of education affects overtime" is not rejected. As the education level increases, overtime hours decrease and the coefficients support this result statistically. Zeng et al. (2005) found a negative relationship between the level of education and overtime. According to Bauer and Zimmermann (1999), when the time spent in education increased by one more year, a decrease is observed in overtime hours.

***Marital status***

Another factor affecting overtime is the marital status of workers. Our results show that divorced, widowed and married workers work more over time compared to singles. Similar results were obtained in previous studies (Carr, 1986, p.37; Trejo, 1993, p.264; Bauer & Zimmermann, 1999, p.10; Bell & Hart, 1999, p.287; Anxo & Karlsson, 2019).

***Household Size and Experience***

As the number of people living in the household increases, the number of overtime hours' increases. Anxo and Karlsson (2019, p.29) have compared Spain, Romania, Turkey, United Kingdom, Denmark, and Germany. They have found that in Turkey, like other countries, in the research, overtime rate was low among the single workers and younger cohabiting couples without children, while larger household size causes more overtime, especially among men. As the experience of the individual increases, overtime hours' decrease. Hart & Ma (2010, p.172) analyzed the relationship between tenure and experience and overtime. As a result of the same analysis, it is concluded that overtime decrease as the total work experience increases.

***Register to SSI***

In our study the hypothesis "workers who are not registered with the SSI work more overtime" is not rejected. Informal workers work more overtime. Long working hours and



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overtime are common among informal workers, this is the result of their desire to compensate for their low wages (Saget, 2006; Tsai et al., 2016, Disk-Ar, 2020).

***Working status***

According to the results, employers, unpaid or family workers, self-employed workers work more overtime than paid employees. In Japan, employers work much more overtime than paid employees. Overtime is higher, especially among employers who run small businesses in China and South Korea (Tsai et al., 2016). On the other hand, in small scale enterprise that employs up to 10-20 people, workers whose wages are below average work more overtime. Thus, our hypothesis "as the organization or workplace is small in terms of the number of workers, so workers work more overtime" is not rejected. Workers who work in small scale workplace earn an income less than workers who work large scale and corporate workplace (Nopo, 2012; Disk-Ar, 2020). As mentioned earlier, the low wages are a factor that increases the rate of overtime. On the other hand, small scale enterprises may need to work overtime due to surviving in competitive conditions.

***Sectors and regions***

Concerning sectors and regions, weekly overtime hours vary by sector, and in our study, overtime is higher in the service and mining sectors compared to the manufacturing sector. For this reason, the hypothesis "workers who employ in service sector work more overtime" is not rejected. Also, according to Eurostat data, 52 hours of working hours per week in the mining sector decreased by years. It decreased to 50.1 hours in 2015, 49.2 hours in 2016, 49.5 hours in 2017 and finally 48.8 hours in 2018 (Eurostat, 02.08.2019). According to EUROSTAT data, weekly working hours in the mining sector in Turkey are still higher than legal working time, even if it declines over the years. Compared to the legal practice in question, the working hours in the mining sector are quite long.

Individuals work overtime in all regions except the Eastern Black Sea region compared to the Aegean region. Gralla et al. (2017) concluded that people living in the developed parts of Germany work more overtime than those in rural areas.

***Macro variables***

When the impact of macro variables on overtime is examined, the impact of GDP per capita on overtime is negative. Since income growth increases the alternative cost of leisure time, workers are expected to prefer to work more in this situation (substitution effect). However, income growth may also increase leisure preferences (income effect). In this case, the individual prefers to devote more time to himself/herself due to increased income. Since the increase in income increases the alternative cost of leisure time, economic units are expected to prefer to work more in this situation (substitution effect). However, the increase in income may also increase leisure time preferences (income effect). In this case, the individual prefers to devote more time to himself/herself due to increased income (see Gratton & Taylor, 2004; Borjas, 2016; McConnell et al., 2017; Ehrenberg & Smith, 2017). The net effect varies depending on which one is more dominant. The existence of a negative relationship between GDP and overtime shows that the income effect is more dominant than the substitution effect for the period 2014-2017 in Turkey. As can be seen from Table 3, the increase in inflation causes more overtime. The positive relationship between inflation rate and overtime hours is theoretically expected. Since the increase in the inflation rate brings down the real income of economic units, individuals might attempt to compensate their loss not to decrease living standards by increasing working hours in periods of high inflation (Joint Economic Committee, 1974).



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**Interpretation of the marginal effects**

Table 3 summarizes the detailed results for the marginal effects. When the effects of other variables are held constant, men work an average of 1.63 hours more per week than women. When the age categories were examined, it was found that those between the ages of 18-24 worked an average of 1.73 hours longer than those aged 65 and over, and a decrease was observed in overtime as the age increased. When the education levels of the individuals were examined, it was seen that individuals who did not graduate from school worked an average of 4 hours more per week than those who had education above the university. As a result, as the education level increased, a decrease was observed in weekly overtime hours. While the real wage is below the median wage level, it has been found that individuals in small-scale workplaces work 2 hours more per week. The workers in the manufacturing sector work around 2 hours more per week in the service sector. According to those in the professional group, managers have 5 hours, service and sales staff worked 3 hours longer than professional. Compared to wage earners, employers and self-employed workers work around 3 hours more per week, while unpaid family workers work around 2 hours' overtime. When the regions were examined, it was found that the individuals worked 1.33 hours longer in the West Marmara region, 4 hours in the North East Anatolia region, 2.33 hours in the Middle East Anatolia region, 2.5 hours in the South East Anatolia region, and 2 hours more in the Western Black Sea region compared to the workers in Aegean Region. East Marmara and Aegean Regions are places where economic activities and paid employment are very intense. The general economic structure of the Eastern and Southeastern Anatolia regions is based on agriculture and animal husbandry (Kamacı, 2016, p.27). In Eastern and Southeastern Anatolia, overtime is unpaid family workers and informal employment. On the other hand, educated employment is higher in the Marmara, Aegean, and Mediterranean Regions compared to the Eastern regions (Kamacı, 2016, p.28). The low level of education indicates that overtime is more in the eastern regions.

## 6. Discussion and Conclusion

In this study, the factors that affect the working overtime of individuals in the private sector were analyzed through demographic variables, variables related to working conditions, and macro variables. As a result, demographic variables such as gender, age, education, marital status, and household size were found to be effective over overtime. Variables that are related to working conditions such as experience, status at work, sector, registry state to SSI, the scale of the enterprise in terms of the number of workers, and region were found effective for overtime. Finally, macro variables such as the effect of inflation and GDP per capita on overtime were analyzed, and significant results were achieved. Concurring with Böckerman, 2002,p.40; Chiang, 2012, p.128; Tsai et al. 2016: 709; Anxo & Karlsson, 2019, p.37; and Statistica, 2020), we found that men were working more overtime than women. These gender differences are consistent with women who take more of the household and childcare responsibilities than men which limit their work availability in the process (Bertrand et al. 2015, p.573; Bolotnyy & Emanuel, 2019, p.14; Das & Kotikula, 2019, p.33).

It is emphasized that longer working hours are an important way of earning a "decent" income among workers with low education because higher education brings high income. In this study, it is shown that overtime decreases as the total work experience



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increases in working life that is in line with Hart and Ma (2010, p.172). On the other hand, working status is also one of the determining factors of overtime. Unpaid family workers and self-employed people live on their own, or their families' labor and small amounts of personal capital (Wright, 1986, p.126). Therefore, they tend to have overexploitation of their labor to secure their labor market situation (Harrel, 1985, p.216).

Overtime is more common among lower-wage earners. Generally, people living in rural areas are expected to work more overtime. Since individuals living in these regions obtain lower wage income in general, they can work more hours that satisfy their own, or their employers' wishes. Apart from this, people may prefer to work overtime as they need more income for a better life and for living in big cities or metropolitan areas.

Finally, the main contribution of our study is to introduce two macro variables namely GDP and inflation as determinants of overtime in Turkish private sector. We found the impact of GDP per capita on overtime is negative. The existence of a negative relationship between GDP and overtime shows that the income effect is more dominant than the substitution effect for the period 2014-2017 in Turkey. In addition, we found that the increase in inflation causes more overtime. The positive relationship between inflation rate and overtime hours is theoretically expected. Due to the increase in the inflation rate, real income decreases. Individuals aim to keep their living standards the same by working overtime during periods of high inflation

Before we conclude, we have to point out the weaknesses of our article. Since the TurkStat Household Labour Force Survey did not ask whether workers are unionized and the level of overtime wages, the variables were not included in this study. The addition of such variables and comparisons with other developing countries seem promising for future studies.



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