

Sector-Based Analysis of the Education–Occupation Mismatch in the Turkish Labor Market

Murat Anil Mercan^a

Gebze Technical University

Mesut Karakas^b

Gebze Technical University

Sadettin Haluk Citci^c

Gebze Technical University

Mehmet Babacan^d

Istanbul Commerce University

Abstract

The aim of this study was to investigate the existence of sectorial undereducation and overeducation problems in the Turkish labor market. In order to cope with this issue, the 2009 Household Labor Force Survey (TurkStat), which covers 145,934 individuals within 27 sectors, was utilized. An objective measure of education–occupation mismatch based on the mean level of schooling was used as the main tool in the analysis. The results revealed two important points. Firstly, high levels of undereducation and overeducation problems in the sectoral job groups were found. Secondly, the results showed that these problems are not specific to a few sectors, but they are widespread among many sectoral job groups, which has created serious problems for the Turkish economy. Moreover, we employed Oaxaca decomposition to investigate the effects of overeducation and undereducation on wage outcomes, and the findings indicate that education–occupation mismatches in the Turkish labor market are also reflected on such outcomes. Finally, the Turkish labor market penalizes workers who acquire less education than the adequate level to perform their jobs, whereas it rewards the workers who obtain more education than the adequate level, but not to a considerable extent.

Keywords: Overeducation • Undereducation • Sector-based education–occupation mismatch • Human capital • Turkish labor market

a Assist. Prof. Murat Anil Mercan (PhD), Faculty of Business Administration, Gebze Technical University, PK: 141, Gebze, Kocaeli 41400 Turkey
Email: mameran@gyte.edu.tr

b Assist. Prof. Mesut Karakas (PhD), Faculty of Business Administration, Gebze Technical University, PK: 141, Gebze, Kocaeli 41400 Turkey
Email: mkarakas@gyte.edu.tr

c **Corresponding author**
Assist. Prof. Sadettin Haluk Citci (PhD), Faculty of Business Administration, Gebze Technical University, PK: 141, Gebze, Kocaeli 41400 Turkey
Research areas: Economics, education
Email: hcitci@gyte.edu.tr

d Assist. Prof. Mehmet Babacan (PhD), Department of Economics, Istanbul Commerce University, Sutluce M. Imrahor Cad. No: 90, Beyoglu, Istanbul 34445 Turkey
Email: mbabacan@ticaret.edu.tr

In economics, there is a consensus that education is an essential ingredient of economic growth and personal welfare. The growth literature (i.e., Barro, 1989, 1999; Lucas, 1988; Mankiw, Romer, & Weil, 1992) theoretically and empirically shows that education, ensuring human capital accumulation, positively and significantly affects long-term economic growth.¹ In a similar vein, the human capital literature, following the seminal paper of Becker (1964), argues that education increases personal income, as it constitutes the main determinant of workers' productivity, and the workers are paid according to their marginal products. Consistent with this argument, the majority of the existing empirical studies show that the return of education is significantly positive. For example, measures of the return of education in the Turkish labor market indicate a high return for each year of schooling (Bakiş, 2012; Dayıoğlu & Kasnakoğlu, 1997; Öksüzler, 2008; Özcan, Özcan, & Üçdoğruk, 2003; Tansel, 1994).²

An implicit assumption in these literatures is that workers' human capital is efficiently utilized in the labor market and, relatedly, workers earn wages equal to their marginal products. However, another strand of literature, following the seminal papers of Freeman (1976) and Duncan and Hoffman (1981), questions this implicit relationship and draws attention to potential labor market inefficiencies in matching occupations and workers according to the required and actual skill levels. This mismatch in the labor market potentially leads to some workers being placed in occupations that require less human capital than the worker has acquired. Such a worker who has acquired more education and has more human capital than his/her job requires is said to be overeducated, whereas a person with less education than what his/her job requires is classified as undereducated. An implication of this overeducation and undereducation problem is that overeducated (undereducated) workers are likely to earn less (more) income compared to similarly educated ones whose education levels actually match their jobs.

In this paper, we examine the prevalence of overeducation and undereducation in Turkey since there are there are substantial inefficiencies in the Turkish labor market that may lead to education-

occupation mismatches. According to results of Turkish Household Labor Force Surveys, more than half of the workers found jobs on their own rather than through employment agencies, which indicates possible inefficiencies in job searching and matching. Moreover, Turkey includes a sizeable informal economy, approximately 30% of the gross domestic product (GDP) (Schneider & Savaşan, 2005), thus pointing out the segmented structure of the Turkish labor market due to the division between formal and informal jobs. However, Turkey has made remarkable progress in education. In the last 10 years, the literacy rate for individuals aged 15 and over increased by approximately 10% (to 92% in 2012), and the average years of schooling increased from 5.5 years in 2000 to 6.5 years in 2012. These statistics imply that there has been a notable change in workers' education characteristics over the last decade.

Furthermore, we estimate the prevalence of overeducation and undereducation for 27 sectors in Turkey. Using data from the 2009 Household Labor Force Survey, we calculate the average level of schooling in each sector and apply this average as a proxy for the required level of education in each occupation. In this manner, we examine the presence of overeducated and undereducated workers in each sector and discuss the mismatch differences among these sectors.³

In order to explain how our paper relates to prior research, it is important to mention key studies in the realm of the economics of education. The education-occupation mismatch in developed countries is well documented. Among others, some of the seminal papers include Freeman (1976), Duncan and Hoffman (1981), Hartog and Oosterbeek (1988), Cohn and Khan (1995).⁴ However, there are only a few studies that have examined this phenomenon for developing countries. Examples include: Quinn and Rubb (2006) who estimated the incidence of overeducation for Mexico; Abbas (2008) for that of Pakistan; Mehta, Felipe, Quising, and Camingue (2011) for that of India, Mexico, Philippines and Thailand; and Herrera-Idárraga, López-Bazo, and Motellón (2013) for that of Columbia. Although the educational attainment level is generally low for these countries, all of the aforementioned studies still found evidence of the presence of overeducation.

1 Two empirical studies (Afşar, 2009; Beşkaya, Savaş, & Şamiloğlu, 2010) have tested this relationship in the Turkish context and found that schooling had a positive impact on the economic growth of Turkey.

2 A recent study by Bakiş (2012) measured the return rate of one year of schooling for the Turkish labor market as approximately 10%.

3 In this study, we employ a positive analysis by examining whether there are overeducated and undereducated workers in Turkey, rather than a normative analysis based on the optimal degree of schooling.

4 Hartog (2000) and Rubb (2003) are two survey studies regarding overeducation and undereducation in developed countries.

To the best of our knowledge, there are only a couple of studies (Filiztekin, 2011; Galasi, 2008) that have examined education–occupation mismatch in Turkey. Galasi (2008), using European Social Survey data of 252 workers in Turkey, documented that 27.9% of the workers were overeducated, whereas 70.8% of them were undereducated. The only paper that examined the issue specifically for Turkey was Filiztekin (2011). Using realized data from the 1994 and 2002 Household Budget and Expenditure Surveys, Filiztekin measured the incidence of overeducation and undereducation in Turkey and analyzed its possible sources. Differently from Galasi, he found that approximately 14% of the workers were overeducated and only 9.7% were undereducated.

The present paper differs from those of Galasi (2008) and Filiztekin (2011) in several respects. Galasi used a subjective measure of overeducation and undereducation and his results were based workers' self-reports, whereas we use an objective measure of overeducation and undereducation by employing realized data from the 2009 Household Labor Force Survey. In this sense, our paper is closer to that of Filiztekin. Galasi's study consisted of observations from 252 individuals while the dataset analyzed by Filiztekin covered 16,375 individuals. Our dataset consists of a total of 145,934 individuals, which is approximately 10 times larger than that of Filiztekin. Moreover, both Galasi (2008) and Filiztekin (2011) documented country averages for overeducated and undereducated workers, and they did not differentiate among sectors. We report the results for 27 sectors and explain the differences among these sectors.

Finally, the analysis of the issue in a sectoral context is also policy relevant since the presence of overeducated and undereducated workers implies that valuable human capital in the economy is inefficiently utilized. This shows that social welfare is reduced compared to the situation in which workers' education and human capital are fully utilized and jobs can be filled with workers possessing adequate levels of education. In addition, education–occupation mismatch signals that public or private capital is spent on non-productive education. In this respect, the findings in a sectoral context can assist policy making by showing in which sectors overeducation or undereducation is present and in which of them the problem is more severe.

Method

Sample

The data used in the present paper is drawn from the 2009 Household Labor Force Survey, which covers 145,934 randomly selected individuals among the Turkish population of which 50.38% consists of women. In addition, the dataset contains both full-time and part-time workers. The individuals with full-time employment account for 88.69% of our dataset. The available data does not provide years of schooling, but instead, it includes information regarding the last degree awarded. There are six education brackets in the dataset: 1) no degree awarded; 2) primary school graduate; 3) secondary school graduate; 4) general high school graduate; 5) vocational or technical high school graduate; and 6), academy/college graduate or higher. Occupational classification is based on the International Standard Classification of Occupations (ISCO 88). The descriptive statistics of the sector-specific education levels are presented in Table 1.

Empirical Method

In the present study, we measure overeducation and undereducation by comparing a worker's achieved education level with the education level required to perform his/her job. There are several methods to define or measure the "required" level of education for occupations and the results can be sensitive to the choice of the specific method.⁵

The measurement methods developed in the literature can be classified into two main categories: subjective and objective measures. Regarding the subjective measure, it includes two approaches. The first is that independent job experts define the required level of education for each occupation, while the second approach is asking the worker whether he/she has acquired the appropriate level of education to effectively perform his/her job. The first type of subjective measure (i.e., job analysis by independent experts) is not viable for most countries and only a few countries (e.g., the United Kingdom and the United States) provide such information. The other subjective measure, which depends on workers' self-reports does not have any objective benchmark and evaluation criteria to define the required level of education.

⁵ For example, while Galasi (2008) used a subjective measure (workers' self-reports) and found that 70.8% of workers in Turkey were undereducated, Filiztekin (2011) employed realized data from Household Budget and Expenditure Surveys and found that only 9.7% of workers in Turkey were undereducated.

Table 1
Descriptive Statistics

Sectoral Job Groups	Mean	S.d.	Min.	Max.	N
Legislators and senior officials	11.05	5.08	0	16	712
Corporate managers	14.42	2.96	0	16	2528
Managers of small enterprises	8.85	4.22	0	16	9162
Physical, mathematical, and engineering science professionals	15.93	0.63	5	16	1264
Life science and health professionals	15.97	0.32	12	16	1242
Teaching professionals	15.96	0.41	8	16	5037
Other professionals	15.10	2.05	0	16	2223
Physical and engineering science associate professionals	12.15	3.82	0	16	2154
Life science and health associate professionals	13.64	2.64	5	16	1482
Teaching associate professionals	12.36	2.27	0	16	256
Other associate professionals	12.15	3.71	0	16	4916
Office clerks	12.18	3.29	0	16	6276
Customer services clerks	11.96	3.71	0	16	2617
Personal and protective services workers	8.71	4.04	0	16	9574
Models, salespersons, and demonstrators	8.90	3.87	0	16	7884
Market-oriented skilled agricultural and fishery workers	4.69	3.40	0	16	30724
Subsistence agricultural and fishery workers	3.48	3.14	0	16	3005
Extraction and building trades workers	6.72	3.43	0	16	5763
Metal, machinery, and related trade workers	7.98	3.49	0	16	6024
Precision, handicraft, craft printing, and related trade workers	6.84	3.54	0	16	1951
Other craft and related trade workers	6.41	3.30	0	16	5379
Stationary plant and related operators	8.06	3.73	0	16	897
Machine operators and assemblers	7.17	3.45	0	16	4774
Drivers and mobile plant operators	7.18	3.08	0	16	7185
Sales and services elementary occupations	6.10	3.39	0	16	9464
Agricultural, fishery, and related laborers	4.76	3.49	0	16	6808
Laborers in mining, construction, manufacturing, and transport	6.73	3.59	0	16	6633

Note: S.d., Min., Max., and N represent standard deviation, minimum, maximum and sample size, respectively.

As a result, it is open to measurement errors. More importantly, McGuinness and Bennett (2007) found that overeducated workers may less respond to questionnaires due to on-the-job apathy, which may lead to bias (in the form of underestimation of overeducation) in the samples.

The objective measure of education–occupation mismatch is based on realized data and it also includes two approaches. The first approach, suggested by Verdugo and Verdugo (1989), uses the mean level of schooling to define the required level of education for each job and classifies workers as overeducated or undereducated if their education level is respectively more than one standard deviation higher or lower than the mean level of education in that job category. Conversely, the second approach, suggested by Kiker, Santos, and Mendes de Oliveira (1997), defines the required education level as the mode year of schooling in that job category and classifies workers as overeducated or undereducated if their education is higher or lower than the modal value of the education in that job category.

In this paper, we apply an objective measure of overeducation and undereducation since job analysis studies by experts are not available for Turkey and the use of workers' self-reports may cause bias in the samples. Within the objective measure, we use the first approach (i.e., the mean value measure of required schooling) in order to measure overeducation and undereducation since, as Ramos and Sanromà (2013) discussed, using the mode measure of required schooling is not optimal when the two-digit classification of jobs is employed.

Results

Our analysis follows that of Verdugo and Verdugo (1989) in which the mean education level is calculated for job groups in each education sector. The boundaries of overeducation and undereducation are determined by utilizing one standard deviation methodology for the 27 sectors. If a worker's education level in a sector falls below the difference between the mean education level and one standard deviation of the sector-specific sample, then this worker is identified as undereducated. Similarly, if a worker's education level in a sector falls over the sum of the mean education level and one standard deviation of the sector-specific sample, then this worker is identified as overeducated. Moreover, when a worker's education level is in the

one standard deviation range of the mean sectoral education level, this worker is defined as adequately educated.

Since overeducation and undereducation are present in most of the sectors, it is difficult to grasp the results. In order to cope with this issue, the results of the study are divided into three parts: 1) undereducation levels in the main sectors; 2) overeducation levels in the main sectors; and 3) adequate education levels in the main sectors.

Undereducation Levels in the Main Sectors

The undereducation levels in the 27 sectors are reported as percentages of sectoral samples and the results are presented in Table 2. The undereducation level is the highest for subsistence agricultural and fishery workers, at 39.97%. Similarly, in the groups of legislators and senior officials, sales persons and demonstrators, the undereducation level is found to be over 30%. However, undereducation is not limited to these sectors since the undereducation levels for the agricultural, fishery, and related laborers group, the market-oriented skilled agricultural and fishery workers group, the customer services clerks group, the other associate professionals group, and the physical and engineering science associate professionals group are all over 20%. In generally, undereducation is expected to be higher among blue-collar workers, but the results are mixed for the different sectors in Turkey, which is possibly due to the ongoing structural reforms there. An important finding is the high undereducation level in the legislators and senior officials group. In a country on the path of becoming a developed one, education levels for the legislators and senior officials group are expected to be more homogenous. However, this is not the case for Turkey, which is probably due to its cultural background that gives utmost importance to family ties and personal relations.

In general, high levels of undereducation tend to exist in many sectors, which signals a distorted wage system that rewards undereducated workers. According to Verdugo and Verdugo (1989), this result also causes the public to misprize educational achievements, which subsequently decreases the return of education below the optimal levels. Thus, the sectors in which job groups have higher undereducation levels are in need of immediate corrections.

Table 2
Undereducation in the Main Sectors

Sectoral Job Groups	Undereducation %
Subsistence agricultural and fishery workers	39.97
Legislators and senior officials	33.1
Models, salespersons, and demonstrators	32.75
Agricultural, fishery, and related laborers	25.92
Market-oriented skilled agricultural and fishery workers	24.59
Customer services clerks	23.51
Other associate professionals	22.01
Physical and engineering science associate professionals	21.42
Other professionals	19.02
Office clerks	18.86
Sales and services elementary occupations	11.24
Laborers in mining, construction, manufacturing, and transport	9.32
Other craft and related trade workers	9.05
Corporate managers	8.46
Precision, handicraft, craft printing, and related trade workers	7.29
Teaching associate professionals	6.57
Life science and health associate professionals	6.37
Extraction and building trades workers	6.27
Machine operators and assemblers	5.28
Personal and protective services workers	3.75
Stationary plant and related operators	3.36
Managers of small enterprises	2.63
Metal, machinery, and related trade workers	1.97
Physical, mathematical, and engineering science professionals	1.48
Drivers and mobile plant operators	1.37
Teaching professionals	0.86
Life science and health professionals	0.65

Undereducation is the lowest for the life science and health professionals group, at 0.65%, while the level among teaching professionals is also low at 0.86%. These low levels of undereducation are related to strict regulations in the health and teaching sectors, respectively. Moreover, undereducation is lower in the personal and protective services workers group, the stationary plant and related operators group, the managers of small enterprises group, the metal, machinery, and related trade workers group, the physical, mathematical, and engineering science professionals group, and the drivers and mobile plant operators group compared to the job categories in the other sectors. Except for the

physical, mathematical, and engineering science professionals group, all of these sectors demand basic education and provide blue-collar jobs. In a developing country where blue-collar positions are available for nearly all workers (even without basic education), this fact is a priori expected.

Overeducation Levels in the Main Sectors

Overeducation levels in the main sectors are presented in Table 3. The highest overeducation level is observed in the physical and engineering science associate professionals group, at 36.58%. It should be mentioned that the undereducation level in this group is also high. Thus, this group appears to be one of the most problematic in which education–occupation mismatches excessively exist. This problem also persists in the other associate professionals group. The overeducation level in the other associate professionals group is 35.61% and it is the second highest level among the other sectors. The most probable reason for these education–occupation mismatches mainly arises from the definition of “associate.” Employment in a so-called associate position may demand either an impressive educational background or basic education with good craftsmanship skills in similar sectors. Thus, the concept of “associate” is open to debate in the Turkish economy, where job definitions and classification requirements are quite insufficient. The overeducation levels in the stationary plant and related operators group, the customer services clerks group, the metal, machinery, and related trade workers group, and the office clerks group are also high. Except for the customer services clerks category and the office clerks category, all of these job groups are classified as blue-collar. In addition, although customer services clerks and office clerks are thought to be white-collar positions, the workers in these job classes actually receive lower wages with very limited career opportunities. Thus, it may be more appropriate to classify these groups either as blue-collar jobs or a transitional class between blue-collar and white-collar jobs. When this aspect is considered, it is clear that the overeducation problem mainly persists in blue-collar or blue-collar like jobs.

Overeducation is also quite an important problem in other blue-collar job classes such as the machine operators and assemblers group, the drivers and mobile plant operators group, the laborers in mining, construction, manufacturing, and transport group, and the precision, handicraft, craft printing,

and related trade workers group. The overeducation problem in these blue-collar jobs is possibly related to the fact that many newly graduated students have failed to find white-collar positions and as a result, they unwillingly take blue-collar positions and create education–occupation mismatches on the side of overeducation. As it can be seen in Table 3, education surpluses exist in many sectors, and these surpluses give rise to considerable welfare losses for a society channeling scarce resources to economically unused educational activities.

Table 3
Overeducation in the Main Sectors

Sectoral Job Groups	Overeducation %
Physical and engineering science associate professionals	36.58
Other associate professionals	35.61
Stationary plant and related operators	35.56
Customer services clerks	32.67
Metal, machinery, and related trade workers	31.53
Office clerks	29.99
Machine operators and assemblers	23.96
Drivers and mobile plant operators	22.13
Laborers in mining, construction, manufacturing, and transport	21.32
Precision, handicraft, craft printing, and related trade workers	20.98
Extraction and building trade workers	19.02
Teaching associate professionals	18.32
Sales and services elementary occupations	15.21
Other craft and related trade workers	15.13
Managers of small enterprises	13.63
Subsistence agricultural and fishery workers	12.87
Personal and protective services workers	10.85
Agricultural, fishery, and related laborers	7.80
Market-oriented skilled agricultural and fishery workers	7.49
Models, salespersons, and demonstrators	7.40
Life science and health professionals	0
Teaching professionals	0
Physical, mathematical, and engineering science professionals	0
Life science and health associate professionals	0
Corporate managers	0
Other professionals	0
Legislators and senior officials	0

The overeducation levels in the life science and health professionals group, the teaching professionals group, the physical, mathematical and engineering science professionals group, the life science and health

associate professionals group, the corporate managers group, the other professionals group, and the legislators and senior officials group are equal to zero. Except for the other professionals group and the legislators and senior officials group, the undereducation levels in the aforementioned groups are extremely low. Actually, the education–occupation mismatch is not valid in the life science and health professionals group, the teaching professionals group, the physical, mathematical, and engineering science professionals group, the life science and health associate professionals group, and the corporate managers group. Conversely, the legislators and senior officials group suffers from the undereducation problem due to the presence of family ties and personal relations. This is also a factor that suppresses the prevalence of overeducation in these professions. The zero overeducation level in the other professionals group also seems to be questionable since its undereducation level is 19.02%. Most likely, this finding stems from the unclear definition of the other professionals group, which contains professions that are not described in depth.

Adequate Education Levels in the Main Sectors

Table 4 presents the degree of education–occupation match for the sectoral job groups. A high percentage means that the occupation and education levels are well matched in that sector. The education–occupation match is the highest in the life science and health professionals group at 99.35%. In addition, education–occupation levels are more than 90% in the teaching professionals group, the physical, mathematical, and engineering science professionals group, the life science and health associate professionals group, and the corporate managers group. These job groups are the least problematic ones, since the degree of undereducation or overeducation in these sector-specific job groups is ignorable.

Education–occupation mismatch is extremely high in the subsistence agricultural and fishery workers group, the customer services clerks group, other associate professionals group, and the physical and engineering science associate professionals group. For the groups with education–occupation levels below the 50% level, it probably stems from the unclear definition of “associate,” as seen in the associate professionals group and the physical and engineering science associate professionals group. However, the mismatch problem in the subsistence agricultural and fishery workers group and the customer services clerks group is dependent on the sectoral and educational structure. There are

Table 4
Adequate Education Levels in the Main Sectors

Sectoral Job Groups	Adequately Educated %
Life science and health professionals	99.35
Teaching professionals	99.14
Physical, mathematical, and engineering science professionals	98.52
Life science and health associate professionals	93.63
Corporate managers	91.54
Personal and protective services workers	85.4
Managers of small enterprises	83.74
Other professionals	80.98
Drivers and mobile plant operators	76.5
Other craft and related trade workers	75.82
Teaching associate professionals	75.11
Extraction and building trade workers	74.71
Sales and services elementary occupations	73.55
Precision, handicraft, craft printing, and related trade workers	71.73
Machine operators and assemblers	70.76
Laborers in mining, construction, manufacturing, and transport	69.36
Market-oriented skilled agricultural and fishery workers	67.92
Legislators and senior officials	66.9
Metal, machinery, and related trade workers	66.5
Agricultural, fishery, and related laborers	66.28
Stationary plant and related operators	61.08
Models, salespersons, and demonstrators	59.85
Office clerks	51.15
Subsistence agricultural and fishery workers	47.16
Customer services clerks	43.82
Other associate professionals	42.38
Physical and engineering science associate professionals	42

also many job groups in different sectors that suffer from education–occupation mismatch such as the laborers in mining, construction, manufacturing, and transport group, the market-oriented skilled agricultural and fishery workers group, the legislators and senior officials group, the metal, machinery, and related trade workers group, the agricultural, fishery, and related laborers group, the stationary plant, and related operators group, the models, salespersons, and demonstrators group, and the office clerks group. All of these groups have an education–occupation mismatch of more than 30%.

Furthermore, in these sectoral job classes, overeducated individuals earn less than they deserve when their level of education is taken into consideration. According to Verdugo and Verdugo (1989), undereducated workers in these groups tend to be paid higher wages. In this case, the return of less education becomes higher than the

return of higher education and this situation seems to be widespread among many sectors. Thus, the willingness to be educated and take a career path that demands higher levels of education generally decreases and the labor market structure takes major blows on the side of human capital, which in return causes considerable welfare losses for society. Human capital accumulation is a slow, but important mechanism that leads to economic growth and technological advancement. In the presence of high levels of undereducation and overeducation among many main sectors, it is impossible to increase human capital accumulation. Due to this, the aforementioned job groups that suffer from the undereducation or overeducation are in need of immediate political and regulatory actions. As a policy implication, the sectors with high levels of undereducation should be strictly regulated to impose a minimum level of educational achievement in the recruitment process. In addition, overeducation may be decreased by utilizing simple, but more developed job-person matching systems. In the case of such systems, the burdens fall on both the public and private sector.

Effects of Education–Occupation Mismatches on Wage Outcomes

The analyses in the previous sections show that, in many of the sectors, education–occupation mismatches are present and more than 30% of workers in some of these sectors have less or more education than the required level to effectively perform their jobs. These results indicate the presence of inefficiencies in the job searching and matching processes in the Turkish labor market. Another point of interest on this issue is whether this matching inefficiency is also reflected on wage outcomes. In this section, we investigate the effects of overeducation and undereducation on wage outcomes. Moreover, we determine whether overeducation or undereducation results in wage differentials and whether there are wage penalties for overeducated and undereducated workers.

Following Oaxaca (1973), McGuinness and Bennett (2007) and Hernández and Serrano (2012), we employ Oaxaca decomposition in order to examine the issue. In our analysis, Oaxaca decomposition allows us to divide the wage differential between two groups of workers: overeducated versus adequately educated workers, and undereducated versus adequately educated workers. The decomposition output reports the mean predictions of wages for each group and it allows us to disentangle the portion of

the wage differential that originates from individual characteristics and the part that originates from labor market evaluations regarding these characteristics. In this manner, this decomposition technique allows us to assess the contribution of education–occupation mismatches in explaining the wage differentials.

Table 5 presents the results of the decomposition. The first two components of Panel A and Panel B show the mean of log wages for non-overeducated versus overeducated workers and the mean for non-undereducated versus undereducated workers, respectively. The component “difference” measures the wage differential between non-overeducated workers and overeducated workers, and the wage differential between non-undereducated and undereducated workers. The component “endowments” reflects the mean decrease in overeducated (undereducated) workers’ wages if they had the same characteristics as their non-overeducated (non-undereducated) counterparts. The component “coefficients of change” quantifies the change in overeducated workers’ wages when applying the non-overeducated (non-undereducated) workers’ coefficients to those of the overeducated (undereducated) workers. In other words, it shows the change in the wages of non-overeducated (non-undereducated) workers if they had the same characteristics as overeducated (undereducated) workers. Thus, while the component “endowments” decompose the wage differential between groups from the perspective of overeducated (undereducated) workers, the component “coefficients of change” decompose the wage differential from the perspective of non-overeducated (non-undereducated) workers. The final component, “interaction,” measures the simultaneous effect of differences in endowments and coefficients of change.

Table 5
Oaxaca Decomposition Results (Dependent Variable Log Wages)

A. Overeducation	Coefficient	Standard Error
Non-overeducated	6.64	0.00
Overeducated	6.81	0.00
Difference	-0.16	0.01
Endowments	-0.51	0.01
Coefficients of change	0.18	0.00
Interaction	0.17	0.01
B. Undereducation	Coefficient	Standard Error
Non-undereducated	6.70	0.00
Undereducated	6.40	0.01
Difference	0.30	0.01
Endowments	0.38	0.01
Coefficients of change	-0.11	0.01
Interaction	0.02	0.01

In our sample, the mean of the log wages is 6.64 for non-overeducated workers and 6.81 for overeducated ones, thus yielding a wage gap of -0.16 . This result indicates that, while there is no wage penalty for overeducated workers, the labor market pays only a small premium for workers who acquire more education than the required level to perform their jobs. The decomposition further allows us to analyze how overeducated workers' wages would change if they had the same characteristics as non-overeducated workers. The coefficient of "endowments" (0.51) indicates that differences in endowments (individual characteristics) account for about threefold of the wage gap. Similarly, the obtained result for the component "coefficients of change" (0.18) indicates that when applying the non-overeducated workers' coefficients to the overeducated workers' characteristics, the wage gap is almost closed.

The decomposition for non-undereducated and undereducated workers leads to the following results. The mean of the log wages is 6.70 for non-undereducated workers and 6.40 for undereducated one, thus yielding a wage gap of 0.30. This result indicates that the wage gap between non-undereducated and undereducated workers is approximately two times the wage gap between non-overeducated and overeducated workers. This implies that the labor market penalizes workers who acquire less education than the required education level for the jobs. The coefficient of "endowments" (0.38) indicates that differences in endowments (individual characteristics) account for about one-and-a-half of the wage gap between the groups of non-undereducated and undereducated workers. In other words, if undereducated workers had the same characteristics as non-undereducated ones, then they would earn higher wages than the other group of workers. Furthermore, the result for the component "coefficients of change" (-0.11) indicates that, when applying the non-undereducated workers' coefficients to the undereducated workers' characteristics, the wage gap is almost closed.

Overall, the results of the Oaxaca decomposition indicate that education–occupation mismatches in the Turkish labor market are also reflected on wage outcomes. The labor market penalizes the workers who acquire less education than the adequate level to perform their jobs and it rewards the workers who obtain more education than the adequate level, but not to a considerable extent. Therefore, the results of the decomposition, especially the ones obtained for the difference between the groups of

non-overeducated and overeducated workers, indicate that acquiring more education than the required level to perform a specific job does not pay off. This is an important finding implying that education–occupation mismatches may have a negative effect on the return of education, which is in contrast to Mincer's (1974) earning equation. In other words, the education premium seems to fall short to compensate for the cost of education, especially when the time allocated to educational activities and other expenses are considered.

Discussion

In this paper, the sector-specific education–occupation mismatch levels were analyzed. Following the approach of Verdugo and Verdugo (1989), the mean education level was used to determine the existence of undereducated, overeducated, and adequately educated levels in the sector-specific job classes.

The case of undereducation was found to be prevalent among many sectors. Especially, the results indicated that the undereducation levels in the subsistence agricultural and fishery workers group, the legislators and senior officials group, and the models, sales persons, and demonstrators group were more than 30%. In addition, the undereducation levels for the agricultural, fishery, and related laborers group, the market-oriented skilled agricultural and fishery workers group, the customer services clerks group, the other associate professionals group, and the physical and engineering science associate professionals group were found to be more than 20%. Such prevalence of undereducation signals an immediate need for corrective action by the government, especially since it decreases the return of education below the optimal levels by rewarding undereducated workers.

The results of our analyses also showed that overeducation persists at high levels in the physical and engineering science associate professionals group, and the other associate professionals group. However, this finding was a priori expected since the definition of the term "associate" is extremely vague. Apart from these two groups, the overeducation levels were found to be extremely high in the stationary plant and related operators group, the customer services clerks group, the metal, machinery, and related trade workers group, and the office clerks group. The overeducation was also determined to create an important problem

in blue-collar job categories such as the machine operators and assemblers group, the drivers and mobile plant operators group, the laborers in mining, construction, manufacturing, and transport group, and the precision, handicraft, craft printing, and related trade workers group. Moreover, the overeducation problem in the blue-collar jobs mainly stems from the number of newly graduated students who have failed to find appropriate white-collar positions and reluctantly accept blue-collar jobs that do not match their education level.

The level of the education–occupation match was found to be extremely high in the life science and health professionals group, the teaching professionals group, the physical, mathematical, and engineering science professionals group, the life science and health associate professionals group, and the corporate managers group. Except for the corporate managers group, these sectoral job categories are well regulated by laws and strictly controlled by the authorities. Conversely, the results of our analyses pointed out that the education–occupation mismatch is a prevailing issue in many sectors. Especially, our findings underlined the

existence of high levels of education–occupation mismatches in the subsistence agricultural and fishery workers group, the customer services clerks group, the other associate professionals group, the physical and engineering science associate professionals group, the laborers in mining, construction, manufacturing, and transport group, the market-oriented skilled agricultural and fishery workers group, the legislators and senior officials group, the metal, machinery, and related trade workers group, the agricultural, fishery, and related laborers group, the stationary plant and related operators group, the models, salespersons, and demonstrators group, and the office clerks group.

Finally, the aforementioned groups in which education–occupation mismatch highly exists are in urgent need of correction and regulation. The main responsibility of this objective falls into the hands of public policy makers. In addition, sectors in which high levels of undereducation persist should be under strict regulation to provide a sufficient level of educational attainment within these job groups. In the case of overeducation, both the public and private sector should take part in developing simple, but efficient job-person matching systems.

References

- Abbas, Q. (2008). Over-education and under-education and their effects on earnings: Evidence from Pakistan, 1998-2004. *SAARC Journal of Human Resource Development*, 4, 109-127.
- Afşar, M. (2009). The relationship between education investments and economic growth in Turkey. *Anadolu University Journal of Social Sciences*, 9(1), 85-98.
- Bakış, O. (2012). Türkiye’de eğitimin bireysel getirisi: 1988-2008. *TÜSİAD-Sabancı Üniversitesi Rekabet Forumu Notlar*, 2012-1. Retrieved from http://ref.sabanciuniv.edu/sites/ref.sabanciuniv.edu/files/ozanbakis_not.pdf
- Barro, R. J. (1989). *Economic growth in a cross section of countries* (NBER Working Papers 3120). National Bureau of Economic Research, Inc.
- Barro, R. J. (1999). Human capital and growth in cross-country regressions. *Swedish Economic Policy Review*, 6, 237-277.
- Becker, G. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*. New York: Columbia University Press.
- Beşkaya, A., Savaş, B., & Şamiloğlu, F. (2010). The impact of education on economic growth in Turkey. *Suleyman Demirel University The Journal of Faculty of Economics and Administrative Sciences*, 15(3), 43-62.
- Cohn, E., & Khan, P. (1995). The wage effects of overschooling revisited. *Labour Economics*, 2, 67-76.
- Dayioğlu, M., & Kasnakoğlu, Z. (1997). Kentsel kesimde kadın ve erkeklerin işgücüne katılımları ve kazanç farklılıkları. *METU Studies in Development*, 24(3), 329-361.
- Duncan, J., & Hoffman, S. (1981). The incidence and wage effects of overeducation. *Economics of Education Review*, 1(1), 75-86.
- Filiztekin, A. (2011). *Education-occupation mismatch in Turkish labor market* (MPRA Paper 35123) University Library of Munich, Germany. Retrieved from <http://mpra.ub.uni-muenchen.de/35123/>

- Freeman, R. B. (1976). *The overeducated American*. New York: Academic Press.
- Galasi, P. (2008). *The effect of educational mismatch on wages for 25 countries* (Budapest Working Papers on Labor Market, BWP 2008/8). Retrieved from <http://www.econ.core.hu/file/download/bwp/BWP0808.pdf>
- Hartog, J. (2000). Over-education and earnings: Where are we, where should we go? *Economics of Education Review*, 19(2), 131-147.
- Hartog, J., & Oosterbeek, H. (1988). Education, allocation and earnings in the Netherlands: Overschooling? *Economics of Education Review*, 7(2), 185-194.
- Hernández, L., & Serrano, L. (2012). Overeducation and its effects on wages: A closer look at the Spanish regions. *Investigaciones Regionales*, 24, 59–90.
- Herrera-Idárraga, P., López-Bazo, E., & Motellón, E. (2013). *Informality and overeducation in the labor market of a developing country* (Working Paper, Research Institute of Applied Economics). Retrieved from http://www.ub.edu/irea/working_papers/2013/201305.pdf
- Kiker, B., Santos, M., & Mendes de Oliveira, M. (1997). Overeducation and undereducation: Evidence for Portugal. *Economics of Education Review*, 16(2), 111-125.
- Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22, 3-42.
- Mankiw, N. G., Romer, D., & Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2), 407-437.
- McGuinness, S., & Bennet, J. (2007). Overeducation in the graduate labour market: A quantile regression approach. *Economics of Education Review*, 6(5), 521-531.
- Mehta, A., Felipe, J., Quising, P., & Camingue, S. (2011). Overeducation in developing economies: How can we test for it, and what does it mean? *Economics of Education Review*, 30, 1334–1347.
- Mincer, J. (1974). *Schooling, experience and earnings*. New York: Columbia University Press.
- Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review*, 14, 693-709.
- Öksüzler, O. (2008). Does education pay off in Turkey? An ordered logit approach. *The Empirical Economics Letters*, 7(2), 213-221.
- Özcan, Y. Z., Özcan, M. K., & Üçdoğruk, S. (2003). Wage differences by gender, wage and self employment in urban Turkey. *Journal of Economic Corporation*, 24, 1-24.
- Quinn, M. A., & Rubb, S. (2006). Mexico's labor market: The importance of education-occupation matching on wages and productivity in developing countries. *Economics of Education Review*, 25(2), 147-156.
- Ramos, R., & Sanroma, E. (2013). Overeducation and local labour markets in Spain. *Journal of Economic and Social Geography*, 104(3), 278-291.
- Rubb, S. (2003). Overeducation in the labor market: A comment and re-analysis of a meta-analysis. *Economics of Education Review*, 22(6), 621-629.
- Schneider, F., & Savaşan, F. (2005). *The size of shadow economies of Turkey (and of her neighbouring countries) including an informal hiring and sectoral analysis of the Turkish shadow economy* (Working Paper, Johannes Kepler University of Linz Economics). Retrieved from <http://www.economics.uni-linz.ac.at/Schneider>
- Tansel A. (1994). Wage employment, earnings and returns to schooling for men and women in Turkey. *Economics of Education Review*, 13(4), 305-320.
- Verdugo, R., & Verdugo, N. (1989). The impact of surplus schooling on earnings. *Journal of Human Resources*, 24(4), 629–643.