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Research Article

Underutilisation of Labour: Underemployment and Skills-Mismatch in Turkey[a]

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This paper aims to reveal the extent and characteristics of under and inadequate forms of employment in Turkey. Our descriptive analysis using the Household Labour Force Surveys of 2014-2021 shows that despite not being unemployed, many people do not work in their full capacity or cannot enter the workforce, although they are willing to do so. In addition, the size of these groups varies due to age, sex and education level. To better understand the demographic and socioeconomic determinants of skill-related underemployment, the incidence and evolution of education-occupation mismatch are investigated using the Income and Living Conditions Survey (SILC) of 2016-2021. The results of the multinomial logit models using SILC-2021 indicate that age and education effects are similar for both sexes, but marital status, number of kids and household size have diverging effects for men and women. Moreover, the effects of household income, excluding the respondents' income, social transfers and social security registration in the household confirm the reservation income hypothesis.

JEL codes: A14, J01, J10, J24, C31

Keywords: Underemployment, Youth unemployment, Skills-mismatch, Education-occupation mismatch

1 Introduction

The first aim of this study is to investigate the notions of underemployment and inadequate employment in Turkey so as to better understand the size and characteristics of these groups among the working-age population. It is hard to say that there is a consensus on the definition of the concept of underemployment in contemporary economics literature. This is probably due to the fact that the concept is multi-faceted and one of the hardest concepts to measure. The International Labour Organisation (ILO) defines underemployment in relation to full employment, which is "*the condition that everyone who is looking for jobs can freely find jobs that match their skills and are as productive as possible*" (Greenwood, 1999). Based on the full employment definition, underemployment can be skill-, earnings-, or time-related (ILO, 1998). In other words, if employed people are working in jobs that do not

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match their skills, or in jobs that they earn less than they desire or deserve, or if they work part-time although they want to work full-time, they are categorised as underemployed. On the other hand, despite adopting a similar definition for underemployment, The Organisation for Economic Cooperation and Development (OECD) makes a distinction between the visible and invisible types of underemployment (OECD, 2002); a worker is categorised as visible underemployed if s/he is seeking another job because of being underemployed.

To better understand the concept of underemployment, it is best to investigate how it emerged. Unemployment is the most used measure among labour market statistics, but claiming that it is the best indicator for understanding issues related to employment and non-employment in the labour market is not possible. The concept of underemployment has been suggested to overcome these difficulties ILO (1998). As emphasised in the ILO definition, existing jobs do not meet the expectations of a considerable number of employees. Although these people are considered employed, they do not function at their maximum capacity due to labour market-related problems. For example, they work part-time while they can and are willing to work full-time or in jobs that require lower qualifications than they have. Moreover, many people who are not working due to various reasons are not counted as unemployed because they are not actively seeking jobs. Thus, there are other concepts broadly defining unemployment, including labour underutilisation, and people not in education, employment or training (NEET) that cover a quite high number of people (ILO, 1998; Sengenberger, 2011). However, statistics about these groups are not published as regularly as unemployment in many countries. For instance, the Turkish Statistical Institute (TURKSTAT) publishes only time-related underemployment statistics but, for other types of labour underutilisation, began publishing supplementary labour force indicators only in January 2021. In this respect, we also depict a descriptive picture of groups in the Turkish labour market who are not seeking jobs or who are willing to change their jobs due to problems in the labour market for different age and education level groups.

This study secondly aims to identify the socio-demographic characteristics that are associated with skill-related underemployment in particular. Finally, we focus on skill-related underemployment, statistics of which have not been released by TURKSTAT. Via regression models, we investigate the demographic and socioeconomic variables related to skill-related underemployment to find out which social groups are more likely to have an education-occupation match, to be underemployed or to stay out of employment. This way, we aim to get a holistic view of the different forms of labour underutilisation (as defined by ILO, Sengenberger, 2011) among the working-age population in Turkey.

The study contributes to the extant literature on three aspects. Firstly, to get a better view of society, the analyses cover the entire working-age population, unlike most of the studies focusing only on employed individuals. Second, we outline the characteristics of the underutilised labour in Turkey instead of just calculating the overall size of them. Third, in addition to individual characteristics, income, social security status and social transfers of the members of the household are taken into account to better understand the factors related to underemployment status.

The structure of this paper is as follows. Section 2 provides the literature review. Section 3 introduces the data and methods we use. In Section 4, we first present descriptive statistics about supplementary labour force indicators and skill-related underemployment. Then, we present our regression models and discuss the results in relation to the extant literature in the same section. Finally, we summarise our findings in Section 5.

2 Literature Review

The concept of underemployment has not been as popular as unemployment in the academic literature partly because underemployment is defined on subjective criteria, unlike unemployment (Feldman, 1996). However, various studies showed that the unemployed and the underemployed have similar experiences compared to the adequately employed (Kinicki et al., 2000; Leana & Feldman, 1995; Wilkins, 2007). In their review, McKee-Ryan & Harvey (2011, p. 964) identifies several terms for underemployment: "inadequately employed, underutilised, underpaid, overeducated, over skilled, and overqualified or as having low skill utilisation or reemployment quality".

In another review, Feldman (1996) summarises the causes of underemployment in the literature as economic factors, job and demographic characteristics, career history, and job search strategies and argues that economic recessions cause underemployment rates to increase. This is confirmed in several studies after the 2008 recession (Jefferson & Preston, 2010; Tam, 2010) or the COVID-19 pandemic (Dean Avila & Lunsford, 2022; Khan et al., 2021). Existing literature also shows that underemployment is experienced more in certain professions such as executives (Feldman & Leana, 2000), retail sales workers (Erdoğan & Bauer, 2009) or technicians and associate professionals (Philp & Wheatley, 2013). Feldman (1996) proposed that employees who have been laid-off recently (Feldman et al., 2002), who have been unemployed for a long time (Virick & McKee-Ryan, 2017) and who have become career plateaued (More & Rosenbloom, 2022) are more likely to be underemployed, whereas an early start in job hunting, an intensive job search effort, geographical relocation to seek jobs and retraining may reduce the possibility of underemployment. However, McKee-Ryan & Harvey (2011) concluded that there are mixed results about these hypotheses.

Demographic characteristics like sex, age and education level may also be related to underemployment. For example, women, especially women with children, are required to find a new job more quickly than men after leaving their jobs. There are several studies that found higher rates of underemployment among women (e.g., Acosta-Ballesteros et al., 2021; Jefferson & Preston, 2010; Jensen & Slack, 2003; Kamerade & Richardson, 2017; Mau & Kopischke, 2001). The fact that women concentrate on jobs which are usually part-time and low-paid and men get jobs which produce better rewards for similar qualifications is argued to be the main driver behind this pattern (Acosta-Ballesteros et al., 2021; Kamerade & Richardson, 2017). However, McKee-Ryan & Harvey (2011) pointed out that there are studies showing no relationship between sex and underemployment, such as in the USA, Belgium, England, Italy, Portugal, Spain and the Netherlands, or there are also studies showing higher underemployment rates for men such as in Portugal, the USA, Canada and the UK. Another demographic factor related to underemployment is age. Tam (2010) showed that underemployment peaks at early ages, then declines and eventually increases again in older ages. MacDonald (2011) argued that for young people, underemployment has been becoming a transitory state between school and work. This hypothesis has been corroborated with research in different countries (Allen, 2016; Mendoza et al., 2020; Suleman & Figueiredo, 2020). There are also studies pointing out the increased risk of underemployment among working people who are close to their retirement age or who have been retired (Chan & Stevens, 2004; Koeber & Wright, 2001) because they take on bridge jobs to have a smooth transition from working life to retirement and these jobs are usually interim, part-time, less-paid and demanding lower skills jobs (Virick, 2011). There is mixed evidence about the relation between underemployment and education level (McKee-Ryan & Harvey, 2011). There are studies showing the negative relationship between the level of education and underemployment in Spain (Acosta-Ballesteros et al., 2021), in the USA (Jensen & Slack, 2003), in Canada (Weststar, 2009) or in Australia (Doiron, 2003). Acosta-Ballesteros et al. (2018) conclude that specific and work-oriented skills such as sciences, technology and health help workers avoid underemployment. On the contrary, others found inverse or no relationships (Holtom et al., 2002; Johnson & Johnson, 2000).

There is also a wide literature on skill-related underemployment, which defines two types of skills mismatch: horizontal and vertical (McGuinness et al., 2017). Horizontal mismatch refers to a non-matching individual's field of study with the requirements of the job they have, although they obtain the correct amount of education. However, in this study, we focus only on vertical mismatch where workers have higher levels of schooling than the requirements of their job, or vice versa. These conditions are also called overqualification (or overeducation) and underqualification (or undereducation). Various characteristics of the overqualified are identified in the extant literature, and one of the most observed differences is due to sex. Several studies in different contexts found that skill-related underemployment is more prevalent among women (Büchel, 2001; Groot & van den Brink, 2000; Haddad & Habibi, 2017; Moro-Egido, 2020; Renes & Ridder, 1995). Bauer (2002) showed that underqualification is also observed more frequently for women in Germany. Frank (1978) argued that especially married women are more prone to overqualification. He criticised the explanations of the gender pay gap that are only focusing on the personal characteristics of men and women by arguing that men are the main breadwinner in households and they are the ones to find jobs first, and usually, the job options have to be limited for women. So, there is a higher possibility for women to accept less skilled jobs. This hypothesis was refuted in several studies based on data from various countries such as the USA (McGoldrick & Robst, 1996), Switzerland (Frei & Sousa-Poza, 2012) or Sweden (Johansson & Katz, 2007). Similarly, married individuals are found to be less likely to be overskilled in Iran (Haddad & Habibi, 2017) and South Africa (Grapsa, 2017). On the other hand, using panel data from Germany, Büchel & Battu (2003) showed that married men and women in rural areas where the commuting distances are longer tend to be more overqualified. Moreover, women with children are more likely to be overqualified than other women in the USA (Johansson & Katz, 2007) and in Sweden (children less than age six, Addison et al., 2020).

Another demographic variable related to educational mismatch is age. Younger people are shown to be more likely to experience underemployment due to skills (Dekker et al., 2002; Sicherman, 1991; Sutherland, 2012; Vera-Toscano & Meroni, 2021). Some studies used experience as an estimator instead of age and found similar results, i.e. the probability of being overeducated is negatively correlated with years of work experience (Alba-Ramirez, 1993; Haddad & Habibi, 2017; Johansson & Katz, 2007). Dekker et al. (2002) argue that young or less-experienced workers might accept jobs requiring lower skills than they have to compensate for other human capital attributes like on-the-job training or experience.

The number of studies on underemployment is quite limited in Turkey. This is mostly due to the lack of available data on the topic. Still, there are few studies exploring the topic using TURKSTAT data, some of which have investigated the factors related to underemployment using the Household Labour Force Survey (HLFS) (Taşçı & Darıcı, 2010; Kumaş & Çağlar, 2011; Görmüş, 2019, using 2006-2008, 2009, and 2016 waves, respectively) though they are limited to time-related underemployment. On the other hand, the number of research on skill-related underemployment is even more limited due to the lack of data availability. Recently, Filiztekin (2015) investigated the variables related to skills mismatch and found out that education, sex, marital status, previous job experience, trade union membership and social security status are all related to skills mismatch.

3 Data and Methods

As mentioned above, one of the aims of the paper is to describe the size and characteristics of several groups in the labour market that are also labelled as supplementary labour force indicators by the Statistical Office of the European Union (EUROSTAT). These groups are time-related underemployed, potential labour force, underutilised labour, and inadequately employed. TURKSTAT has been collecting information about these characteristics via HLFS and releasing aggregated statistics about these groups since 2014.[1]

The second part of the paper is devoted to skill mismatch. At first, the dynamics of education-occupation match is discussed utilising the five recent Income and Living Conditions Survey (SILC) of TURKSTAT as well. Secondly, the determinants of education-occupation mismatch are clarified with a special emphasis on the impact of household income and social transfers. In doing so, the 2021 SILC data set was used.[2]

Before going on with the size and characteristics of supplementary labour force statistics in Turkey, we need to define them. TURKSTAT defines time-related underemployment as the number of people working for less than 40 hours per week despite being willing to work more among the total workforce. Hence, we identified respondents in the HLFS as time-related underemployed if they are working less than 40 hours per week, willing to work for more hours and ready to start working full-time in two weeks.

The potential labour force is defined in Labour Force Statistics (LFS) as the ones who are neither working nor unemployed among the working-age population, who seek jobs but are not ready to start working or who do not seek jobs but are willing to work and ready to start working in two weeks. Thus, among the working-age population, respondents who are identified as "not in the labour force" are the ones who said they had not actively sought jobs for the last four weeks but were available to start working in two weeks. On the other hand, the ones who said they had sought jobs but were not available to start working in two weeks are identified as the "potential labour force". The rate of the potential labour force is the percentage of the number of people in the potential labour force to the sum of the labour force and potential labour force.

Composite measure of labour underutilisation is a composite measure calculated using three categories: unemployment, time-related underemployment and potential labour force. It is calculated by dividing the sum of these three categories by the sum of the labour force and potential labour force, and the result is multiplied by 100.

The final category[3], inadequate employment is defined as the ones who are employed but not time-related underemployed, have applied or have sought jobs for the last four weeks and are ready to start working in two weeks. The question about availability to start in the new job in two weeks was removed from the HLFS questionnaire in 2021. Thus, inadequate

[1] https://data.tuik.gov.tr/Bulten/Index?p=Labour-Force-Statistics-2020-37484.

[2] Data sources and variables utilised in discussions and analyses in Table A.1 in the appendix.

[3] See Table A.2 in the appendix to capture the difference between these four categories more clearly.

employment could be calculated for the years from 2014 to 2020. In the second part of the paper, we switched to another data set, the SILC data, to measure education mismatches and identify the variables that are associated with job-education mismatch.

There are various approaches to conceptualise skills mismatch, two of which –vertical and horizontal mismatches– were discussed above. In addition to these, skill shortage (surplus), skill gap, overeducation (undereducation), overqualification (underqualification), and skills obsolescence can be listed among the frequently discussed types of skills mismatch (ILO, 2014; McGuinness et al., 2017). One may also argue that there are two main forms of mismatches, which are qualification mismatch and skill mismatch (ILO, 2018). In this part of the paper, we focus on qualification mismatch or mismatch by level of education. In other words, we concentrate on overeducation and undereducation in Turkey.

After deciding which definition to go with out of four alternative approaches for measuring over and undereducation - namely, normative, statistical, self-assessment, and income ratio (ILO, 2014), it remains to determine how we scale it. We chose the normative measure[4] which was a necessity rather than a choice.[5] In the normative measure, the minimum level of educational attainment (along with ISCED levels) is identified for occupational groups. The underlying idea is that each ISCED level is matched with skill levels, and each skill level is matched with occupations.[6]

Turkish labour market data in all surveys (HLFS, HBS and SILC) allow us to work with the major occupational groups listed under first-digit ISCO-08 levels. Considering the categories of educational level in each survey, HLFS is not compatible with ISCED 97 levels, where two-year college and university are aggregated in one level. Thus, if we chose to work with HLFS data, we would end up with three skill levels instead of four. However, we could identify two-year college graduates that match with ISCED level 5 in the SILC and HBS data. Besides, there is no information about household income or expenditure in the HLFS that can be utilised among the explanatory variables in modelling overeducation. Therefore, we were left with two data options, SILC and HBS, and chose to work with the SILC data since it has both a larger and more heterogeneous sample than the HBS.

In our descriptive analysis, we disaggregate education-occupation mismatch categories with respect to the levels of mismatch as discussed in the methodology note of the Uni-Veri (Human Resources Office, 2022). Specifically, if the difference between the actual and required skill levels for an occupation is one, it is considered a low-level mismatch (it could be either overeducation or undereducation), but if it is three, which is the maximum, it is regarded as a high-level mismatch. Thus, "*the value approaching three indicates that the person [graduate] is working in a job which requires much less qualifications than s/he has*" (Human Resources Office, 2022, p. 2). If there is a match, the difference would be zero.

[4] For a brief discussion on the advantages and disadvantages of each approach, see ILO (2014, 2018). The main disadvantage of the normative approach is that a broad range of occupations are matched with the ISCED levels from 4 to 8. As a result, what we measure is an underestimation of the mismatch in Turkey. If occupations were given at two digits, we would be more likely to encounter education-occupation mismatch.
[5] Alternatively, we could have utilised years of schooling instead of ISCED 97 levels. However, education level is not collected in years in SILC data in Turkey. There are some studies in Turkey using the self-assessment approach (Duman, 2018) or OECD Survey of Adult Skills data (OECD, 2016), but the questions containing the necessary information for these calculations are not available in the data set we use.
[6] Table A.3 in the appendix provides the details of matching applied.

The descriptive analysis is complemented by model estimation, through which we try to shed light on the role of socioeconomic characteristics in labour market participation decisions. In other words, we aim to identify the effects of certain demographic and household characteristics on skill mismatch. In doing so, we use a multinomial logit (MNL) specification and identify four different labour market states, three of which are defined with reference to educational mismatch. The MNL model specifies that

$$Pr(y = m|x) = \frac{exp(x\beta_{m|b})}{\sum_{j=1}^{J} exp(x\beta_{j|b})}, \quad m = 1, \dots J$$

where x denotes explanatory variables and m is the labour market states of an individual. In order for such a model to be identifiable, one outcome needs to be specified as the base outcome (or reference category), which is b here. It follows that $\beta_{b|b} = 0$. The parameters of the model are estimated by the maximum likelihood estimation method.

We have four labour market states in our model, namely overeducated, matched, undereducated and non-employed. We use "non-employed" for those who are either unemployed or not in the labour force. The base outcome is identified as "matched" in the models. The MNL model is estimated for men and women aged between 15 and 64. Although it is repeated for each year in between 2016-2021, we provide and discuss the results only for the 2021 sample in the text[7]. The reason for discussing only 2021 sample results is that it is the most recent survey, and there are slight differences in estimation results (only in magnitudes, but not signs) across the years.

The explanatory variables in the MNL analysis include demographic characteristics of the individuals (age[8], education, marital status), characteristics of the households (number of kids at home under age 6, household size), non-wage benefits associated with the household (dummy variables for transfer income and social security registration status), household income excluding the respondents' labour income and dummies for the region of residence.

Each education level is matched with the year corresponding to that education level and used as such in the models. Non-wage benefits are captured by two dummy variables for transfer income and social security registration. If the respondent gets any social transfer-/benefit[9] in cash, such as unemployment benefit, old-age pension, etc., the "social transfer dummy" is coded as one; zero otherwise. On the other hand, the "social security registration dummy" is constructed at the household level rather than the individual level: if there is at least one person who is registered to social security other than the individual herself, it would be coded as one; zero otherwise. "Household income except for his/her labour income" is obtained by subtracting the respondent's labour income from household net annual disposable income. As in the social security registration dummy, we aimed to control the status of the household with this covariate.

[7] All descriptive statistics and estimation results are available upon request.

[8] To account for the nonlinear effect of age on labour force participation decisions, we have also added the square of age, which was excluded as it was insignificant. Although we wanted to control the experience, we had to exclude it as experience is higher than the age of 356 respondents in the 2021 SILC sample. Besides, it is argued that age and experience are closely correlated to each other.

[9] This is the total of unemployment benefits, old-age pension/benefits, family/children benefits, education grants, voluntary pension, sickness benefits, disability/occupational disability pension, and veteran salary.

4 Findings and Discussion

Results are presented under two subsections.[10] First, the descriptive statistics of supplementary labour force statistics are presented. These are time-related underemployment, potential labour force, composite measure of labour underutilisation and inadequate employment. These figures are constructed using 2014-2021 HLFS data and with respect to age and education. These are complemented with a closer look at skill-underemployment via utilising 2016-2021 SILC data. Lastly, we investigate the dynamics of labour force participation decisions through MNL models in which overeducation, undereducation, matching and non-employment constitute the categories of our dependent variable.

4.1 Characteristics of supplementary labour force indicators

Figure 1 depicts the frequency distributions of the supplementary labour force indicators by age and education groups. The size of time-related underemployment is rather small in the Turkish labour market. However, it has almost doubled since 2020, when the COVID-19 pandemic started. It went from 1.84% in 2014 to 3.20% in 2021. The increase is similar

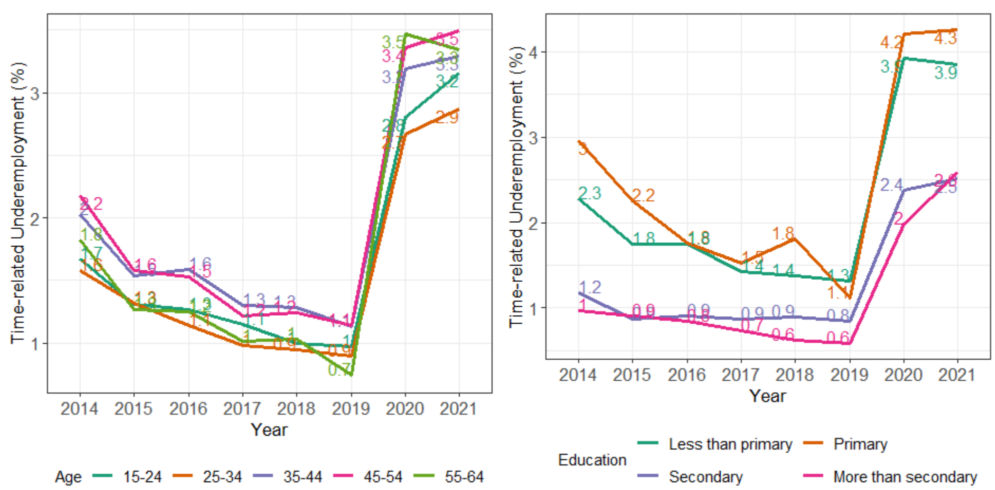

Figure 1: Time-related underemployment by age and education.
Data: TURKSTAT, HLFS, 2014-2021

across all age and education groups. Among education groups, the increase is steeper for primary school graduates and less educated. Considering precautionary measures during the pandemic in Turkey, such as short-time working allowance and remote working, this is an expected change and in line with many other developed and developing economies (Bell & Blanchflower, 2020; Gould & Kassa, 2020; Meyer & Mncayi, 2021).

While underemployment is a condition of employment, the measure of potential labour force is a form of non-employment which is not counted as unemployment. It is seen in Figure 2 that there was a gradual decrease from 2014 until the pandemic year 2020. In 2019, the potential labour force was 6.5% of the total working-age population. In 2020, it

[10] Sample sizes of each SILC and HLFS are available in Table A.4.

reached 12% and then dropped to 8.8% in 2021. This pattern is similar across age groups, though the youngest and oldest age groups had the highest rates across years and have been affected most by the fluctuation. This is also in line with recent post-pandemic research

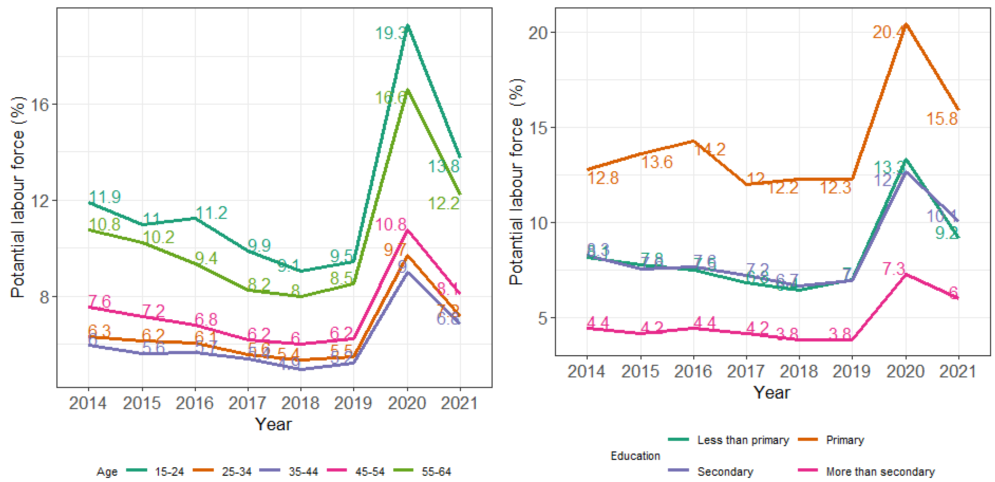

Figure 2: Potential labour force by age and education.
Data: TURKSTAT, HLFS, 2014-2021

across the world (e.g., Aina et al., 2021; Espi-Sanchis et al., 2022; Hlasny & AlAzzawi, 2022). Across education groups, primary school graduates have the highest rates of the potential labour force, while the highest-educated group has the lowest rates. For the US, Kesler & Bash (2021) showed that less educated individuals, especially those with children, have the highest probability of dropping out of the labour force (non-participation) during (after) the pandemic. Our results hint at a similar relationship for the Turkish case.

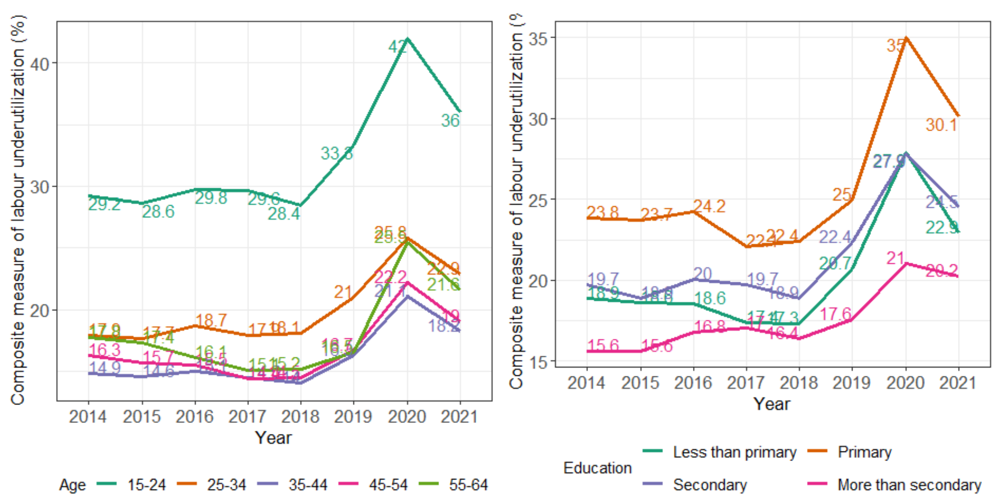

Figure 3: Composite measure of labour underutilisation by age and education.
Data: TURKSTAT, HLFS, 2014-2021.

Not surprisingly, we see the same fluctuation for the composite measure of labour underutilisation, which is composed of unemployment, time-related underemployment and potential labour force, Figure 3. The youngest age group diverges substantially from other age groups. For education groups, a similar trend as in the potential labour force is visible.

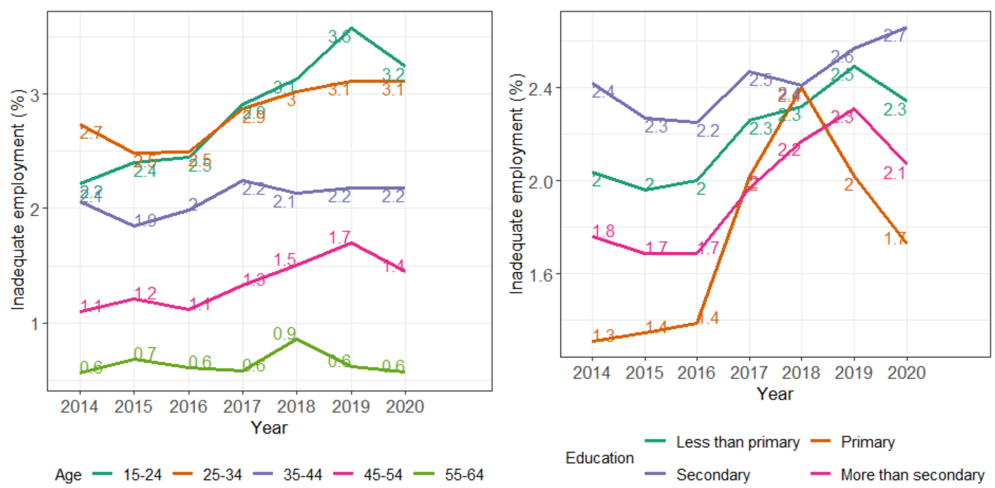

Figure 4: Inadequate employment by age and education.
Data: TURKSTAT, HLFS, 2014-2021.

Figure 4 shows the distribution of inadequate employment across age and education groups between 2014 and 2020. By age groups, there is virtually a ranking from the youngest age group to the oldest, while the youngest has the highest rates and the oldest has the lowest, particularly after 2017. Across education groups, primary school graduates have the biggest fluctuation. They had the lowest rates between 2014 and 2016, and then had almost the highest rate in 2018 and then dropped to the lowest following year. Here, it should be underlined that primary school graduates comprise the biggest group in the working-age population, with a size of about 50%.

4.2 The size and characteristics of education mismatches

In this sub-section, we present the underemployment problem in Turkey with reference to the education-occupation mismatch. To do so, we first refer to the distribution of skill levels of men and women aged 15-64 between the years 2016 and 2021. Then, we illustrate the labour market status of the working-age population by skill level using the SILC-2121 data, separately for men and women. Lastly, we focus on the distribution of employees due to their (mis)match positions again using the SILC-2121 data.

Figure 5 shows the distribution of the working-age population by skill levels. Educational attainment has been improving between 2016 and 2021, especially for women. The percentage point increase in skill level 4 among males from 2016 to 2021 is less than the one for females. The share of men with at least a university education increased from 11.7% in 2016 to 14.8% in 2021 (26.5% increase), whereas those figures are 9.5% and 13.1% for women (37.9% increase). Nevertheless, most primary and high school graduates (skill levels

Figure 5: Skill levels of men and women aged 15-64.
Data: TURKSTAT, SILC, 2016-2021.

1 and 2, respectively) constitute the majority of the working-age population, even in 2021. Although it has been decreasing, for 42.3% of women, the highest attained education level is primary school in 2021. The same figure for men is almost two-thirds of that. In sum, women are not only low-educated but also have lower labour force participation (Figure 6).

Figure 6: Employment status of the working-age population by sex and skill level.
Data: TURKSTAT, SILC, 2021.

Of the working-age men with level 1 skills in 2021, 67.4% were employed, and 23.4% were out of the labour force (Figure 6). For women in the same group, it is quite different: 24.1% were employed, and 74.8% were out of the labour force. This suggests that even if males are low-skilled, they are employed, and it is parallel to the findings of Uraz et al. (2010, p. 6): “For the male population, not having any formal education or having low levels of education is not a deterrent in entering the labour market both in urban and rural areas in Turkey". Women with level 2 skills have the lowest levels of participation in the labour market: 21.4% of them are employed, whereas this figure is 60.9% for men with the same level of skills.[11] As Uraz et al. (2010, p. 7) argues, this may be due to the lack of available jobs for women and the low pay associated with them since "(...) the earning potential for low-skilled women in urban areas might not be 'high' enough in Turkey to justify them leave home for work". As a confirmation of the statement that "*the higher the education level of women, the more likely they are to be employed*", 44.1% of women with skill level 3 were employed, and it rises to 64.1% for women who were at least university graduates (skill level 4) in 2021. Those figures were 79.8% and 83.6% for men, respectively.

One more disaggregation of the working-age population is the distribution of those in employment among the working-age population by education-occupation mismatch levels, as displayed in Figure 7. Among the overall employed population, the percentage of the matched employees is 50.7%[12], while 17.2% are overeducated, and 32.1% are undereducated.[13] The shares of matched, overeducated, and undereducated individuals decrease to 25.1%, 8.5%, and 15.9%, respectively, when we consider the same ratios within the working-age population. These decreases are due to the high number of unemployed individuals and the ones not participating in the labour force among the working-age population. These numbers show that skills-related underemployment is a much bigger phenomenon compared to other forms of underemployment or underutilised labour in Turkey.

Figure 7 provides the distribution of the working population according to the degree of occupation-education (mis)match separately for men and women and for each skill level. An overeducation status cannot be expected for people with skill level 1 because this group has the lowest education. When we look at the figures for skill levels 1 and 2, there are different patterns for men and women in terms of the distribution of mismatch levels within the working-age population, although the general pattern, i.e., the distribution within the employed population, is the same. What we mean by the general pattern being more or less the same is that 69% of women and 77.5% of men with skill level 1 and lucky to be employed are found to be associated with low undereducation mismatch. The ones who are employed and high school graduates are mostly likely to work in jobs that match their skills, regardless of their sex (i.e., 70.5% of men with skill level 2 in employment have an education-occupation match, and it is 66% for women). The reason why we see more low-level undereducation mismatch for skill level 1 is that occupations that are associated with skill level 2 are more than the ones for skill level 1 (see Table A.3). This is parallel to the main limitation of the normative measure to investigate education mismatches. This explanation also applies to why there are few people who have the education-occupation match for skill level 1.

[11] These figures reflect the same pattern in Dayıoğlu & Kırdar (2010, p. 4). Although the data they use is from 2006, it is quite sad that nothing has changed in the last 15 years.

[12] There is not a substantial difference between sexes: 50.6% of males and 50.9% of females working in a matched job in 2021. 16.7% of males and 18.5% of females are overeducated.

[13] The percentage of workers with skill mismatch for selected OECD countries for 2011-12 ranges from 18% to 33% on the basis of the OECD Survey of Adults Skills (Adalet McGowan & Andrews, 2015). However, in European countries, the percentage of mismatches seems to be much higher than in the OECD countries "*In country studies reported in the literature, between 10 per cent and one-third of the employed are found to be overeducated, and around 20 per cent are undereducated, which results in a total mismatch of between 30 per cent and 50 per cent of the employed in European countries*" (ILO, 2014, p. 8). For a comprehensive literature review on skills mismatch, see Sala (2011) and Caroleo & Pastore (2013).

When we consider matching profiles of the individuals with skill levels 1 and 2 within the working-age population rather than employment (Figure 7), there is a huge difference between men and women. The proportion of women in all categories is considerably lower than that of men. It is because of the fact that female labour force participation is so low, especially when they are less educated (Figure 6).

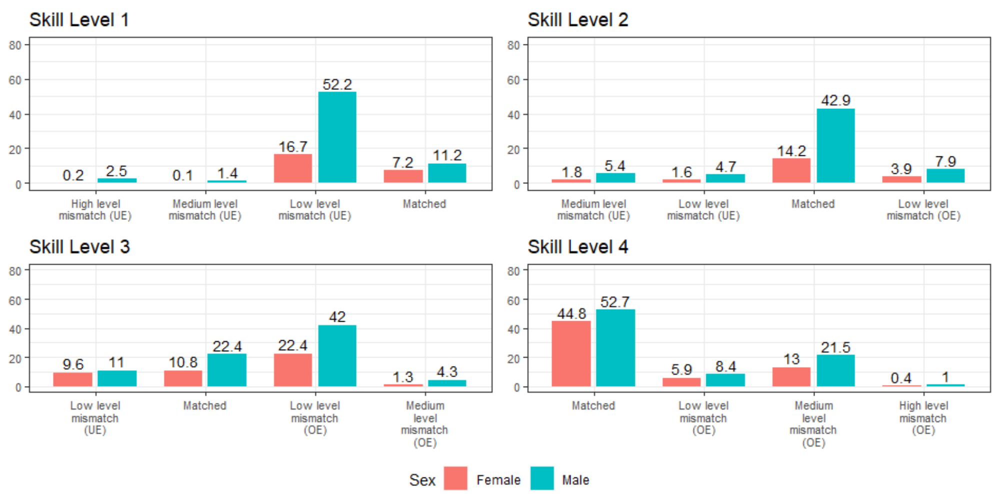

Figure 7: The percentages of the match status of the employed population to the total working-age population in every skill level by sex. Data: TURKSTAT, SILC, 2021.
Note: UE: Undereducated, OE: Overeducated

As of 2021, 10.8% of women and 22.4% of men who are two-year college graduates (skill level 3) work in jobs that suit their education. Both figures almost double for overeducation, reflecting a low mismatch. This group has the least matching jobs and the most overeducation of all skill levels. It seems that they work in all occupations regardless of the required level of education, and employers make this group do any job they want, from the simplest job to the most complicated job.

Education-occupation match is much more widespread among the ones who have skill level 4. On the other hand, the mismatch still exists for at least university graduates and the figures are not that low. This can be explained due to the lack of appropriate jobs for the high-skilled workforce.

4.3 Socioeconomic and demographic factors related to skills-mismatch and non-employment

Tables 1 and 2 present the results of MNL analyses for men and women, respectively. In these models, we investigate the effects of several demographic and socioeconomic variables on labour market status, i.e., the odds of being overeducated, undereducated or non-employed compared to having matched education-occupation. In addition to the coefficients, we provide average marginal effects (AME). Positive (negative) AMEs imply an increase (a reduction) in the probability of the labour market status due to an increase in explanatory variables. In addition to the variables listed above, we are also interested in the effects of "non-wage benefits" and "household income except for the respondents' labour income", both of which, in a way, work in the same manner, and this will be clarified below.

Table 1: Men aged 15-64, multinomial logit model estimation results

	Overeducated		Undereducated		Nonemployed	
	Coefficient	AME	Coefficient	AME	Coefficient	AME
Age	-0.0252***	-0.0020***	0.0170***	0.0030***	-0.0119***	-0.0023***
	(-0.0029)	(-0.0002)	(-0.0023)	(-0.0003))	(-0.0021)	(-0.0003)
Education	0.2104***	0.0264***	-0.3804***	-0.0368***	-0.2109***	-0.0176***
	(-0.0074)	(-0.0006)	(-0.0071)	(-0.0006)	(-0.0059)	(-0.0007)
Married	-0.1821*	0.0190***	0.4074***	0.1446***	-1.4842***	-0.2896***
	(-0.0714)	(-0.0056)	(-0.0733))	(-0.0063)	(-0.0555)	(-0.0084)
# of kids under	-0.0017	0.0087**	-0.2062***	-0.0088*	-0.2863***	-0.0351***
age 6	(-0.0371)	(-0.0031)	(-0.0322)	(-0.0037)	(-0.0343)	(-0.0049)
Household size	0.0547***	0.0044***	0.0088	0.0003	0.005	-0.001
	(-0.0157)	(-0.0012)	(-0.0132)	(-0.0014)	(-0.0118)	(-0.0016)
Social transfer	0.4979***	-0.0290***	0.2100**	-0.1195***	2.1637***	0.3582***
dummy	(-0.0913)	(-0.0053)	(-0.0698)	(-0.0051)	(-0.0613)	(-0.0073)
Registered household	-0.1118*	-0.0114**	-0.013	-0.0058	0.0882*	0.0181**
member dummy	(-0.0567)	(-0.0042)	(-0.0542)	(-0.0054)	(-0.0437)	(-0.0058)
Household income	-0.0369***	-0.0044***	-0.002	-0.0029***	0.0517***	0.0095***
except his/her wage	(-0.0079)	(-0.0005)	(-0.0108)	(-0.0007)	(-0.0068)	(-0.0006)
Constant	-2.6326***		1.8261***		2.2639***	
	(-0.1346)		(-0.116)		(-0.1043)	
Observations	28,160		Log Likelihood	-28,383,814		
Wald χ^2	10,794.71***		Pseudo R^2	0.229		

Notes: Coefficient is the MNL's estimation, and AME is the average marginal effect. "Household income except his/her wage" is given in 10,000 TL. Robust standard errors are in parentheses. Regions are controlled. *** p<0.001, ** p<0.01, * p<0.05, and + p<0.1.
Data: TURKSTAT, SILC, 2021.

Age is found to be important in explaining labour force participation decisions, regardless of gender. As people get older, they become less likely to be overeducated or non-employed, whereas they are more likely to become undereducated rather than being "matched". This result is in line with existing findings in international literature. Several studies have shown that years of work experience decreases the probability of being overeducated (Alba-Ramirez, 1993; Haddad & Habibi, 2017; Johansson & Katz, 2007). It is likely that unmatched jobs are a temporal state between school and work for young people, as argued by several scholars (Allen, 2016; MacDonald, 2011; Mendoza et al., 2020; Suleman & Figueiredo, 2020).

It is not surprising that the level of education has a substantial association with the labour market status, while a match is defined in relation to it. The probability of being overeducated significantly increases, while the probability of being undereducated decreases with the level of education. Higher education is also associated with lower levels of non-employment, implying that highly educated people are significantly less likely to be non-employed than the ones who work in matched jobs.

Another demographic variable related to the labour market status is marital status. Married men are less likely to be overeducated and non-employed in comparison to their unmarried counterparts. For women, exactly the opposite is true: the effect of being married is significantly positive for being overeducated and also non-employed among women. This result corroborates the argument of Frank (1978), who claimed that women have limited options for jobs in cases where there is a male breadwinner, and women try to limit themselves geographically and have to accept less skilled jobs. This is also in line with the findings from national literature such as Tunalı & Başlevent (2006) showing that the labour force participation rate of married women is much lower than that of unmarried women.

Table 2: Women aged 15-64, multinomial logit model estimation results

	Overeducated		Undereducated		Nonemployed	
	Coefficient	AME	Coefficient	AME	Coefficient	AME
Age	-0.0204***	-0.0003+	-0.0029	0.0014***	-0.0225***	-0.0033***
	(-0.0037)	(-0.0001)	(-0.0027)	(-0.0002)	(-0.002)	(-0.0003)
Education	0.1472***	0.0132***	-0.3481***	-0.0103***	-0.2571***	-0.0253***
	(-0.0097)	(-0.0004)	(-0.0084)	(-0.0005)	(-0.0058)	(-0.0007)
Married	-0.0326	0.0005	0.3842***	0.0351***	-0.0958+	-0.0411***
	(-0.0971)	(-0.0034)	(-0.0845)	(-0.0045)	(-0.0562)	(-0.007)
# of kids under	0.004	-0.0053*	-0.0794	-0.0219***	0.2187***	0.0448***
age 6	(-0.0664)	(-0.0024)	(-0.0535)	(-0.0032)	(-0.0377)	(-0.0048)
Household size	0.0262	0.0016+	0.0755***	0.0078***	-0.0243+	-0.0104***
	(-0.0267)	(-0.0009)	(-0.0185)	(-0.0011)	(-0.0144)	(-0.0018)
Social transfer	0.2920*	-0.0238***	0.8698***	-0.0286***	1.3777***	0.1487***
dummy	(-0.1456)	(-0.0031)	(-0.1088)	(-0.0052)	(-0.0842)	(-0.007)
Registered household	-0.1529+	-0.0069*	-0.2300***	-0.0212***	0.0386	0.0273***
member dummy	(-0.0812)	(-0.003)	(-0.06)	(-0.0038)	(-0.0443)	(-0.0057)
Household income	-0.0183+	-0.0011***	0.0038	-0.0006+	0.0127***	0.0025***
except his/her wage	(-0.011)	(-0.0002)	(-0.0059)	(-0.0003)	(-0.0038)	(-0.0004)
Constant	-1.9113***		1.8953***		4.4845***	
	-0.2114		-0.1767		-0.1278	
Observations	29,077		Log Likelihood	-21,900,079		
Wald chi2	6,001.418***		Pseudo R2	0.145		

Notes: Coefficient is the MNL's estimation, and AME is the average marginal effect. "Household income except his/her wage" is given in 10,000 TL. Robust standard errors are in parentheses. Regions are controlled. *** p<0.001, ** p<0.01, * p<0.05, and + p<0.1.
Data: TURKSTAT, SILC, 2021.

Similar to marital status, the effect of the number of kids under age 6 is opposite for males and females. Our results are consistent with the traditionally defined distribution of duties in the household: the male is the breadwinner (thus has to work), and the female is responsible for the housework, child and elderly care (so needs to stay at home). As the number of kids under age 6 increases, men are less likely to be non-employed. It may be due to the fact that household expenditures increase as a result of each increase in the number of family members. For men, the effect of this variable works like the effect of household size. On the other hand, having kids under age 6 is associated with a significantly higher probability of being non-employed for women. This result also confirms existing findings from Sweden (Johansson & Katz, 2007) and the USA (Addison et al., 2020).

Considering the results for males, the marginal effect of the household size is only significant for being overeducated. That is, the larger the household size, the higher the probability for men to be overeducated compared to being matched. This might be due to the fact that men have to work in jobs where they have more skills than required because they have to sustain a (large) family. In other words, they cannot afford to be unemployed until they find a matching job. On the other hand, for women, there is not a significant effect of household size on being overeducated, whereas being non-employed compared to matched employment has a significant negative effect. It is found that as household size increases, women are more likely to be underemployed and less likely to be non-employed. This finding points out that household size does not work in the same way as the number of children under age 6 for women since the signs of the coefficients for all labour market states reverse. This may suggest that due to the increase in expenditures of the family, women enter the labour market. Because they are poorly educated in general, it is more likely that they work in jobs regardless of the level of education-occupation match status. Following Dayıoğlu & Kasnakoğlu (1997), the effect of having a large number of working individuals in crowded households is included in the model with the "household income" variable.

The variables controlling non-wage benefits are household-level dummy variables for transfer income and social security registration. It is argued that benefits associated with a social transfer, especially unemployment benefits, would decrease the willingness to work (Filiz, 2017; Küçükbayrak, 2012; Tunalı & Ulus, 2021). If it were the case in our models, this covariate would be positive for the non-employment category, indicating that people who benefit from social transfers are more likely to be non-employed. It would turn out to be negative for being overeducated and undereducated since these social transfers operate as a safety net. Thus, the individual can wait for a job that suits her education level. Consistent with these expectations, we have found significant negative effects of social transfers on being over and undereducated for both sexes. Besides, individuals living in a household with a social transfer income are significantly more likely to be non-employed. This finding also suggests that social transfer income would increase the reservation wages.

The reason for adding a dummy variable for social security registration is that if there is at least one formally employed person in the household, it is highly likely that other family members would benefit from social security coverage (Taymaz, 2010), which would increase the non-unemployment probability. However, its effect on being overeducated can be twofold. If it increases the reservation wage, people would be less likely to be overeducated (like in the case of social transfers). On the other hand, relying on safe employment and its social benefits from family members, individuals may not care about their education-occupation mismatch. This may imply that such people will accept jobs that do not match their education level instead of matched ones, which would be associated with positive marginal effects. Our estimation results show that reservation wage theory works: if there is at least one registered person other than the respondent, they are more likely to be non-employed and less likely to be over and undereducated.

Another variable that works in the same way as social security registration is the "household income except his/her labour income", which is also controlled for the status of the household without him/herself with this covariate. Consistently, reservation wage theory seems to work again: if one is a member of a high-income family, they are less likely to work in jobs that do not match their education level and more likely to be non-employed.

5 Conclusion

This article has been motivated by the growing levels of underemployment in Turkey. As in many countries, discussions in the public on the labour markets focus almost solely on unemployment. Depending on whether the unemployment rate is rising or falling, the labour market is said to be operating well or not. However, in the case of Turkey, it is hard to get a grasp of the recent situation in the labour market. Since 2014, TURKSTAT has published supplementary indicators for the labour force in accordance with ILO and EUROSTAT regulations. Thus, we first attempt to describe the Turkish labour market using a more holistic approach. Moreover, apart from the supplementary indicators published by TURKSTAT, we think that skills mismatch, or skill-related underemployment, is another indicator in order to better understand the Turkish labour market. Hence, we also focus on describing and analysing skill-related underemployment in relation to various demographic and socioeconomic variables as our second aim in this article.

The paper has three major contributions. First, the study population is the working-age population (15-64 years old) in Turkey instead of only employed individuals or those participating in the labour force, as in most similar studies. Second, on top of the fact that supplementary labour force indicators have only recently been published by TURKSTAT, there is not much detail on the characteristics of these sections of the population. We present these groups by age, sex and education level. Lastly, econometric models in similar studies do not take into account factors related to household benefits, such as the income of other family members or social transfers. We show the effects of these variables on labour market status in our analyses. With these contributions, we believe that this paper provides a broader perspective on the different aspects of labour underutilisation among the working-age population in Turkey.

Our descriptive analysis of the supplementary indicators for the labour force shows that despite not being unemployed, there are lots of people in Turkey who do not work at their full capacity or cannot enter the workforce although they are willing to. The descriptive results in Section 4.1 show that the number of these groups peaked during the COVID-19 pandemic in 2020, especially among the younger population.

More strikingly, although TURKSTAT does not publish any indicators about skill-related underemployment, it is a substantial problem for the Turkish labour market. As might be expected, it is found to be more prevalent among the female workforce. Not surprisingly, the incidence of overeducation increases with schooling, but it peaks among two-year college graduates rather than at least university graduates. This result contradicts the popular argument that it is vocational college graduates required in the labour market rather than undergraduates. A university degree or higher still offers the highest likelihood of finding a job that matches one's skills.

Finally, we modelled the incidence of skills mismatch and labour force participation with several demographic and socioeconomic indicators by considering the choice of being over or undereducated as a labour market participation choice rather than an employment choice in contrast to many other recent studies in Turkey (Acar, 2017; Duman, 2018; Filiztekin, 2015; Kantarmacı et al., 2021; Orbay et al., 2021; Şahin, 2021). In other words, our sample consists of the working-age population rather than the employed. Therefore, we try to find out the dynamics of labour force participation decisions where skill mismatches are taken into account by the categories of our dependent variable. Age, education, marital status, number of kids under the age of 6, household size, household income, social transfers and registered work all have significant effects on the labour market status.

The effects of age and education are similar for both sexes. Young women and young men are more likely both to be overeducated for their jobs and to stay out of employment as suggested in the literature (Allen, 2016; MacDonald, 2011; Mendoza et al., 2020; Suleman & Figueiredo, 2020). However, in contrast to findings in the international literature on increasing levels of overqualification in older ages (Chan & Stevens, 2004; Koeber & Wright, 2001; Virick, 2011), our results suggest that while overqualification decreases, underqualification and non-employment increases with age. This may suggest that older workers find it difficult to find transitional jobs and rather leave the job market. Further studies focusing on bridge jobs (Ruhm, 1990) would be useful to better understand this issue.

Moreover, both males and females are more likely to get jobs that match their education and less likely to stay out of employment if they have at least a university degree, even when all other variables are controlled for. These results are consistent with the existing literature, but some studies argue that there are specific fields where the risk of underemployment is lower or higher (Acosta-Ballesteros et al., 2018). Due to the lack of data, we were unable to include a similar variable in our analysis. This is another interesting topic that should be explored in future studies.

On the other hand, marital status, number of kids and household size have diverging effects for men and women. While married men are more likely to be employed and have matched jobs, married women are more likely to be out of employment compared to unmarried women. While the number of kids under the age of 6 reduces the probability of being out of employment for men, it is the opposite for women. Nevertheless, while household size increases the probability of being overeducated rather than having matched jobs for men, the same effect is not significant for women. These results are in line with the hypotheses presented by Frank (1978). Unlike more recent studies in countries like the USA, Switzerland and Sweden (Frei & Sousa-Poza, 2012; Johansson & Katz, 2007; McGoldrick & Robst, 1996), it seems that the traditional gender division of labour in which male is the main breadwinner and female is the domestic caregiver persists in Turkey.

Finally, the effects of household income, excluding the respondents' income, social transfers in the models and social security registration in the household confirmed the reservation income hypothesis. Household income, social transfers and social security registration increase the probability of staying out of employment and decrease the probability of being overeducated for both men and women.

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Appendix: Additional Tables

Table A.1: Data sources and variables

Data	**Supplementary indicators for labour force**	**Skill levels and predictors of underemployment**
Variables	Time-related underemployment, potential labour force, composite measure of labour underutilisation, inadequate employment	Age, education, marital status, number of kids under age 6, household size, social transfers, social security registration, household income
Source	Household Labour Force Survey (HLFS)	Income and Living Conditions Survey (SILC)
Period	2014-2021	2021

Table A.2: Definitions of supplementary indicators for labour force

Supplementary indicators for labour force	**Definition**
Time-related underemployment	The persons who were employed in the reference week and actually worked less than 40 hours as total (in main and additional job/s) and were willing to work additional hours and were available to do so.
Potential labour force	The persons who are looking for work but not available to start in a short period or who are available to work in a short period, want to work but are not seeking work.
Composite measure of labour underutilisation	The ratio of the sum of unemployed time-related underemployment and potential labour force to the sum of the labour force and potential labour force
Inadequate employment	In case persons are not covered in the "time-related underemployment" concept, persons employed in the reference week but were also looking for a job to replace the present job or as an additional job within the last 4 weeks and were available to start work within two weeks if they could find another job.

Source: TURKSTAT, Labour Force Statistics

Table A.3: Educational requirements by occupational group, normative approach

ISCO 08 Occupation	ISCO-08 skill level[a]	ISCED 2011 required level[b]
Managers	3, 4	5, 6, 7, 8
Professionals	4	6, 7, 8
Technicians and Associate Professionals	3	5
Clerical Support Workers	2	2, 3, 4
Services and Sales Workers	2	2, 3, 4
Skilled Agricultural, Forestry and Fishery Workers	2	2, 3, 4
Craft and Related Trades Workers	2	2, 3, 4
Plant and Machine Operators and Assemblers	2	2, 3, 4
Elementary Occupations	1	x, 0, 1
Domestic Workers	1	x, 0, 1

Source: ILO (2018, p. 27)

[a]: Detailed descriptions are available in ILO (2018, Table 1, p. 11).

[b]: ISCED 2011 levels for Turkey are available at European Commission (2023).

Table A.4: Sample Size (aged between 15 and 64)

		2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
HLFS	**Individuals**	341,828	336,055	328,329	325,468	321,252	314,151	404,657	416,003
	Households	133,225	132,325	131,245	131,107	130,410	128,563	166,767	173,829
SILC[a]	**Individuals**			50,879	51,600	53,611	55,358	57,332	57,716
	Households			20,222	20,592	21,575	22,345	23,000	23,351

a: Due to unit and item non-response, we are left with 57,237 individuals who are aged between 15 and 64 from 23,175 households in the multinomial logit model estimation, in which only the SILC-2021 data is used.