

Nazarbayev University

**Education-job mismatch in the labor market of Kazakhstan:  
implications for public policy**

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**PhD Thesis**

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**Declaration**

I certify that this thesis has been written solely by myself as the result of my research. I present it for examination for the PhD degree of Nazarbayev University and declare that it has not been submitted in any form for any other academic degree or qualification.

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I declare that my thesis contains more than 67 000 words, the title, abstract, table of contents, references and appendices included.

To my children, Alkhan, Ilyas and Malika, who have inspired me throughout all this time and let me complete one of the most important projects of my life, my thesis. Thank you for your endless love and patiently waiting “until mama finishes her dissertation”.

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## **Abstract**

Considering the expansion of post-secondary education, its expensiveness and the costs associated with ineffective use of available human capital, the issue of the match between worker education and job is an important research question to study. The current study investigates education-job mismatches among Kazakhstani workers, using the mixed methods research design. Based on the nationally representative Labor Force Survey data for the period 2014-2018, the quantitative part of the research examines the incidence, determinants of education-job mismatches and their effects on individual earnings. For these purposes, we estimate binary logit models and OLS regressions. Ordered probit models are employed to check the robustness of the OLS findings on the earnings effects of mismatches. The qualitative inquiry implemented through online focus groups pursues the goal of complementing the findings of the quantitative study by exploring multiple perspectives of experts on the importance of education-job match, reasons for educational mismatches<sup>1</sup>, and the role of education-system and labor market-related factors in the matching of education to employment.

The empirical analysis shows that human capital and employment characteristics are likely to have much more impact on the probability of being mismatched than individuals' socio-demographic characteristics. We also find that relative to being well-matched, both vertical and horizontal mismatches have significant negative effects on individual earnings. The earnings penalty is found to be greatest for both vertically and horizontally mismatched (double mismatched) workers. The findings from the focus groups indicate that constrained career choices, labor demand-supply gaps, flaws in the education system, the lack of career guidance, inflated job expectations, unfavourable employment and macroeconomic conditions present additional important factors that could contribute to explaining education-job mismatches. The study has important policy implications.

*Key words: education-job mismatch, vertical mismatch, horizontal mismatch, overeducation, earnings, public policy, Kazakhstan*

<sup>1</sup> The terms education-job mismatch and educational mismatch are used interchangeably throughout the thesis.

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**List of Abbreviations**

BNS	-	Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan
HEI	-	Higher education institution
IAC	-	Information-Analytic Center
LFS	-	Labor Force Survey
OECD	-	Organization for Economic Cooperation and Development
VET	-	Vocational education and training
WB	-	World Bank
WEF	-	World Economic Forum

## **Chapter 1. Introduction**

In the context of the expansion of higher education and technological changes characterizing the contemporary world, the investigation of the match between worker education and job has become a prolific strand of research in the economic literature. Most existing studies on educational mismatch argue for and provide substantial evidence for the importance of studying the issue of education-job mismatch.

Given the important role of human capital in economic development, education-job mismatch is an important matter of public policy. Since education contributes to greater economic opportunities for individuals in terms of labor market participation, higher wage returns and better job perspectives, public policies that foster the full leveraging of the human capital stock of the labor force and enhance the quality and relevance of education to labor market needs are of great significance for economic growth. In general, an effective use of human capital deriving from a good matching of education to employment is related to benefits for individuals, firms, and a society at large, such as productivity increase and welfare (García-Espejo & Ibáñez, 2006). Meanwhile, mismatch is argued to be potentially costly both at the macroeconomic level with national welfare being lower in case of incomplete utilization of workers' skills, and at the individual level with mismatched workers earning less than similarly educated individuals in matched jobs (McGuinness, 2006; Kupets, 2015a; ILO, 2019).

Importantly, the extent of education-job match among workers is considered a criteria for evaluating the efficiency of the education system (Witte & Kalleberg, 1995). Considering high costs of public and private education, graduates' use of the skills acquired during education in subsequent employment is important and more knowledge about the match between education and job can be helpful in maximizing returns on education investments and understanding how education and labor market systems could serve to improve matching (Boudarbat & Chernoff, 2012; Levels et al., 2014). Given that one of the key goals of educational training is to teach skills to be used in future employment, mismatch is often viewed as an inefficient use of resources (Witte & Kalleberg, 1995; McGuinness, 2006; Murillo et al., 2012; Iriondo & Pérez-Amaral, 2016). But, the increasing expansion of higher education in modern societies and an increase in the supply of a highly educated workforce give rise to concerns about whether graduates can secure employment that matches their education (Green & Henseke, 2016). Then this begs the question: do individuals who have secured matching between education and employment achieve better labor outcomes compared to those who have not? This is, in turn, related to the capabilities of education systems to develop required skills and the need for labor market policies designed to contribute to a better adjustment between labor demand and

supply (OECD, 2017b; Garcia-Mainar & Montuenga, 2019; Murillo et al., 2012). Therefore, in view of the need to better understand the nature of the phenomenon and design and implement measures to reduce its negative implications if any, examining the issue of education-job mismatch is an important public policy matter.

Previous studies provide substantial evidence on the earnings premium to being vertically and horizontally matched to the job (Duncan & Hoffman, 1981; Hartog & Oosterbeek 1988; Sichernan, 1991; Cohn & Khan, 1995; Hartog 2000; Robst, 2007; Nordin et al., 2010; Yakusheva, 2010; McGuinness & Sloane, 2011; Iriundo & Pérez-Amaral, 2016; Li et al., 2018). Considering the evidence showing that education-job match increases productivity the analysis of this issue is highly relevant for developing countries. The current study argues that investigating the issue of education-job mismatch is highly important on grounds of productivity and efficient allocation of resources, which is particularly relevant in a developing country such as Kazakhstan.

Kazakhstan's post-secondary education system has experienced system-wide reforms since the 1990s in the post-independence period. While by the end of the Soviet period, 55 HEIs in the Kazakh SSR enrolled 287 400 students (NIIVO, 1992, as cited in Ahn et al., 2018), as of 2019-2020, 125 HEIs and 740 VET institutions train more than 600 000 and 475 000 students, respectively<sup>2</sup>. The enrollment ratio in tertiary education increased from 39.7% in 1990 to 61.7% in 2019<sup>3</sup>. Positive achievements in education enrollment and attainment rates that have taken place for the last 30 years are supposed to imply significant improvements in the stock of human capital of the country. But, in spite of these accomplishments, both international and national reports don't look good. In the 2019 Global Competitiveness Index report, out of 141 countries Kazakhstan is ranked 90th on the quality of vocational training and holds the 81st place on ease of finding skilled employees, while on the graduates' skill set derived from the average score of secondary education and university graduates' possession of the skills demanded by businesses the country is ranked 95<sup>th</sup> (WEF, 2019). Meanwhile, as widely noted in official reports, studies, magazine articles and other publications, currently there is a shortage of many blue-collar workers and certain higher-educated specialists (IAC, 2019; kursiv.kz, 2021; 24kz, 2021; forbes.kz, 2021; Atameken, 2020). These data coupled with the Labor Force survey data on the incidence of educational mismatch (discussed in Chapter 6 of this study) raise questions about whether the high education enrollment and attainment rates are in line with meeting labor market

<sup>2</sup> Source: The Bureau of National Statistics (BNS).

<sup>3</sup> Source: World Bank, World Development Indicators databank.

needs. The current data may well point to the existence of “an inadequately educated workforce” in the country which may also exacerbate educational mismatches in the labor market.

The purpose of this study is to investigate the incidence, determinants and earnings effects of education-job mismatches among Kazakhstani workers and the role of education system- and labor market-related factors in matching of education to employment. The study is based on using the definitions of vertical and horizontal mismatches commonly accepted in the literature. We examine overeducation as a form of vertical mismatch which corresponds to the case when the job performed is below a worker’s qualification level and mismatch between an individual’s specialty and his/her job, corresponding to horizontal mismatch, as well as double mismatch, combining these two types of educational mismatch.

The objectives of the study are: 1) to determine the incidence of education-job mismatches; 2) to identify the determinants of education-job mismatch; 3) to estimate the earnings effects of education-job mismatch; 4) to examine the role of the education system- and labor market-related factors for the matching of education to employment; 5) to frame policy recommendations for a better alignment of the education system with labor market needs.

Based on the review of the relevant literature and theoretical frameworks carried out within the study as well as the research context and the data used in the analysis, the research addresses the following questions that guide the study:

- 1) What is the incidence of education-job mismatches among Kazakhstani workers?
- 2) What factors can explain education-job mismatches across individuals?
- 3) How does education-job mismatch impact individual earnings?
- 4) Does the education system in Kazakhstan provide labor market relevant knowledge and skills?
- 5) What is the role of labor market-related factors for education-job mismatches?

The following hypotheses follow from the research questions and objectives of the study:

- 1) *Ceteris paribus*, education-job mismatches are more prevalent among workers employed in lower skilled industries than in higher skilled industries;
- 2) All else equal, there will be a significant negative effect from being educationally mismatched on individual earnings;
- 3) There are imbalances between labor demand and supply in the labor market of Kazakhstan;
- 4) The better the alignment of the education system with labor market needs, the better the worker is educationally matched to his/her job.

The study is designed as a mixed-method research, which best serves its objectives. The assessment of the extent of education-job mismatch, determination of the factors having impact on mismatch and its income effects require the use and estimation of quantitative data. The data used in the quantitative part of the study come from the Labor Force Survey of Kazakhstan (LFS), for its recent five waves (years 2014-2018), obtained from the Statistics Committee of Kazakhstan. The qualitative research through online focus group sessions has been carried out to explore multiple perspectives of experts on the issue of education-job mismatch in the domestic labor market. Broader and more contextual expert opinions on the topic of the study obtained from focus group discussions allow to complement the quantitative research findings.

The major findings of the study are as follows. The quantitative inquiry reveals that the majority of respondents (70.7%) report working according to their qualification level and specialty. Horizontal mismatch is reported more frequently than vertical mismatch (28.6% versus 22.3%). The incidence of education-job mismatches varies across socio-demographic, human capital and employment characteristics. In particular, education-job mismatches are much more prevalent among workers employed in lower skilled industries than in higher skilled industries. All socio-demographic, human capital and employment factors are found to be important determinants of the probability of being educationally mismatched to the job. At the same time, the estimated marginal effects suggest that human capital and employment characteristics appear to have much more impact on the probability of educational mismatch than individuals' socio-demographic characteristics. Regarding the determining factors of education-job mismatches, the qualitative inquiry provides complimentary evidence from the focus group participants' reported opinions about the reasons for mismatches. The major themes, revealed from the focus group discussions, such as constrained career choices, labor demand-labor supply gaps, flaws in the education system, lack of career guidance, inflated job expectations, unsatisfying employment conditions and unconducive macroeconomic setting represent additional factors that could contribute to explaining education-job mismatches on the labor market of the country. In particular, we have revealed from the focus groups and the existing studies that there are concerns about the labor market relevance and quality of knowledge and skills provided by educational institutions.

Importantly, the quantitative research provides evidence for wage penalties associated with education-job mismatches. The findings from both the OLS and ordered probit regressions show that all three types of education-job mismatch have statistically significant negative effects on individual earnings. We find that overeducated, horizontally mismatched, and double mismatched employees earn

less than workers with the same level of schooling but who work in jobs that match both their qualification level and specialty. The earnings penalty appears to be greatest for being double mismatched. Furthermore, the findings also suggest that regardless of an individual's ability, educationally mismatched workers seem to earn less than matched workers and that lower earnings aren't necessarily related to lower ability.

The study has important public policy implications. The key policy implication of the findings is to facilitate the matching between education and employment. The quantitative evidence for earnings penalties associated with educational mismatches makes studying the issue highly relevant for reducing educational mismatches might be tapped as one of the ways of increasing aggregate productivity in the country, especially across lower-skilled industries. Importantly, both quantitative and qualitative findings suggest that education-job mismatches might be related to problems with the quality and/or labor market relevance of knowledge and skills acquired in formal education, and/or the quantity and quality of the jobs or the job matching processes. Therefore, enhancing education quality and relevance, job-creation and the growth of job quality in the economy as well as matching skills, qualifications and available jobs through efficient job placement services and labor market information must be policy priorities. Other important policy recommendations derived from this study include orienting the education system towards labor market needs by improving the quality and relevance of education, among others, developing career guidance across all education organizations, raising public awareness about labor market demand and trends, increasing the analytical, operational and policy capabilities of the state faced with new challenges and trends in the current dynamic labor market environment

The study contributes to the existing literature on education-job mismatch in several ways. First, as noted by McGuinness et al. (2018), research on labor market mismatch in developing economies is quite scarce. To the best of our knowledge, this research is the first study on education-job mismatch in Kazakhstan, which analyzes the extent of mismatch between education and employment in the labor market, its determinants and effects on individual earnings. Second, the study is valuable in terms of employing the largest household employment data-set from the nationally representative survey for examining the issue of education-job mismatch. Third, the current study is novel in terms of the methodology used. Its mixed research design is hardly found being used in the educational mismatch literature. And, finally, the research has great public policy significance and develops valuable policy recommendations to improve the alignment of the education system with the labor market.

Data availability constraints complicate the empirical analysis of educational mismatch in developing countries and our study is no exception. First, due to the cross-section nature of the data used in the study, we couldn't directly control for unobserved individual heterogeneity or use the instrumental variables approach. Second, the LFS data-set doesn't contain a question on the field of study/specialty completed by the respondent, often used in educational mismatch studies. We hope future research will overcome these limitations as new forms of data become available. In particular, it would be great to have relevant data to apply panel estimation techniques, construct variables indicating the extent of knowledge and skills utilization on the job, model movement into matching employment and examine the persistence of education-job mismatches. Furthermore, given the possible trade-offs between wages and other aspects of the job, such as increased flexibility, promotion opportunities, job autonomy, status, working conditions, and the like, the avenues for further research could also include examining the reasons for accepting a mismatched job, when relevant data are available.

The thesis is structured as follows. Section 2 presents an overview of earlier studies on the incidence, determinants and labor market consequences of vertical (overeducation) and horizontal mismatches. Section 3 outlines conceptual and measurement issues and reviews major theoretical approaches to explaining education-job mismatches and the related earnings outcomes. In section 4 the research context is provided through the description of the education system and labor market of the country. Chapter 5 presents the research design of the study with the quantitative and qualitative research methodologies and data described. Specifically, the description of the data and the variables used in the study is provided, and then are examined the econometric framework for the empirical analysis and the focus group research design. Section 6 discusses the results of the quantitative and focus group studies. Section 7 presents an integrated analysis of the quantitative and qualitative findings. We describe some international practices for improving the alignment of education systems to labor market needs in Section 8. Chapter 9 presents policy implications and recommendations derived from the study. Chapter 10 highlights the main conclusions of the study and its limitations and implications for future research.

## **Chapter 2. Literature Review**

### **2.1 Incidence of Education-Job Mismatches**

Recent decades have seen a growth of literature on labor market mismatch. Extensive surveys of the mismatch literature mostly on developed countries can be found in the works of Groot & Van

den Brink (2000), Hartog (2000), McGuinness (2006), Leuven & Oosterbeek (2011), McGuinness et al. (2018) and Somers et al. (2019). These studies, among others, contain quite thorough discussions of conceptual and measurement issues related to educational mismatch. Theoretical interpretations of the evidence on educational mismatch are well elaborated by Hartog and Oosterbeek (1988), Alba-Ramírez (1993), Hartog (2000), Leuven & Oosterbeek (2011), and many others. Notably, most of the literature on education-job mismatch refers to its vertical dimension, namely the phenomenon of overeducation, while horizontal mismatch is not so much studied (Groot & Van den Brink, 2000; Wolbers, 2003; Verhaest et al., 2017). Moreover, the existing literature examining education-job mismatch in developed countries is much larger than research on mismatch in developing economies which has seen upsurge markedly in more recent times. As such, the studies by Kupets (2015b), Handel et al. (2016), and ILO (2019) are among the recent major cross-country investigations examining educational mismatch in developing countries, with Battu & Bender (2020) providing a review of the existing evidence on educational mismatch in the context of developing countries.

Some extent of skills and qualification mismatch is unavoidable, since the job task content changes with time in response to technological and organizational changes, changes in the supply of labor and customer demands (OECD, 2013). However, in developing economies educational mismatches can play out differently than in developed countries because of specific distinctions of the labor markets in the former such as underdeveloped or ineffective unemployment insurance and social assistance systems, relatively high shares of the informal sector including self-employment, and relatively low employment rates (ILO, 2019; Battu & Bender, 2020), and in particular, considerable imbalances between the labor supply and demand for skills propelled by economic restructuring, misalignment between the education system and labor market demands, and, in general, poorly developed education and training systems in transition countries (Kupets, 2015a). Therefore, it is reasonable to examine whether the findings from the educational mismatch literature differ across developed and low and middle-income countries (Battu & Bender, 2020).

There is considerable variation in the incidence of mismatch within and across both developed and developing countries. The meta-analysis of 25 studies of European countries and the US by Groot & Van den Brink (2000) finds the unweighted average of the incidence of overeducation to be 23.3%, varying from 6.9% among females in Portugal measured using the mean value within the occupation (Kiker et al., 1997) to 42% of US workers reporting having more education than required (Duncan & Hoffman, 1981). As such, educational mismatch studies provide evidence that different definitions and measurement approaches to mismatch lead to differences in estimates of the incidence of education-job

mismatch<sup>4</sup>. In the more recent literature review McGuinness et al. (2018) analyze the incidence of overeducation reported in 73 papers, covering 39 countries and show that the average incidence of overeducation ranges from 3% in Croatia measured by the empirical approach to 45,8% in Denmark and 49.5% in Slovakia, measured by the subjective method and empirical method, respectively, 51.6% in 25 European countries determined by the job evaluation method, while finding quite similar overall averages for three different measurement approaches: 21.5 % for the subjective approach, 25.9% for the empirical approach and 25.5% for the job evaluation method. The study by Levels et al. (2014) shows that among upper secondary and post-secondary non-tertiary school-leavers in 20 European countries the proportion of vertical mismatch on the first job varies from 8% in Germany, Luxembourg and Austria to 29% in France, while the incidence of horizontal mismatch ranges from 20% in Germany to 55% in Norway. The review by Somers et al. (2019) summarizing the findings of 20 studies documents the incidence of horizontal mismatch reported in previous research ranging from 7 to 63%. To name just a few examples, 8% of PhD holders residing in the US indicated that their job was not closely related to their education (Bender & Heywood, 2011), 20% of US workers reported working in unrelated degree fields (Robst, 2007b), 5 years after graduation 35.1% of Canadian graduates reported being in a job not closely related to their education (Boudarbat & Chernoff, 2012), while 23% of men and 17% of women in Sweden in the age-group 28–39 (Nordin et al., 2010) and 59% of young French graduates 3 years after leaving the educational system were classified as being mismatched to their occupation/job according to the objective evaluation method (Béduwé & Giret, 2011). On average, studies using definitions of horizontal mismatch based on employees' assessments find that over 20% of the employees are mismatched in terms of their field of study, while according to the measurement based on the objective evaluation method, 22.1% of the employees have an occupation that is somewhat relevant for their field and 35.4% are fully mismatched or hold a job that has low relevance for their degree (Somers et al., 2019).

Generally, as shown by the analysis of the educational mismatch literature, there has been relatively little research into educational mismatch in developing countries, and vertical mismatch appears to be the most studied type of mismatch. Handel et al. (2016) study multiple forms of mismatch across low- and middle-income countries<sup>5</sup> and find that the mean education-job match rate is 52%, while the average overeducation rate is 36% but for Lao PDR, Ghana, Kenya, Vietnam and Sri

<sup>4</sup> Different ways of measuring education-job mismatch are discussed in sub-section 3.1 “Concepts and Measurement” of Chapter 3 of the thesis.

<sup>5</sup> The countries analyzed include Ghana, Kenya, China (Yunnan province only), Lao PDR, Sri Lanka, Vietnam, Armenia, Georgia, Macedonia, Ukraine, Bolivia and Colombia.

Lanka (the lowest income countries), they find quite high rates of overeducation of 41.1, 39.5, 24.9, 70 and 46.1%, respectively. The study of mismatch in 12 low- and middle income countries by ILO (2019) based on the World Bank's Skills Toward Employability and Productivity survey (STEP) survey data among urban working-age adults, extending the work by Handel et al. (2016), finds the average of over-education at 35.7% to be higher than what is observed in advanced countries. According to another analysis by ILO (2019) of 16 middle-income and 4 low income countries based on national LFSs in 2012 (or the closest available year), overeducation was found to be 35% at most in Argentina, and at more than 30% in five countries, higher than the rates usually observed for developed economies. Yet another study of educational mismatch by ILO (2019) using the data from the ILO School-to-Work-Transition Survey (SWTS) shows that the average rate of overeducation among young employees in 31 countries measured subjectively is 15.3%, ranging from 2.8% in the Dominican Republic to 35.4% in the Occupied Palestinian Territory among employees, and from 5.8% in Ukraine to 44.6% in North Macedonia among own-account workers.

In their survey of the economics literature on overeducation Leuven & Oosterbeek (2011) show the overall means of the share of overschooled workers reported in existing studies to be 26% for Asia, 24% for the Latin American continent which are lower compared to 37% for the USA/Canada and 30% for Europe. The cross-country study by Kupets (2015b) analyzing education-job mismatch in non-EU transition economies documents that the proportion of overeducated workers is quite high among urban working-age population in Armenia, Georgia and Ukraine but that it is roughly the same as in many developed countries (estimated for both rural and urban population). This study shows that according to the self-assessment method, the incidence of overeducation ranges from 13.4% in Italy to 20.7% in Macedonia, about 30% in Armenia and Ukraine (only urban population), to 33% or more in Georgia (only urban population), France, Japan, and Russia (excluding the Moscow municipal area population).

The existing single-country studies of educational mismatch in other transition countries document considerable heterogeneity in the prevalence of overeducation which ranges from 12% reported by workers in Estonia (Lamo & Messina, 2010), 17.2% among Indian workers derived from looking at mean education in an occupation (Sharma & Sharma, 2017), approximately 13.7% of youth in Kyrgyzstan overeducated for their current jobs as found by the objective approach, and 7.6% of youth perceiving themselves as overeducated according to the subjective measurement (Karymshakov & Sulaimanova, 2019), 19.4% among all working respondents in Poland (Kiersztyn, 2013), to 26% in six large metropolitan areas of Brazil (Reis, 2017), determined by using the objective (job analyst)

method, and 34% in the urban area of Kunming City, the capital of Yunnan Province (China), found from the subjective measure of mismatch.

There is quite little research on horizontal mismatch in developing countries. According to Rudakov et al. (2019), about 32% of university graduates in Russia report that they work in a job that is not related to their field of study. Using the data on graduates from the colleges located in the Shandong province of China, Zhu (2014) finds that the proportion of college graduates who reported a major–job mismatch is 28.2%, assuming that taking major mismatched jobs is possibly related to supply-related reasons such as pay requirements and/or oversupply of college graduates from the same major resulting from the college enrollment expansion and unavailability of matched jobs.

Education-job mismatch is present in both developed and developing labor markets, including in the latter category countries with both low levels of average educational attainment and high rates of tertiary education (Handel et al., 2016). According to Battu & Bender (2020), the rates of overeducation are relatively high in most developing countries. Our analysis shows that there is wide variability across and within countries, and as noted by the ILO study (2019), overall, overeducation in low- and middle-income countries is quite comparable to that typically observed in developed countries, in many cases exceeding it.

## **2.2 Determinants of Education-Job Mismatches**

A well-explored aspect of education-job mismatch is its potential determinants. Several factors relating to education both on the individual and the country level are among the most commonly discussed in research on mismatch. Educational determinants of mismatch at the individual level include the level and characteristics of the program attended, including the field of education, orientation of the study program (general versus vocational/occupation specific), full-time or part time mode of study. The studies suggest that a higher level of education is likely to decrease the odds of being mismatched (Robst, 2007a; Boudarbat & Chernoff, 2012; Bender & Roche, 2013), that study programs providing more occupation-specific skills and full-time programs are associated with greater incidence of match between education and job (Wolbers, 2003; Robst, 2007a; Garcia-Espejo & Ibanez, 2006; Boudarbat & Chernoff, 2012, Li et al., 2018).

At the country level a number of studies have focused on the relationship between education system institutions and characteristics and education-job matching (Verhaest & Van der Velden, 2013; Levels et al., 2014; Verhaest et al., 2017). Highly stratified education systems are found to be associated with higher chances of school-leavers to work at the right level of education (Levels et al.,

2014). The orientation of the education system and the quality and selectivity<sup>6</sup> of education may be also important in accounting for country, field-of-study and individual differences in mismatches (Verhaest et al., 2017; Levels et al., 2014). Strong institutional linkages in the education system presented as the share of vocational education organized as a mix of school-based education and training at the workplace are likely to enhance better allocation of vocationally trained individuals in the labor market (Levels et al., 2014). A host of other factors affecting education-job mismatch incidence in the labor market include the quality and theoretical or practical orientation of educational training, responsiveness of educational institutions to labor market changes, information asymmetry, lack of career advice and guidance, misalignment between initial educational choices and labor market demands, etc. (Wolbers, 2003; CIPD, 2013; Mocanu et al., 2014; Dužević et al. 2014; Bartlett, et al., 2016; Kupets, 2016).

Labor market-related determinants refer to another group of factors explaining education-job mismatch. Many studies attribute variation in the mismatch incidence across nations and individuals to differences in the characteristics of labor market institutions and conditions (Green & Henseke, 2016; Ghignoni & Verashchagina, 2014; Verhaest et al., 2017). As such, they have examined the association of education-job mismatch with labor market institutions and characteristics such as the strictness of employment protection legislation (EPL), union density, labor supply-demand imbalances, business cycle conditions, and the unemployment rate (Wolbers 2003; Verhaest & Van der Velden, 2013; Ghignoni & Verashchagina, 2014; Kupets, 2016; Verhaest et al., 2017). Kupets (2016) show that the relative supply and the relative demand for the highly educated labor, *ceteris paribus*, are important factors affecting the incidence of both overeducation and undereducation. Ghignoni & Verashchagina (2014) find that demand factors have greater effects on reducing educational mismatch in technologically more developed countries, whereas supply-side factors seem to constitute the main cause of over- and undereducation in countries with lower technological development. As noted by Wolbers (2003), economic recessions tend to induce graduate labor market entrants to accept non-matching jobs.

Upon employment, there are job-related factors that influence the matching of education to performed tasks. Employment characteristics including the job type, type of employment contract, firm size, employment sector, occupation type can be important determinants of mismatch (Witte & Kalleberg, 1995; Wolbers, 2003; Green & McIntosh, 2007; Dolton & Silles, 2008; Li et al., 2018).

<sup>6</sup> A selective school system bases admission of individuals on their academic performance

According to some findings current context characteristics appear to matter more than educational variables in accounting for fit between academic credentials and job (Battu et al., 1999; Green & McIntosh, 2007).

Finally, studies of education-job mismatch commonly consider individual-level factors that are predicted to impact labor market outcomes of individuals. Personal characteristics such as gender, age, marital status, individual abilities, work experience, job tenure appear to affect the probability of being employed in a non-matching job (Witte & Kalleberg, 1995; Wolbers, 2003; Robst, 2007a; Green & McIntosh, 2007; Boudarbat & Chernoff, 2012; Sloane et al., 1996). Existing studies more or less consistently report that young people, females, unmarried people, and migrants are more likely to be overeducated (Leuven and Oosterbeek, 2011). Race/ethnicity and disability might also be important determinants of educational mismatch (Robst, 2007a; Boudarbat & Chernoff, 2012).

Outcomes of the matching of individuals to job positions are found to be also affected by other structural and individual characteristics as the job opportunity structure in the economy, job search constraints and previous individual mismatch experience (Witte & Kalleberg, 1995; Dolton & Silles, 2008). Mismatch is also positively related to the search duration in finding the first job (Robert, 2014). Dolton & Silles (2008) find that graduates who were over-educated in their first job have a greater likelihood of being overeducated for their current job. Information asymmetry between employers and job seekers can also contribute to explaining mismatches (Wolbers, 2003).

In the medium to long run, education-job mismatches may vary with structural factors, such as structural changes in employment, technological and demographic changes, globalization and trade, organizational innovations, and changes in the patterns of consumption which may have impact on education-job mismatches (Brunello & Wruuck, 2021; Sparreboom & Tarvid, 2016). New sectors and jobs in the economy emerge while others shrink, and the tasks performed and the demand for the skills needed to implement them undergo important transformations within existing occupations (Brunello & Wruuck, 2021). This is to an extent reflected in changes in job growth across different occupations, which affects their education and skill requirements (Sparreboom & Tarvid, 2016). The skills supply changes as well, for instance, because of the expansion of higher education, changes in the labor force participation and patterns in retirement and migration (Brunello & Wruuck, 2021). Several papers have documented the trend in job polarization (Autor, Katz, & Kearney, 2006; Goos & Manning, 2007; Goos et al., 2009; Alonso & Zvakou, 2020), which suggests a decline in middle-skilled jobs and a relative increase in high- and low-skill jobs. Rohrbach-Schmidt & Tiemann (2011) show that the substantial upgrading in educational attainment and some observed polarization in employment over

time in Germany have been accompanied by an increase in over-qualification within occupations from the mid-1980s. Alonso & Zavakou (2020) provide evidence that technological changes increase the job polarization by raising the demand for highly skilled tasks and reducing the demand for routine tasks and as a result increase skill mismatches in the Euro area.

The evidence from existing studies on mismatch in developing countries provides support for the importance of many of the above- discussed factors such as individual factors (gender, age, marital status, place of residence, socio-economic background, completed education, job tenure, job mobility, work experience, skills and ability-related indicators), and employment characteristics (firm size, ownership of the work unit, informality status, job type, economic sector) in explaining educational mismatch (Kiersztyn, 2013; Robert, 2015; Kupets, 2015b; Handel et al., 2016; Sharma & Sharma, 2017; Haddad & Habibi, 2017; Rudakov et al., 2019; ILO, 2019). As such, Rudakov et al. (2019) in their study of recent university graduates in Russia find that studying in fields, which contribute to acquiring specific human capital, in full-time programs and on a state-funded basis, being female, and getting older are associated with a higher likelihood of being matched in terms of job and field of study. In his cross-country analysis for post-Soviet Hungary, Poland, Lithuania and Slovenia, Robert (2014) reveals that extensive job mobility during early career, longer unemployment period, the mismatch in the first job influence negatively education-occupation match, increasing the odds for both vertical and horizontal mismatch, with the field of study being also an important predictor. According to Karymshakov & Sulaimanova (2019), technical education is argued to provide skills that help find a job corresponding to one' professional education, contributing to a lower probability of being overeducated.

In the context of developing countries, many other distinct factors also play a role in accounting for education-job mismatches, which is conditioned by the specificities of the labor markets in these environments. Unlike developed labor markets where overeducation is mainly related to the oversupply of graduates, information asymmetries, and inefficiencies in management practices, the principal drivers of overeducation in low- and middle-income countries appear to be related to low labor market demand associated with a shortage of quality formal employment, with the rates of informality<sup>7</sup> being often much higher than in developed countries, relatively low levels of educational attainment, and the lag in the growth in high-quality jobs (ILO, 2019). At the same time, as with developed countries, factors such as per capita GDP (business cycle effects), unemployment, and labor force participation

<sup>7</sup> The term “informal economy” refers to “all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements” (ILO, 2015).

rates are found to matter in explaining differences in mismatch rates across developing countries (ILO, 2019). The SWTS study by ILO (2019) reveals that for young workers in emerging middle-income countries in Latin America, Northern Africa, Europe and Central Asia suffering from overeducation it is seen as a long-run adjustment mechanism representing an alternative to unemployment.

As shown by both the individual studies and the meta-analysis by ILO (2019) the extent of informality, which is a salient feature of developing labor markets, is the key to understanding educational mismatch in developing countries. Except for some findings, as found by Robert (2014) in the study of vertical and horizontal mismatch among graduates in four post-Soviet societies, Hungary, Poland, Lithuania and Slovenia, according to which new labor market entrants seem to consider holding a permanent occupation as opposed to a fixed-term contract job or self-employment, even if the concrete job is vertically and/or horizontally mismatched due to self-selection from the viewpoint of job safety, generally, studies in developing countries provide evidence that informal employment is commonly associated with greater educational mismatch. The ILO study (2019) finds that on average about 38.8% of STEP respondents would accept informal employment that do not offer social security benefits and on average 45.3% of those willing to take informal jobs report that they have no choice. Using the ratio of self-employed to employed workers as a proxy for the level of informality within the labor market the panel study of ten middle-income countries by ILO (2019) provides evidence that overqualification tends to be higher in labor markets with a larger informal sector of employment, which suggests that overeducation is driven by a shortage of sufficient and quality jobs. The ILO study (2019) based on STEP data shows that informality is a strong predictor of overeducation using written employment contracts as a second measure of informality. According to Handel et al. (2016), high rates of self-employment and other forms of informality in developing countries suggest that good jobs utilizing knowledge and skills of existing workforce are in short supply, which may be related to weak investment, unfavorable business conditions, low economic activity, and low quality of institutions and social conditions. As such, in their study of overeducation across 12 low and middle-income countries Handel et al. (2016) find that employment in the public sector rather than the private sector is associated with better education-to-job matching, and that working in the informal rather than the formal sector is associated with doubled odds of overeducation, which are nearly tripled for self-employed informal workers than for those in the formal sector.

Another factor which is worth considering in relation to educational mismatch in the developing world, given generally weak institutions and capacities, ineffective and inefficient management and financing processes in these countries is the quality of education. Mehta et al. (2011) argue that

overeducation in developing countries sometimes mayn't be tied to a growing share of educated workers, but to a scarcity of quality education, when the poorly educated accumulate in unskilled jobs. The lag of education and training systems behind the requirements of labor demand is an important reason for education mismatch in fast-growing low- and middle-income countries (ILO, 2019). Having studied employers' perspectives and secondary data from post-Soviet Tajikistan, Jonbekova (2015) finds that the quality of higher education has deteriorated over the past two decades, contributing to the widening gap between the university graduates' acquired skills and those required in the job market, and, in particular, to the higher prevalence of skills mismatch among graduates from field-specific programs such as engineering and science. Sondergaard et al. (2012) also relate the skills mismatch in the European and Central Asian (ECA) region to the quality of education and training of graduates in these countries. As noted by Sondergaard et al. (2012), despite generally high average enrollment and attainment rates, especially booming tertiary enrollments in ECA countries and respectable quality education at the elementary and lower secondary levels for their income levels, the quality of higher levels of education in the region continues to be of concern. At the tertiary level, the expansion seems to have resulted in poorer-quality education due to weakness or absence of quality assurance agencies, the dominance of short-term profit motives in new institutions, and unknown quality of part-time and long-distance learning programs, in which a good deal of the expansion of tertiary education in the ECA countries took place (Sondergaard et al., 2012). According to Sondergaard et al. (2012), the limited quality and relevance of education among upper secondary and tertiary education graduates, and in addition, the decline of vocational schools at the upper secondary level contribute to the skills shortage among countries in the region. Another reason for the skills shortage may be that ECA education systems are quite good at imparting basic skills, but not problem-solving and behavioral (or soft) skills increasingly emphasized by employers (Sondergaard et al., 2012). As noted by Kupets (2015a), in transition economies, although the level of educational attainment of the population is on par with that in developed countries, high levels of formal education don't necessarily result in high levels of modern productive skills leading to the situation when the rapid expansion of higher education oftentimes fails to provide graduates with adequate skills due to the low quality and relevance of education programs. Hence, one can observe substantial skill shortages and overeducation of workers as well as structural unemployment affecting both young and old workers (Kupets, 2015b). According to Sondergaard et al. (2012), three major factors prevent education systems in ECA countries from having the skills shortage lowered, namely, the absence of crucial data on learning and labor market outcomes of students, the legacy of central planning keeping the governance and management of

education policy highly centralized, which is focused on compliance with norms and regulation, and inputs and not outputs and outcomes, and the inefficient use of financial resources by education systems.

Unlike developed countries where, overeducation tends to be prevalent among individuals with post-secondary education, in low- and middle-income countries overeducation is more spread among individuals with lower levels of education, and at the same time, reflects the scarce availability of better-quality skill-intensive jobs, as found in the panel study of 10 middle-income countries by ILO (2019). Moreover, education-job mismatch seems to be a more permanent phenomenon in transition economies, affecting both young and older workers. This may be explained by rapid deindustrialization expansion of less-knowledge intensive services after the collapse of the Soviet system that increased the relative demand for low-skilled workers, the lack of basic skills among the large cohort of older workers relevant for the new economic environment, loss of signalling ability of education and the tendency to get diplomas without taking into account employment opportunities (Kupets, 2015b). At the same time, the ILO panel study (2019) shows that an increase in the share of the labor force aged under 30 is likely to lead to an increase in the overeducation rate, explained where applicable by a slower rate of the growth of job quality compared to the growth in the number of more educated young labor market entrants with education investment concentrated on younger cohorts. Using data from the Polish Panel Survey for 1988–2008, Kiersztyn (2013) finds that overeducation in Poland is highly persistent, with overeducated workers facing a higher risk of persistent overqualification five years later, compared to other working respondents, and that the incidence of persistent overeducation is higher in the youngest cohorts. According to the ILO SWTS data young workers in emerging middle-income economies in Latin America, North Africa, Europe and Central Asia appear to experience high levels of overeducation given the dominance of low-productivity firms in traditional sectors despite rapid growth in tertiary education enrollment and overall educational attainment of the population in most of these countries (ILO, 2019). Using the World Bank's STEP dataset for 2012, Wu & Wang (2018) claim that quite a high incidence of overeducation in the urban area of Kunmin City, the capital of Yunnan Province (China), stems partly from the expanded enrollments of Chinese universities since 1999 on the supply side, and on the demand side from firms' inability to benefit from technological progress because of the strict employment protection regulation and the skill-biased technological change (SBTC). In their study of youth based on the ILO 2013 data from the school-to-work transition survey for Kyrgyzstan, Karymshakov & Sulaimanova (2019) argue that education-job mismatch results from both demand- and supply-driven factors, namely, a high extent of informality, insufficient

job-creation in the economy leading to an oversupply of the labor force and the inability of the education system to provide right skills and high qualification, respectively, reinforced by poor quality of public employment services and low quality of labor market information. According to Karymshakov & Sulaimanova (2019), high tertiary education enrollment in tandem with the rising difficulty in finding a qualified workforce are related to formal education content and its ability to provide labor market relevant skills. The findings of Robert (2014) for Hungary, Poland, Lithuania and Slovenia suggest that the quality and relevance of academic curricula and courses at tertiary level need to be paid attention in terms of the importance of job-related skills and competences.

### **2.3 Labor Market Effects of Education-Job Mismatches**

A major strand of research on education-job mismatch has focused on its effect on wages (Hartog, 2000; McGuinness et al., 2018). Empirical research has showed that education-job match is rewarded on the labor market (Duncan & Hoffman, 1981; Hartog & Oosterbeek, 1988; Sicherman, 1991; Cohn & Khan, 1995; Hartog, 2000; Van de Werfhorst, 2002; Robst, 2007a; Nordin et al., 2010; Iriondo & Pérez-Amaral, 2016; Li et al., 2018). Following the seminal work of Duncan & Hoffman (1981), who derived measures of over- and undereducation from the concepts of attained and required levels education and estimated returns to years of mismatch and the wage specification of Verdugo & Verdugo (1989), who used years of schooling attained and dummy variables for overeducation and undereducation, quite a lot of scholars have contributed to this line of research. Considerable evidence suggests that overeducated workers earn less than their equally educated counterparts in matched employment, i.e. who are adequately schooled for their job, but more than their co-workers who have the required years of schooling (Duncan & Hoffman, 1981; Hartog & Oosterbeek, 1988; Sicherman, 1991; Hersch, 1991; Alba-Ramirez, 1993; Cohn & Khan, 1995; Van Smoorenburg & Van der Velden, 2000; Dolton & Vignoles, 2000; Dolton & Silles, 2008; McGuinness & Sloane, 2011; Murillo et al., 2012; Green & Henseke, 2016; Iriondo & Pérez-Amaral, 2016). It is well-documented by many of these studies that the rate of return to over-schooling is positive but smaller than the one to required schooling. As noted by Hartog (2000), this finding holds independent of the type of the measure of required education. The meta-analysis by Groot & Van der Brink (2000) finds that the rate of return to a year of education required for the job is 7.9%, to a year of overeducation 2.6%, and to a year of undereducation -4.9%. Having analyzed 74 estimates of the overeducation wage penalty reported in the more recent papers McGuinness et al. (2018) document that on average overeducated individuals

earn 13.6% less than individuals with the same education but who hold jobs for which they have the required the level of schooling.

Some scholars differentiate between apparent/formal and genuine/real overeducation and show that the pay penalty is greater for real overqualification/genuine overeducation, when overqualification is accompanied by skills underutilization or non-useful educational skills, i.e. skills that are hardly applicable to jobs (Chevalier, 2003; Green & Zhu, 2010; Garcia-Mainar & Montuenga, 2019). Meanwhile, Green & McIntosh (2007) find that a wage penalty for the over-educated does persist even when the extent of skill-underutilization is controlled for.

Likewise, it is well-documented that individuals not working in jobs/occupations that match their field of education tend to incur a wage penalty (Robst, 2007a; Yakusheva, 2010; Somers et al., 2019). With the same amount of education, matched workers are likely to have wage gains relative to mismatched workers with wage effects being greater for fields of study providing occupation-specific skills (Robst, 2007a). The size of wage penalty seems to depend on the degree of mismatch. Robst (2007b) shows that partially mismatched males incur smaller wage penalties than mismatched males: a wage loss of 2.9% vis-à-vis 11.9%, while the wage losses for mismatched and partially mismatched females are 10.1 and 2.1%, respectively. Nordin et al. (2010) provide evidence that fields of education with more occupation-specific skills are associated with greater income penalty for being employed in a non-matching job, and that the penalty isn't caused by ability sorting. Several studies argue that wage penalties of horizontal mismatch are related to the presence of vertical mismatch, namely overeducation (Montt, 2017; Béduwé & Giret, 2011; Verhaest et al., 2017).

The wage implications of both vertical and horizontal mismatches are found to vary across different reasons for mismatch (Robst, 2007). Therefore, some scholars argue that to some degree education-job mismatch may be a voluntary phenomenon due to compensating differentials whereby mismatched workers might be trading off being mismatched and its negative implications for different aspects of employment. For example, McGuinness & Sloane (2011) find that overeducated females value and are more likely to opt for jobs offering security, suggesting that such workers may be trading off lower pay for higher job security, whereas overeducated males are more likely to place a high emphasis on and be employed in jobs allowing a balance with family life while high earnings don't seem to be a major factor for their job choice.

Many studies have dealt with potential omitted variable bias in the estimation of the mismatch penalty. As such, the probability of education-job mismatch may be related to innate ability (Bauer, 2002) and overeducation may stem from differences in the level of individuals' unobservable skills

(Chevalier, 2003). Based on a large German panel data set Bauer (2002) documents a decrease in pay penalty when unobserved skills heterogeneity is accounted for. Chevalier (2003) also finds reduced wage effects of overeducation when the measure of unobservable skills is included. Dolton & Silles (2008) provide evidence of somewhat upward biased estimates of the overeducation pay penalty due to unobserved ability, but show that this upward bias in OLS estimates is compensated by downward bias resulting from measurement error. Controlling for unobserved heterogeneity and measurement error, based on Belgian panel data Sellami et al. (2017) find that overeducated individuals who are matched to their field of study incur a wage penalty. Relying on an individual's position within the wage distribution as a proxy for their unobserved ability, McGuinness & Bennett (2007) provide only partial support for the link between overeducation and ability by finding that relative to their well-matched counterparts lower- and mid-ability overeducated males experienced a disadvantage in terms of wages, while overeducated females earned significantly less regardless of their ability levels. Also some studies that relied on propensity score matching models and those that incorporated ability, motivation, and skill-related variables and test scores document that earnings premiums for education-job matching are robust to controlling for unobserved individual heterogeneity (McGuinness & Sloane 2011; Yakusheva, 2010).

The existing studies on the effects of educational mismatch on individual labor market outcomes in developing countries provide results consistent with the findings from previous studies for developed countries. As with developed labor markets, educational mismatch imposes significant wage costs on individuals. Most overeducated workers experience a pay penalty relative to their similarly educated but matched counterparts and this penalty typically tends to be higher than that in developed markets (ILO, 2019). The STEP study of mismatch in low and middle-income countries by ILO (2019) finds wage penalties in all countries excluding the Plurinational State of Bolivia and Lao PDR, to range in magnitude between 13 and 45% with the average of 21%, which is higher than the average of 13.5%, reported by McGuinness et al. (2017) in a review of 16 papers, providing 61 estimates of the overeducation wage penalty from mostly developed economies. Another OLS study by ILO (2019) provides evidence for substantial wage penalties from overeducation within low- and middle-income countries, which vary from about 20–25% in the Philippines, Guatemala, Pakistan, Vietnam, Ecuador and Bangladesh to as high as 30, 40 and 60% in the Gambia, Uganda and Namibia, respectively, higher than what is observed in the studies for developed countries.

There is a growing literature looking at the earnings penalties in individual low and middle-income countries. For the Chinese urban area, namely Kunmin city, Wu & Wang (2018) find that

overeducated workers having tertiary education experience about 20% earnings loss compared with the well-matched, with no significant effect of overeducation detected for workers with high school education. From the pooled OLS model for six large metropolitan areas in Brazil, Reis (2017) provides evidence that one additional year of overeducation raises labor earnings, but that the associated earnings penalty relative to those having the required education is around 6%, and that though taking into account individual fixed effects, the estimated effect of each year of overeducation on labor earnings drops to 1.1%, it remains statistically significant. Examining earnings penalties from mismatch in India, Sharma & Sharma (2017) find positive and significant returns to overeducation, but overeducation is found to be related, on average, to a 9-11% wage loss (with the higher penalty found when endogeneity taken into account) relative to the matched case. Karymshakov & Sulaimanova (2019) find wage penalty of above 16% for males among young people in Kyrgyzstan only with using the objective measure of mismatch. Rudakov et al. (2019) find that field of study (horizontal) mismatch negatively affects the earnings of Russian university graduates, with mismatched graduates experiencing a 12% wage penalty relative to matched graduates and the penalty increasing with the degree of mismatch.

Besides earnings, among the issues discussed in the mismatch literature are the effects of education-job mismatch on other labor market outcomes such as job satisfaction, labor turnover, occupational mobility. Previous studies have provided evidence that mismatched workers are likely to have lower job satisfaction, higher turnover rates, greater job search incentives, higher occupational mobility, and increased likelihood of regret of study program (Hersch, 1991; Sicherman, 1991; Alba-Ramirez, 1993; Battu et al., 1999; Wolbers, 2003; Beduwe, & Giret, 2018; Kim & Choi, 2018; Garcia-Mainar & Montuenga, 2019; Ge et al., 2019; Kucel & Vilalta-Bufi, 2013; Choi & Hur, 2020). Notably, some studies differentiating between educational and skill mismatches have established that compared to educational mismatches, skill mismatches have stronger negative effects on job satisfaction (Allen & Van der Velden, 2001; McGuinness & Sloane, 2011), whereas overqualification accompanied by skill underutilization causes a lot more job dissatisfaction than formal overqualification (Green & Zhu, 2010). Mismatch is found to be also associated with additional training costs, lower occupational status and more volatile career paths (Van Smoorenburg & Van der Velden, 2000; Wolbers, 2003; Wolter et al., 2006; Verhaest et al., 2017). Some authors find that overeducated workers receive less job training compared to adequately educated workers (Sicherman, 1991; Hersch, 1991; Alba-Ramirez, 1993; Van Smoorenburg & Van der Velden, 2000; Garcia Espejo & Ibanez, 2006).

As for the studies on the labor market effects of educational mismatch besides wage effects in developing countries, the literature is still limited. The study by ILO (2019) considers the impacts of mismatch on life satisfaction among urban working-age adults and on job satisfaction among young people in low and middle income countries. As such, the analyses reveal that overeducated adult employees are almost 34% less likely to report life satisfaction compared to their well-matched counterparts, while working in a mismatched job has a strong negative effect on job satisfaction of young workers. In general, the findings of studies on the effects of educational mismatch on labor market outcomes in developing countries seem to be in line with the extant literature on developed countries. Examining the relationship between mismatch and on-the-job search behavior among Malaysian workers, Zakariya (2017) finds a relatively higher likelihood of active on-the job search among the severely mismatched followed by the moderately mismatched workers.

### **Chapter 3. Conceptual and Theoretical Frameworks**

#### **3.1 Concepts and Measurement**

Vertical mismatch and horizontal mismatch are typically distinguished as two forms of education-job mismatch. Vertical mismatch is typically defined in terms of a worker's level of education being above or below that required to perform the job. Hence, vertical mismatch is commonly measured as overeducation or undereducation. The literature on vertical mismatch distinguishes three approaches to its measurement: the subjective method (worker self-assessment), the empirical method (realized matches) and the job evaluation method (job analysis) (Hartog, 2000; Leuven & Oosterbeek, 2011).

The subjective method is commonly based on worker self-assessment of the level of education or qualifications required for the job, which is then compared to the worker's actual level of education. As noted by Hartog (2000), the worker specifies the required education explicitly or indirectly, indicating whether a higher or a lower (or a different) education is needed for his job compared to his actual education. In this way the worker is determined to be either matched if he has education level equal to that required or vertically mismatched if he has a level of education above that required in case of overeducation and undereducated if he has a level of education below that required. This method has been employed in many studies, including Duncan & Hoffman (1981), Hartog & Oosterbeek (1988), Sicherman (1991), Alba-Ramirez (1993), Battu et al. (2000), Dolton & Vignoles (2000); Dolton & Silles (2008); Verhaest et al. (2017) and others. The questions asking workers about education requirements of jobs vary across studies. Some studies ask questions referring to requirements "to get"

the job, whereas others refer to requirements to “to do” the job. Duncan & Hoffman (1981), for example, used the question in the American Panel Study of Income Dynamics “How much formal education is required to get a job like yours?” to identify self-reported job requirements and compared them with each individual's educational attainment in order to determine the incidence of surplus education and deficit education. They then decomposed actual years of schooling into years of required education, years of surplus education, and years of deficit education to estimate the impact of inadequate schooling on earnings. Ever since this has become one of the basic specifications that has been used in the literature to study the wage effects of education-job mismatch. Alba- Ramirez (1993) used the question in the Spanish Living and Working Conditions Survey "What kind of education does a person need in order to perform your job?" in order to compare required and attained education to determine “adequately educated”, "overeducated", and "undereducated" workers. The worker self-assessment approach has the advantage of being easily applied to up-to-date data from surveys. But, its shortcomings include the potential of subjective bias in that individuals may overstate the qualification requirements of their job to inflate either their occupational status or their position (Hartog, 2000; McGuinness et al., 2018).

By comparison, the empirical method, also known in the literature as realized matches, determines required education from the mean or modal level of education in the respondent's job or occupation. This approach has been used by Verdugo & Verdugo, (1989), Groot & Van den Brink (2000), McGuinness et al. (2017) and many others. As such, Verdugo & Verdugo (1989) computed the mean education and standard deviation for more than 300 occupations, and defined overeducated workers as those whose education was greater than one standard deviation above the average for their occupation, undereducated workers as those who had education less than one standard deviation below the occupation average, and adequately educated as workers within +/- one standard deviation of the mean education for their specific occupation. It should be noted that it is the Verdugo & Verdugo model (1989) which used dummy variables for overeducation and undereducation to examine their effects on earnings that has become another basic specification widely used in the literature to study the wage effects of educational mismatch. Limitations of the realized matches method are that they don't reflect actual job requirements, being the result of labor demand and supply factors (Leuven & Oosterbeek, 2011; McGuinness et al., 2018). Disregard of variation in required education across jobs within an occupation and arbitrary cutoff at one standard deviation from the mean are among other shortcomings of the empirical method, as noted by many researchers. Scholars identify its main advantage as allowing for easy application to available datasets containing relevant information.

Finally, the educational requirements of occupations are measured from specifications of the required level and type of education, based on occupational classifications, performed by professional job analysts. This is called the job evaluation (job analysis) approach. The Dictionary of Occupational Titles (DOT) is an example of occupational dictionaries which contains scale indicators for educational requirements running from 1 to 7, which are converted into school-year equivalents (Leuven & Oosterbeek, 2011). Using DOT Rumberger (1987) derived required schooling for each occupation to investigate the impact of surplus schooling on individual earnings. The studies by Verhaest & Van der Velden (2013), Beduwe & Giret (2011), and Marioni (2020) rank among those that determine the required level of education using the job analysis approach to studying educational mismatch. The merits of this method include its relative accuracy, objectivity, clarity of definitions and measurement used, while its disadvantages are related to its costliness and potential unreliability of analysis due to rapid changes in occupational requirements (Hartog, 2000; McGuinness et al., 2018).

Another strand of the recent literature has focused on vertical mismatch distinguished in terms of skills which is argued to represent a more direct measure of mismatch (Mavromaras et al., 2009; Sánchez-Sánchez & McGuinness, 2015). The measures of skill mismatch, namely, overskilling and underskilling, are commonly derived from subjective assessments of workers of their accumulated skills relative to skill requirements of the job (McGuinness & Sloane, 2011; McGuinness et al., 2018). Here, overskilling refers to the situation whereby the worker believes that they have more skills than required in the job, while underskilling refers to the situation whereby the worker believes that they aren't equipped with the necessary skills to meet the demands of the job (Allen & Van der Velden, 2001; McGuinness et al., 2018).

Another basic form of education-job mismatch, horizontal mismatch, refers to a poor fit between a worker's field of study and the current job (occupation) (s)he is employed in. Horizontal mismatch is commonly determined by comparing an individual's field of study with that required for the job. This can be done either by using a survey collecting employees' self-assessments of the extent to which their current job is related to their field of study (Robst, 2007a,b; Verhaest et al., 2017; Bender & Heywood, 2011; Bender & Roche, 2013), or using the objective method, by defining the educational requirements for an occupation based on expert opinions or assigning occupational codes to educational fields (Bédoué & Giret, 2011; Levels et al., 2014; Sellami et al., 2017). One drawback of these measures, as noted by McGuinness et al. (2018), is that, as with vertical mismatch, they don't pick up informal skills acquired through labor market experience and on-the-job training which could relate more to the job.

The choice of the measurement approach in a study is typically constrained by data availability. Comparing the advantages and disadvantages of the approaches to measuring educational-job mismatches discussed above, one might conclude that the subjective approach may often be the best available measure, as suggested by Hartog (2000).

### **3.2 Theoretical frameworks**

Several theoretical frameworks have been put forward to provide interpretations of the phenomenon of education-job mismatch in the economic literature. The question of how labor is rewarded in the market is the focus of the prevailing theoretical perspectives on education-job mismatch.

*Human capital theory (HCT).* According to HCT schooling provides knowledge, skills and ways of analyzing problems and enables to raise earnings and productivity (Becker, 1993). The individual remuneration in the labor market is determined by a worker's marginal productivity, which is an increasing function of human capital acquired through formal education, experience, and on-the-job training (Becker, 1964). As noted, by Sørensen & Kalleberg (1981), earnings differences reflect differences in the productive capacity of individuals determined by differences in their skills. In this respect, Gary Becker's seminal book "Human Capital" (1964) presents the dominant framework for explaining rates of return from investment in human capital and the central predictions of HCT are commonly assessed by Mincer's earnings model (1974). As such, the human capital perspective represents a supply-side theory which doesn't assume earnings to be affected by the job requirements (Hartog & Oosterbeek, 1988). Individuals with better education and training, hence, more human capital are supposed to be more productive and earn higher wages than their less-educated counterparts. Different levels of skills which are the result of different levels of investment in human capital are what differentiates individuals from each other (García-Espejo & Ibáñez, 2006). Within this framework, increasing the skill level of an individual is assumed to lead to increases in earnings, and earnings growth will be constrained mainly by the limitations on acquiring additional human capital (Sørensen & Kalleberg, 1981).

From the point of view of HCT, education-job mismatches may just reflect skill gaps between the matched and the mismatched (Green & Henseke, 2016). Thus, individual differences in human capital within education levels might underlie wage differences for mismatch (Allen & Van der Velden, 2001). It is wage differentials in the labor market, that ensure the balance and match between the skills of individuals and those that are demanded (Blanco, 1997, as cited in García-Espejo &

Ibáñez, 2006). Individual characteristics of workers, primarily their educational level, determine their earnings. Regardless of the job a person's human capital level ensures a particular level of productivity (Green & McIntosh, 2007). And, as noted by Murillo et al. (2012), the returns to education don't depend on whether or not the person is overeducated. This makes it plausible that in order to maximize productivity employers look for workers whose skills match the work, and will be willing to pay higher wages to them (Van de Werfhorst, 2002).

From the perspective of HCT, horizontal mismatch, when a field of schooling is fully irrelevant to an occupation, should not raise a worker's productivity and its effect on earnings should not differ from zero (Yakusheva, 2010). Therefore, individuals who are not in a position to utilize entirely their specific training in their workplace may receive fewer gains from their human capital, including smaller wage gains than otherwise (Yakusheva, 2010). Being mismatched in a job by field of study entails applying fewer of the occupation specific skills of the acquired specialty and, as a result, wages are lower for such workers (Robst, 2007a). Given the potential economic losses due to skills underutilization associated with horizontal mismatch, from the human capital theory standpoint, it is an undesirable phenomenon (Somers, 2019). However, as noted by Yakusheva (2010), there are two reasons why positive returns to an irrelevant degree can be observed: first, post-secondary education including irrelevant one may be perceived by the employer as a signal of unobserved productivity-augmenting individual characteristics (the signaling model), and second, general human capital like critical thinking, social skills, computer literacy, possibly accumulated through post-secondary schooling can help increase one's productivity even in jobs unrelated to the field of education (the human capital model). As noted by Becker (1964), general skills increase workers' marginal productivity in a wider range of firms and jobs than specific training.

HCT assumes that mismatch in the labor market is rather a temporary phenomenon. In this view, firms are assumed to adapt their production techniques to changes in relative labor supplies and input prices, and overeducation may represent a temporary phenomenon deriving from a lack of coordination between firms and individuals (Duncan and Hoffman 1981; Dolton & Vignoles, 2000). Thus, it is plausible that workers will be overeducated in the short term, while firms adapt the production processes to fully utilize the human capital of individuals (McGuinness, 2006). However, quick adjustments in firms to changing factor input prices may be impeded by factors such as the rigidity of institutional arrangements, including national pay agreements (McGuinness, 2006). Then, an individual's productivity and earnings will also depend on job characteristics (in particular, educational

requirements), and it is quite possible that the return to surplus education may be lower than the one to required education (Dolton & Vignoles, 2000).

Another human capital perspective on the existence of education-job mismatches is related to the multi-dimensional nature of human capital. Individuals' skills are not only acquired through schooling, but also through work experience and on-the-job training and may be affected by unobservable individual qualities such as ability, motivation. In this view, apparently over-qualified individuals indeed may not be genuinely over-qualified because of low values of other aspects of their human capital (Green & McIntosh, 2007; McGuinness, 2006). Thus, individuals with different levels of schooling but similar levels of total human capital may qualify for similar jobs and a given amount of human capital can be produced by many combinations of education and training/experience (Sicherman, 1991). Overeducation may be a compensation or a substitute for a lack of other forms of human capital endowments and/or lower quality of schooling, and hence, apparent lower earnings of the "overeducated" may be due to an omitted variables problem (Sicherman, 1991, McGuinness, 2006; Chevalier, 2003). For example, Alba-Ramirez (1993) found evidence that overeducated workers possess less work experience and on-the-job training. Conversely, the lack of formal schooling of undereducated individuals may be compensated by skills acquired through work experience and/or training (Alba-Ramirez, 1993; Sicherman, 1991). As a result, different combinations of education and other forms of human capital can produce individuals of similar productivity and workers with different levels of education may turn out to have the same amounts of human capital endowments (McGuinness, 2006). Thus, as noted by Alba-Ramirez (1993), individuals can have the adequate level of human capital through combining of formal education, work experience and on-the job training. Moreover, human capital components can have alternating importance during one's career life. With age the value and importance of knowledge and skills acquired during education in the stock of human capital may diminish while other forms of human capital – such as work experience, on-the-job training, and continuing education- may gain importance (Witte & Kalleberg, 1995).

As suggested by occupational mobility theory overeducation might be phased out in the labor market if skills deficiencies can be attenuated or eliminated with experience or on-the- job training (Dolton & Silles, 2008). According to *the career mobility theory* by Sicherman & Galor (1990) more educated individuals are less likely to change occupations and for a given occupation higher educated individuals are more likely to move to higher- level occupations. Importantly, the model of career mobility presented by Sicherman & Galor (1990) suggests that in a specific occupation with lower returns to schooling, the effect of schooling on the probability of being promoted from this occupation

for a worker in this occupation will be higher. Therefore, the authors assume that, it will be rational for some individuals to stay overeducated for a period in occupations requiring a lower level of schooling than what is acquired by them. In his subsequent paper Sicherman (1991) provides evidence for higher rates of firm and occupational mobility, characterized by movement to higher-level occupations among overeducated workers and support for the hypothesis that a discrepancy between workers' education and the one required on the job are the result of a movement along a career path. As noted by Sicherman (1991), according to the theory of career mobility, workers may be temporarily employed in jobs providing them with skills that enable them to attain better career prospects. An alternative approach is offered by *the job-matching theory*. According to Jovanovic (1979), the job-matching theory predicts that workers tend to leave jobs in which their productivity turns out to be low and that each worker's separation probability decreases with longer job tenure. There is imperfect information on both sides of the market about one's optimal assignment and as new information becomes available turnover occurs in certain cases as optimal reassignment (Jovanovic, 1979). Thus, turnover takes place with the accumulation of better information that leads to optimal reassignment of workers to jobs.

However, if education-job mismatch is related to unobserved skill heterogeneity, then workers' wages correspond to their marginal product in line with HCT (McGuinness & Bennett, 2007), and due to permanent individual differences in ability overeducation may represent a long-term problem for some workers (Dolton & Silles, 2008). Thus, the observed wage effects may be explained by differing abilities, with the most competent individuals getting jobs "above their level" and the least competent getting employed "below their level" (Allen & Van der Velden, 2001). In line with this explanation, workers are rewarded according to their productivity and unmeasured ability differences are the real determinants of productivity and wages (Allen & Van der Velden, 2001). Therefore, the human capital theory framework may be consistent if individuals have skill differences due to heterogeneous ability levels and as such overeducated workers having lower abilities earn less wages than their adequately matched peers (McGuinness, 2006). However, the empirical evidence is generally inconclusive. Bauer (2002) and Chevalier (2003) demonstrate that the wage effects of overeducation are substantially reduced with controls for unobserved heterogeneity included. Dolton & Silles (2008) find that the measurement-error-corrected panel estimates produce results very similar to those from cross-sectional OLS regressions that establish wage penalties of overeducation. Similarly, Yakusheva (2010) finds that although the additional controls for ability, aptitude, and motivation decrease the overall return to schooling controlling for unobserved individual heterogeneity leaves the positive returns to

occupational matching virtually unchanged. Some empirical studies have found partial support in favor of the link between overeducation and unobserved heterogeneity (McGuinness & Bennett, 2007).

There have been developed several approaches challenging the idea that individual earnings depend only on the person's individual characteristics. Another explanation for education-job mismatch observed is provided by a credentialist perspective represented by the screening and job competition models. *The screening (signaling) model*. Signaling represents a market process whereby the employer requires and the individual provides information about himself/herself which determines the wages offered to job applicants and the allocation of people to jobs in the market (Spence, 1973). Individuals are assumed to select signals which are observable, personal characteristics that are subject to manipulation at some cost to maximize the difference between offered wages and signaling costs (Spence, 1973). For example, education level is chosen to signal one's productivity to potential employers (Garcia-Mainar & Montuenga, 2019). According to Spence (1973, p. 364), as a potential signal education helps deal with information asymmetry and "the problem of allocating the right people to the right jobs".

Under a signaling approach, the most productive, high-skilled individuals are interested in "signaling" so as to earn the highest wages and they tend to invest in education, irrespective of the job requirements (García-Espejo & Ibáñez, 2006). Or, the signaling role of overeducation may allow workers to compensate for the lack of other skills, or to gain access to the labor market (Garcia-Mainar & Montuenga, 2019). Less-experienced or less able or less skilled individuals may have incentives to become over-educated to signal that they are qualified for a job, to mask their true skill level or to disguise themselves among other similarly-educated, but higher-skilled or more able workers (Garcia-Mainar & Montuenga, 2019). Also, in times of recession and/or high unemployment individuals may voluntarily decide to over-educate themselves to escape from unemployment (Garcia-Mainar & Montuenga, 2019). As shown by Iriondo & Pérez-Amaral (2016), individuals who undergo an involuntary job change and those who have experienced spells of unemployment have a higher likelihood of being overeducated.

Overall, unlike the human capital explanation, the screening theory asserts that the sorting and rewarding of individuals in the labor market occur mainly according to observable proxies for productivity such as education, work experience, gender and social background, rather than on the basis of productivity itself (Allen & Van der Velden, 2001). Considerable shares of workers find themselves in non-matching jobs because of the differential distribution of these proxy indicators within educational categories and different weights employers assign to them (Allen & Van der

Velden, 2001). As a result, individuals who end up in a job below their level will have lower earnings compared to those working at the appropriate level, irrespective of their actual skill level and skills utilization (Allen & Van der Velden, 2001).

*The job-competition theory (JCT).* One of the major alternative theoretical frameworks proposed in the literature for explaining the presence of education-job mismatch in the labor market is the job-competition model. The JCT considers job characteristics rather than individual productivity to be the main determinant of earnings. “Wages are paid based on the characteristics of the job in question” (Thurow, 1975, p. 76), and “The individual’s earnings depend upon the job he acquires and not directly upon his own personal characteristics” (Thurow, 1975, p. 77). According to this approach, marginal productivity is assumed to be a fixed characteristic of the job. Employment into a job position is a matching of the queue of job candidates ranked for vacancies relative to other candidates according to characteristics considered relevant by employers to the queue of vacant jobs arranged according to earnings, the career trajectories, status, required skills, and other characteristics associated with these jobs (Thurow, 1975).

According to the JCT individuals obtain the bulk of work skills through on-the-job training and the labor market represents a training market where training slots are allocated rather than a market for selling existing skills (McGuinness, 2006). Thus, individuals compete for job opportunities, based on their relative costs of being trained (Thurow, 1975). According to Thurow (1975), the job and wage competition models don’t exclude each other and could co-exist as market-clearing mechanisms. The allocation of training slots to individuals depends on factors determining their location in the job queue and the job distribution in the economy (Thurow, 1975). The distribution of individuals across available jobs will be based on their education and other characteristics that allow employers to estimate training costs (Sicherman, 1991). When education is taken as a signal of an individual’s trainability, employers prefer workers with the highest education due to their lower on- the-job training costs (Wolbers, 2003; García-Espejo & Ibáñez, 2006). Thus, the job competition model presents a consistent explanation for overeducation. As noted by Hersch (1981), an inverse relation between the amount of surplus schooling and training time may provide a rationale for hiring overqualified individuals. With the increasing number of educated individuals in the economy, people are likely to invest more in education to preserve one’s position in the job queue (McGuinness, 2006). But if the supply of college workers exceeds the relevant earning opportunities, some individuals will have to accept jobs below their level and receive lower wages respectively (Iriondo & Pérez-Amaral, 2016). From the perspective of JCT, the matching process and earnings differentials reflect variations in job

characteristics and the organization of jobs into job ladders (Sørensen & Kalleberg, 1981). In case of overeducated employees, for example, their surplus schooling would be of no use and would not produce any earnings return (García-Espejo & Ibáñez, 2006). The Thurow model suggests that since workers' productivity depends on the job characteristics, wages will depend upon required education and that returns to education in excess of the required by the job will be zero (McGuinness, 2006). Education-job mismatch might result from the discrepancy with the allocation being based on available labor supply and jobs (Sicherman, 1991). Thus, gaps between labor demand in a specific occupation and labor supply from the corresponding field create education-job mismatch (Montt, 2015).

*The assignment model.* There is considerable empirical evidence that provides support for the assignment interpretation of education-job mismatches (Dolton & Vignoles, 2000; Zhu, 2014). The assignment theory elaborated by Sattinger (1993) combines the perspectives of the human capital and job competition theories and seeks to explain the actual level of productivity and returns to human capital investments also by the quality of the match between the worker and the job. The basic premises of the assignment models are that both supply and demand are relevant and that individuals perform differently at different jobs or sectors (Satinger, 1993). The amount a worker can contribute to production and total output of the economy depend on the assignment of workers to jobs, i.e. which worker performs which job (Satinger, 1993). Workers choose particular jobs over others guided by income or utility maximization and this choice represents an intermediate step between individuals' characteristics and their earnings (Satinger, 1993).

The assignment model suggests an allocation problem, where workers with different abilities are allocated to jobs differing in levels of difficulty or complexity (Sicherman, 1991). Assignment models suppose that wages are instrumental in assigning heterogeneous workers to heterogeneous jobs (Hartog & Oosterbeek, 1988). The earnings function is the equilibrium outcome to the solution of the assignment problem (McGuinness, 2006). The assumption behind the assignment theory and also the job competition model is that a job has a skill level attached to it, and individuals are assigned to or matched with jobs according to their characteristics (Green & McIntosh, 2007). From this perspective, an optimal allocation is a top-down allocation according to workers' skills, whereby "the most competent worker is assigned to the most complex job and the least competent work assigned to the simplest job" (Allen & Van der Velden, 2001, p. 435). Jobs available need not be matched perfectly to individuals, with some workers being mismatched due to certain reasons including rigidities or a lack of information in the labor market (Green & McIntosh, 2007). Such rigidities may refer to a rational choice by the individual who may prefer part-time employment in a mismatched job because of, for

example, family situations (Green & McIntosh, 2007). The incidence of mismatches can be accounted for by gaps between the shares of vacant jobs and available workers with appropriate educational qualifications (Wolbers, 2003). The differences in the availability of jobs/occupations of a certain type and that of workers with relevant qualifications explain the quality of the match (Wolbers, 2003; Montt, 2015). In the assignment theory overeducated individuals are significantly underutilizing their knowledge and skills, while undereducated individuals lack some knowledge and skills required to perform optimally their job and this have an effect on productivity and wages (Allen & Van der Velden, 2001). In assignment models both supply and demand are relevant (Sattinger, 1993), which suggests that educational mismatch stems from both labor demand and supply factors (Montt, 2017), and accordingly both job characteristics and individual characteristics determine earnings (Dolton & Vignoles, 2000; McGuinness, 2006). In general, assignment models specify the jobs or industries available to employment, relevant differences among workers, production technologies generating different demands for workers, and the mechanisms assigning individuals to jobs (McGuinness, 2006). Studies provide evidence for the impact of structural imbalances between the labor demand for and supply of workers on the incidence of vertical mismatch in a country (Verhaest & Van der Velden, 2013; Verhaest et al., 2017). The same effects might be observed in case of imbalances between supply and demand in terms of fields of study and employment sectors. A disproportionate low share of graduates choosing technical fields of study in the face of the increasing demand for them is likely to lead to relatively infrequent mismatches among graduates with technical degrees (Oosterbeek and Webbink, 1997). With regard to a supply side characteristic, for instance, the quality and selectivity of the educational system appears to be important in explaining educational mismatches. As such, a lower quality and selectivity of the study programme is found to be associated with greater likelihood of experiencing mismatch (Verhaest et al., 2017). There are also labor market institutions and conditions that affect labor supply, and as a consequence, the incidence of educational mismatches. The findings of Verhaest et al., (2017) show that generous unemployment benefits, for example, may be related to a lower incidence of vertical and horizontal mismatches, enabling job-seekers to be more selective, which leads to fewer mismatches.

The empirical findings provide support for the effects of a number of demand-side factors on the incidence of education-job mismatches. The adoption of new technologies is found to have a positive effect on demand for highly-educated workers, reducing overeducation (Ghignoni & Verashchagina, 2014). Collective bargaining coverage and employment protection legislation (EPL) are labor market institutions that are likely to affect the demand side of the labor market as well. Strong

EPL that constrains employers' ability to fire employees appears to reduce the incidence of horizontal mismatch because of productivity losses associated with employing workers with the "wrong" field of study (Verhaest et al., 2017). At the same time, EPL might decrease overall employment opportunities of outsiders and urge employers to rely more on internal promotions, and thus, stringent employment legislation may be related to a higher incidence of overeducation at labor market entry (Verhaest & Van der Valden, 2013). Countries with a higher degree of collective bargaining coverage seem to have a higher incidence of mere vertical mismatch<sup>8</sup> and full mismatch, due to wage compression that leads to decreased opportunity costs of employment at lower level jobs and rigid wages which may impede labor market clearing, resulting in more mismatches (Verhaest et al., 2017). Business cycle dynamics may also be important in explaining cross-country differences in the incidence of education-job mismatches. Graduates that join the labor market during economic downturns are found to have a higher likelihood of being overeducated in their first job, with this affecting the quality of the match up to 5 years later (Verhaest & Van der Valden, 2013).

From the viewpoint of some theoretical perspectives, education-job mismatch is considered a temporary phenomenon. According to dynamic labor market theories, some degree of education-job mismatches will always be present and imbalances should be reduced through the normal adjustments of a functioning labor market (Green & Henseke, 2016). The occupational mobility and job matching theories predict a temporary status of mismatch. Overeducated workers may be more upwardly mobile, temporarily working in non-matching jobs to acquire skills that will be used later on in a different higher-level job or just move to jobs that better match their educational level so as to achieve higher earnings in the future (Sicherman, 1991; Alba-Ramirez, 1993). Constructing the transition matrix between the previous and current job matches Alba-Ramirez (1993) finds a consistent improvement of workers' job match over years of age. Sicherman (1981) documents that overeducated workers experience more frequent job changes characterized by movement to higher-level occupations both across firms and occupations which may be interpreted as overeducation involving an adaptation process at the early career stages. Work experience and on-the-job training can play a part in improving workers' job match. For example, Nordin et al. (2010) show that mismatched men earn a higher return to work experience than matched men providing support for the idea that mismatch can be only a temporary phenomenon. Alba-Ramirez (1993) finds that more experienced workers have higher chances of improving their job match as they change jobs though at a decreasing rate. When

<sup>8</sup> It is when an individual is only vertically mismatched to the job

overeducation plays a signaling role to mask or to compensate for lack of skills of workers such overeducated individuals may remain mismatched for a long time, but genuinely mismatched persons may feel greater dissatisfaction and would search for another job, so that the mismatch may be more of a transitory character (Gainar & Monteunega, 2019). There may be various reasons for the job search but it is assumed that job dissatisfaction due to discrepancies between possessed knowledge and skills and required knowledge and skills in the job could provide an incentive for workers' job search behavior (Allen & Van der Velden, 2001). A worker may temporarily optimize by accepting a job below his/her education level so as to reveal his or her productivity and as the worker's tenure increases overeducation may decrease (Dolton & Silles, 2008). The process of job shopping is considered as the way individuals secure a better match based on better information in the view of the job matching theory (Alba-Ramirez, 1993).

However, such theoretical frameworks as the JCT and assignment models describe mismatch as a long-term problem. Many studies have found a high degree of persistence in being underemployed (Dolton & Vignoles, 2000; García-Espejo, & Ibáñez, 2006; McGuinness & Bennett, 2007; Dolton & Silles, 2008; McGuinness & Sloane, 2011; Kupets, 2016). In particular, Dolton & Silles (2008) demonstrate that a large proportion of graduates who were overeducated in their first job experience a higher risk of being overeducated in their current employment. McGuinness & Sloane (2011) find that 30 % of workers who were overeducated in initial employment are still overeducated 5 years after graduation. Such findings suggest that it may be difficult for many workers to exit the initial mismatched status.

## **Chapter 4. Research context**

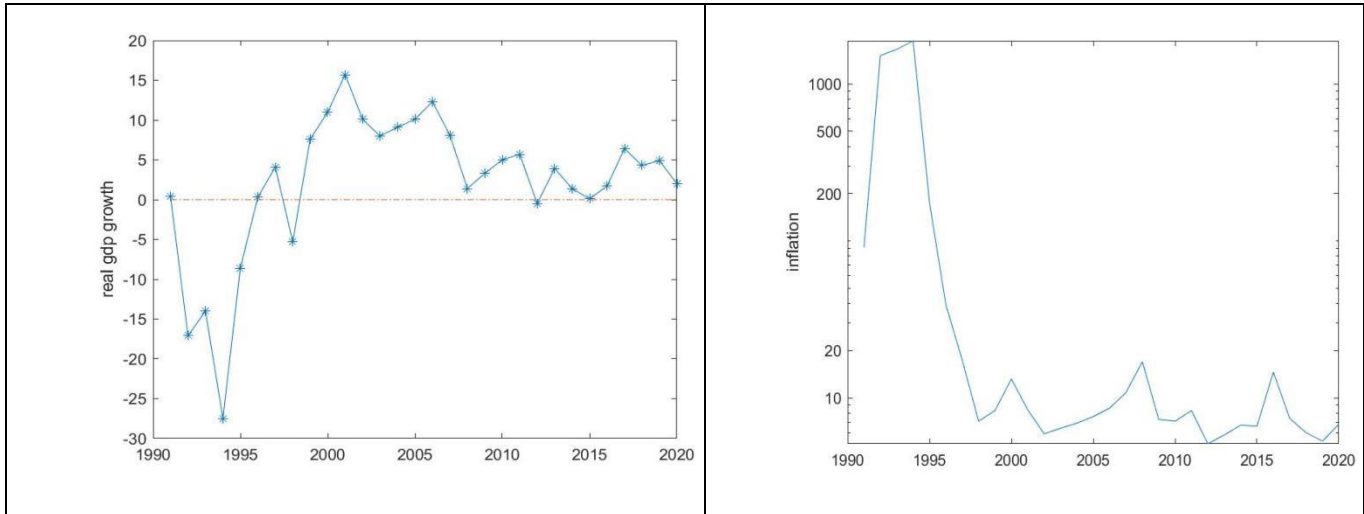
### **4.1 Overview of the socio-economic and political development of Kazakhstan**

In the analysis below, we present the socio-economic and political context before considering the education and labor market systems for studying the issue of education-job mismatches. Specifically, we highlight the main governance institutions and underlying principles of education and labor market policies, major policy priorities and documents. And, importantly, the current situation, outcomes, achievements and challenges are described in more detail. In particular, the evidence on the quality and relevance of vocational and tertiary education and labor market imbalances are analyzed.

Kazakhstan has undergone deep socio-economic transformations since its independence in 1991. The transition to a market economy during the 1990s was highly disruptive, with hyperinflation, a 31% reduction in real GDP by 1995, and about 1.6 million jobs lost (OECD, 2016a). The period of

positive economic growth set around the turn of the century, at first the growth performance being impressive, averaging about 8% per year, accompanied by the creation of 2.3 million jobs and followed by slower and more balanced economic growth since the severe short-run crisis of 2008-2009 up to the recent Covid-19 year of 2020, when the growth fell by 2.6%.

Figure 1. Real GDP and inflation for Kazakhstan in 1991-2020



*Note: The figures display real GDP growth rates and inflation for the period 1991–2020.*

*Source: Abdulla K. (2021)*

The economic growth due to high oil prices since the end of the 1990s (Pomfret, 2005) have lead to substantial improvements in people’s standards of living. Since 2002, GDP per capita has increased six fold up to more than \$9,700. The share of the population at, or below the national poverty line fell strikingly from 47% to less than 3% during the 2001-2014 period (OECD, 2017a). The unemployment rate dropped from 10.4% in 2001 to 5% in 2016 (World Bank, 2018). The HDI in the country has been increasing at 1% annually and life expectancy has risen by about nine years since 1995 (OECD, 2018a).

From the perspective of political development, Kazakhstan has enacted democratic institutions and processes. Although the pace of political and public administration changes was slower than that of economic transformations, the country has implemented New Public Management reforms to shift to the market-oriented, modern and effective public governance system (Vakulchuk, 2016). The aims of the public administration reforms were laid out in the official development strategies of the country such as “Kazakhstan 2030” (Nazarbayev, 1997) and “Kazakhstan- 2050” (Nazarbayev, 2012). The 2030 strategy includes the following long-term priorities to be implemented: 1) ensuring national security; 2) maintaining and reinforcing internal political stability and consolidation of the society; 3) achieving sustainable economic growth rates; 4) improving living conditions, health, education and

well-being of citizens and the environment; 5) making efficient use of the country's energy resources; 6) developing infrastructure, particularly transport and communications; 7) building an effective and professional state. During the then challenging times this policy document outlined the foundations of the development path of the country. As put by Nazarbayev (1997), the country had to carry out a triple modernization for the purposes of building a state, making a breakthrough in a market economy, laying the foundations of a welfare state, and rebuilding public consciousness. The development strategy "Kazakhstan- 2050" was designed to succeed the 2030 strategy at a new stage of the country's development based on the gained achievements and set the goal of joining the ranks of the 30 most developed nations in the world by 2050. The economic policy of the new deal based on the principles of economic pragmatism such as profitability, return on investment and competitiveness, comprehensive support for entrepreneurship, new social policy based on principles of social guarantees and personal responsibility, knowledge and professional skills, further strengthening of statehood and development of democracy, consistent and predictable foreign policy, new Kazakhstani patriotism are considered the major directions of the development strategy of the country (Nazarbayev, 2012). Another capstone strategic document guiding the country's development is the Nations' Plan- the 100 concrete steps set out by the First President Nursultan Nazarbayev (2015) that is directed at implementing the five institutional reforms: 1) creating a modern and professional state apparatus; 2) ensuring the rule of law; 3) promoting industrialization and economic growth; 4) building a unified nation; 5) forming a transparent and accountable state.

According to the OECD (2014a), Kazakhstan has made significant improvements in building an effective public governance system. The reforms in the civil service, the institution of e-government and public service centers, improving the delivery of public services through performance standards and the implementation of the Law on Public Services, and enhancing citizen engagement reflect considerable improvements in the quality of public governance (Libman, 2008; OECD, 2014a). As noted by Knox (2008) and Serikbayeva & Abdulla (2022), the improved governance indicators for the country reflect the success of the public administration reforms. Kazakhstan has largely improved its position on the Worldwide Governance Indicators. In particular, the percentile rank of the country on the indicator of government effectiveness increased from 16.9 to 54.3 for the period 1996-2018, suggesting that more than half of countries rate worse compared to Kazakhstan.

Despite initially following the principle of "economy first, then politics" (Nazarbayev, 2005), in recent times a number of political reform measures have been undertaken which suggests a commitment of the political leadership to promoting democratic reforms (OECD, 2014a). The recent

political reform initiatives to advance democracy and raise civic participation and accountability of the authorities during the presidency of Nursultan Nazarbayev included, among others, the increase of the powers of the legislative branch, the institution of public councils and the open government portal. The institution of the National Council of Public Trust and the implementation of the concept of a “hearing state” were among the first steps taken by current president Kassym-Zhomart Tokayev. Under Tokayev’s presidency the phased implementation of three political reform packages have been proclaimed, with the first reform package having been already implemented, including halving the registration barrier for the creation of political parties and the introduction of a 30 percent quota for youth and women in the electoral party lists and the institution of parliamentary opposition (Baigarin, 2021). The second and third packages of political reforms providing for the transition to direct elections of lower-level akims from 2021, the elaboration of the Concept for Local Self-Government Development and the Law "On Public Control", and the reduction of the threshold for political parties to enter the Mazhilis, among others, are announced to advance the country further in issues such as expanding civic participation, developing parliamentarism and furthering democratization of the country (Baigarin, 2021).

Despite the reforms that Kazakhstan has implemented, there remain significant issues to solve. The structural weaknesses in the country’s economy, in particular its dependency on oil and other extractive industries, inefficiencies of public and state owned entities, the weak financial sector, business climate constraints, and considerable wealth disparities across regions represent challenges the country is currently facing (OECD, 2017b; OECD, 2018a). High dependence on natural resources and the dominance of capital intensive sectors have made the impact of economic growth on jobs relatively weak and pose diversification as a huge challenge to the country (Strokova et al., 2016). Due to dependence on its natural resource sectors the country has a configuration of the economy unconducive to the growth in the rest of the economy. Vulnerability to external shocks through its dependency on fluctuations in raw material prices and the economic performance of its main trade partners as well as the country’s landlocked geographic position through its dependency on its neighbors for the efficiency of logistics networks have important impact on the economic situation in the country (OECD, 2016a).

Over the years since independence Kazakhstan has been implementing reforms in its labor market and education systems. Building a modern and efficient system of education and creating labor market opportunities for everyone are among the primary goals of the country’s development (Nazarbayev, 2012). As noted in the OECD study (2016a) with respect to well-being where public services delivery plays an important role, Kazakhstan performs well on indicators that assess quantity

but underperforms in measures of quality and effectiveness and this also refers to the education and labor market systems. The gaps between the outputs and outcomes of the education system and job requirements and needs of the labor market (OECD 2017b, 2018a) suggest that these mismatches need studying in view of substantial research evidence for their effects on individuals' and country's welfare.

#### **4.2 Post-Secondary Education System of Kazakhstan**

The country has a relatively high level of educational attainment. About 97.4% of the population aged 25 years and older have at least completed upper secondary education, while around 79% have at least completed post-secondary education<sup>9</sup>. Having risen from 39.7% in 1990, the tertiary education enrollment rate<sup>10</sup> currently stands at 61.7%, which is higher than the average level of upper-middle income countries of 53.2%<sup>11</sup>.

As shown in Figure 1, Appendix A, in Kazakhstan students can opt for entering vocational education and training (VET) institutions after 9th or 11th grade. In both cases the educational institution is referred to as a "college". According to the latest statistics, Kazakhstan has a total of 740 VET institutions, training more than 475 000 students<sup>12</sup>. As can be seen from Figure 2, over the past 30 years there has been an upward trend in the number of colleges which has increased from about 247 in the early 1990s to about 770-780 in the most recent period. The number of students enrolling in VET remarkably increased from around 2000 for about a decade, but it has been fluctuating around 500 for the last 10 years.

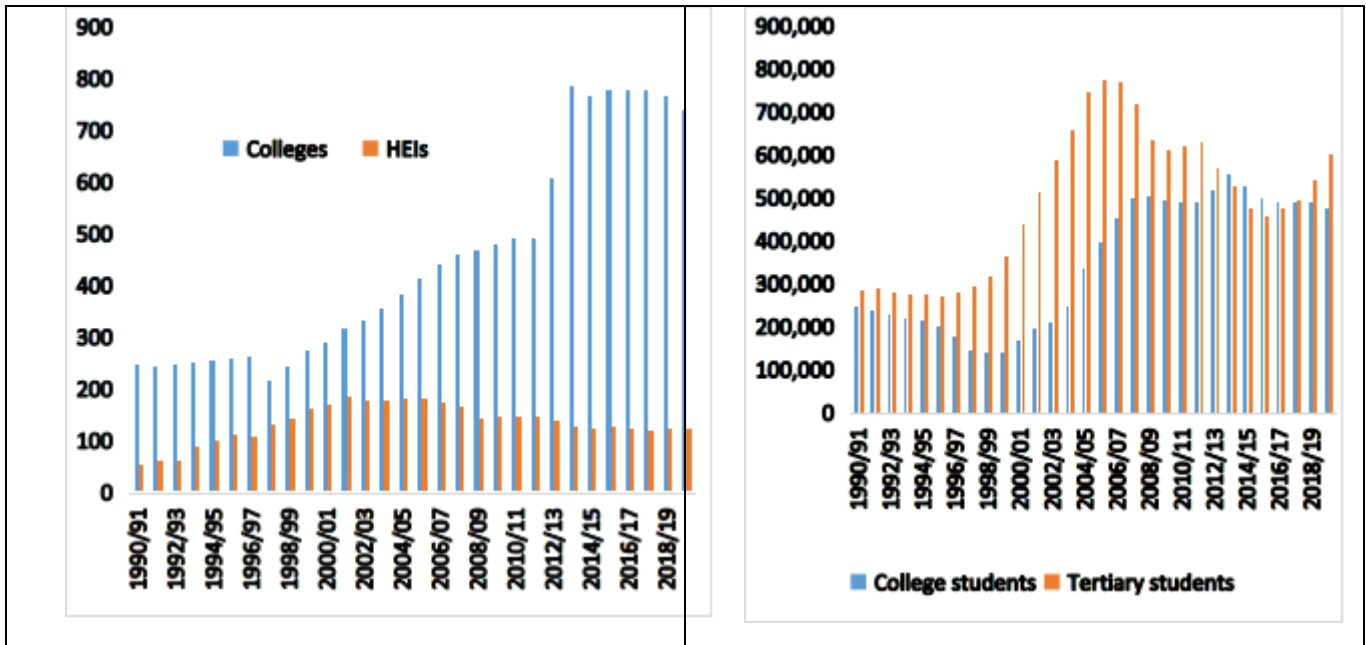
<sup>9</sup> Source: World Bank, World Development Indicators databank.

<sup>10</sup> "Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level". Source: WB, 2021.

<sup>11</sup> Source: World Bank, World Development Indicators databank.

<sup>12</sup> Source: The Bureau of National Statistics (BNS).

Figure 2. The number of vocational and tertiary education institutions and student enrollment in Kazakhstan, 1990-2019



Source: The Bureau of National Statistics

Compared to the end of the Soviet period, when 55 higher education institutions (HEIs) in the Kazakh SSR enrolled about 287 400 students (NIIVO, 1992, as cited in Ahn et al., 2018), as of 2019-2020, 125 HEIs train more than 600 000<sup>13</sup>. Like many other former Soviet countries, Kazakhstan saw a rapid growth in the number of HEIs in the 1990s which increased to more than 180 institutions operating in 2000, in response to high student demand (OECD, 2017b). Although the absolute number of students enrolling in higher education grew from the early 1990s till the 2006-2007 academic year, over the subsequent ten years it showed a downward trend, followed by the upturn in the recent period (BNS, 2021). As noted by OECD (2017b), this volatility is linked to the low fertility rates that was characteristic of the transition period and falling enrollment in part-time education. In 2015 the network of HEIs included 61 public institutions and 64 private institutions, including universities, academies, institutes and a conservatory, and these distinctions are based on various factors including the number of graduate programs, the institution's research profile, and its certification, accreditation, and institutional licensing procedures (OECD, 2017b). There is one autonomous university- Nazarbayev University, established in 2010 to become a world-class university with a strong research programme.

<sup>13</sup> Source: The Bureau of National Statistics (BNS)

The main policy-making institutions administering the country's education and training system include the central government, including the Executive Office of the President, the Ministry of Education and Science of the Republic of Kazakhstan (MES), the territorial departments of education, and the subordinate organizations of the MES. The underlying principles of the education system are laid out in the Constitution of the Republic of Kazakhstan (1995) and the Law on Education (2007).

Kazakhstan largely relies on private funding to support its HEIs (Sagintayeva et al., 2014). Kazakhstan's public spending on education is comparatively low by international standards, only about 2.98% of GDP, which is below the OECD average of 5.02% and the average level of 3.85% for the upper income countries, and 11.64% of total government expenditure on education is spent on tertiary education, which is again lower the OECD average of 22.84% and the average level of 19.1% for the upper income countries<sup>14</sup>. Although low public expenditure on education in Kazakhstan is in part offset by private spending, this public/private balance is fraught with equity implications (OECD, 2018a).

The education system of Kazakhstan has experienced system-wide reforms since the 1990s in the post-independence period. The country has set the goal of improving the quality of its education system, following international benchmarks. The development of the education system over the years has been guided by the country's major development strategies and state educational policy programs: the State Education Program 2004, the State Education Development Program 2005-2010, the State Programme for Education Development 2011-2020, the State Education and Science Development Program 2016-2019, and the State Program for Education and Science Development 2020-2025.

The 2050 Strategy (Nazarbayev, 2012) underscores the crucial importance of higher education for preparing a skilled workforce. As put in this policy document, becoming a highly educated nation is what is required to become a competitive state and individuals must be ready to constantly master skills of working with the most advanced equipment and the most up-to-date production. As noted by OECD (2017b), the Plan of the Nation (Nazarbayev, 2015) highlights the creation of ten leading higher education institutions which receive autonomy and extra resources with a view of spreading their experiences to other institutions, the devolution of the centralized control of education, and the gradual embedding of English as a widely used language of instruction. Building on the state programs for education development the recently adopted "Well-educated Nation" High-quality Education National Project (National project, 2021) pursues the goal of improving the quality of education across all levels of education, by identifying objectives, targets, and strategic indicators to be achieved by 2025.

<sup>14</sup> Source: The World Development Indicators database

At the vocational level, the key policy objective is providing affordable and high-quality vocational education the achievement of which is planned to implement by raising the coverage of young people with free education in colleges in demanded specialties, in particular by increasing government orders for training by colleges, providing training and production workshops of colleges with modern equipment, expanding the number of competence centers meeting international industry requirements (standards), and raising the share of colleges that have introduced the WorldSkills assessment system in the educational process. The implementation of these measures is aimed at improving the position of Kazakhstan on the Global Competitiveness Index of the World Economic Forum up to the 75<sup>th</sup> position (National project, 2021).

At the tertiary education level, the primary objective is to enhance the competitiveness of Kazakhstani universities, the accomplishment of which is planned to reach by increasing the share of HEIs implementing international educational programs and academic exchanges with foreign partners, in particular by creating academic excellence centers on the basis of 20 competitive universities of the country to encourage research and intellectual potential development, founding regional universities based on the experience of Nazarbayev University, and providing continuous education for the development of skills and competencies as well as supporting and "upgrading" graduates of vocational, tertiary and postgraduate institutions. Also, increasing the number of foreign experts involved in teaching and expanding the number of branches of leading foreign universities in the country are expected to lead to having at least 3 universities of Kazakhstan appear in the list of the top 200 universities in the QS World University Rankings by 2025 (National project, 2021).

Over the last decade Kazakhstan has made headway towards achieving strategic goals for improved post-secondary education quality. In the sphere of higher education the relevant reforms include, among others, joining the Bologna Process in 2010, expanding quality assurance practices, introducing institutional autonomy on a gradual basis, and optimizing the number of education institutions. The recent steps undertaken to improve the country's VET system include, among others, the establishment of the National Council, regional and branch councils, as well as trustees, the implementation of the "Free Vocational Education for All" project, and the introduction of dual training system in colleges with the involvement of social partners, enterprises (OECD, 2018a). As a result, a number of unique projects and programs including the "Bolashak" International Scholarship Program, the Nazarbayev University functioning based on partnerships with top ranking universities of the world, the development of world-class vocational colleges have been implemented, representing successful initiatives in the education sphere. However, in general, despite the significant reforms

undertaken to improve the quality of post-secondary education, there are still serious challenges that need to be addressed such as the governance of the education system, which is still highly centralized and top-down, the funding and equity issues (OECD, 2017b; OECD, 2018a). The implementation of Bologna principles is facing major challenges such as the delays in putting in place a coherent national qualifications framework having a strong link to the design of programs and curricula and providing full autonomy to institutions (OECD, 2017b). Along with these gaps in the Bologna Process inefficiencies in the existing quality assurance system, including capacity constraints of national accreditation agencies for full functional autonomy, the lack of developed professional associations, and weak internalised culture of quality assurance within education institutions, poor co-ordination and interaction between education institutions and employers, gaps between the curriculum and student knowledge on the one hand, and labor market expectations on the other, the problems of high teaching loads or added responsibilities, lack of student-centred learning, and inadequate faculty qualifications (OECD, 2017b; Sagintayeva et al., 2014; Álvarez-Galván, 2014) all need addressing as priority matters.

Importantly, these deficiencies raise concerns about the quality of outcomes of education institutions. In terms of meeting the skills needs of the national economy, some comparative international data are quite revealing. According to the 2019 Global Competitiveness Index rankings, out of 141 countries Kazakhstan stands in the 90th place on the indicator measuring the quality of vocational training and holds the 81st place on ease of finding skilled employees, while on the graduates' skill-set derived from the average score of secondary education and university graduates' possession of the skills demanded by businesses the country is ranked 95<sup>th</sup> (WEF, 2019). These data coupled with the Labor Force survey data on the incidence of educational mismatch (discussed in Chapter 6 of this study) raise questions about whether the high education enrollment and attainment rates are in line with meeting labor market needs. These data may well indicate the existence of "an inadequately educated workforce" in the country which may also exacerbate educational mismatches in the labor market. As noted by the national experts as well, currently there is a shortage of many blue-collar workers and certain higher-educated specialists (IAC, 2019; kursiv.kz, 2021; 24kz, 2021; forbes.kz, 2021). All this may suggest the existence of gaps between the outputs and outcomes of education institutions and labor market demands. It should be noted that though government-issued grants are to be used as the mechanism to attract students to enrol in disciplines that have projected need for growth, the fields of highest enrollment are not necessarily those where state grants are most numerous (OECD, 2017b). Moreover, despite the high literacy rates of the population, labor market entrants often do not possess the types of skills and competencies required on the job

(OECD, 2017b). In view of this, the targeting of teaching cognitive, social and emotional skills across all education levels stands out as a matter of some urgency (OECD, 2017b). Importantly, it should be stressed that, there is a data gap with respect to student learning and labor market outcomes of graduates in Kazakhstan enabling to provide an extensive evaluation of the quality of education outputs and outcomes (OECD, 2017b). Educational institutions don't carry out a systematic follow-up of graduates, while employers do report gaps in employees' skills (World Bank, 2013a and b).

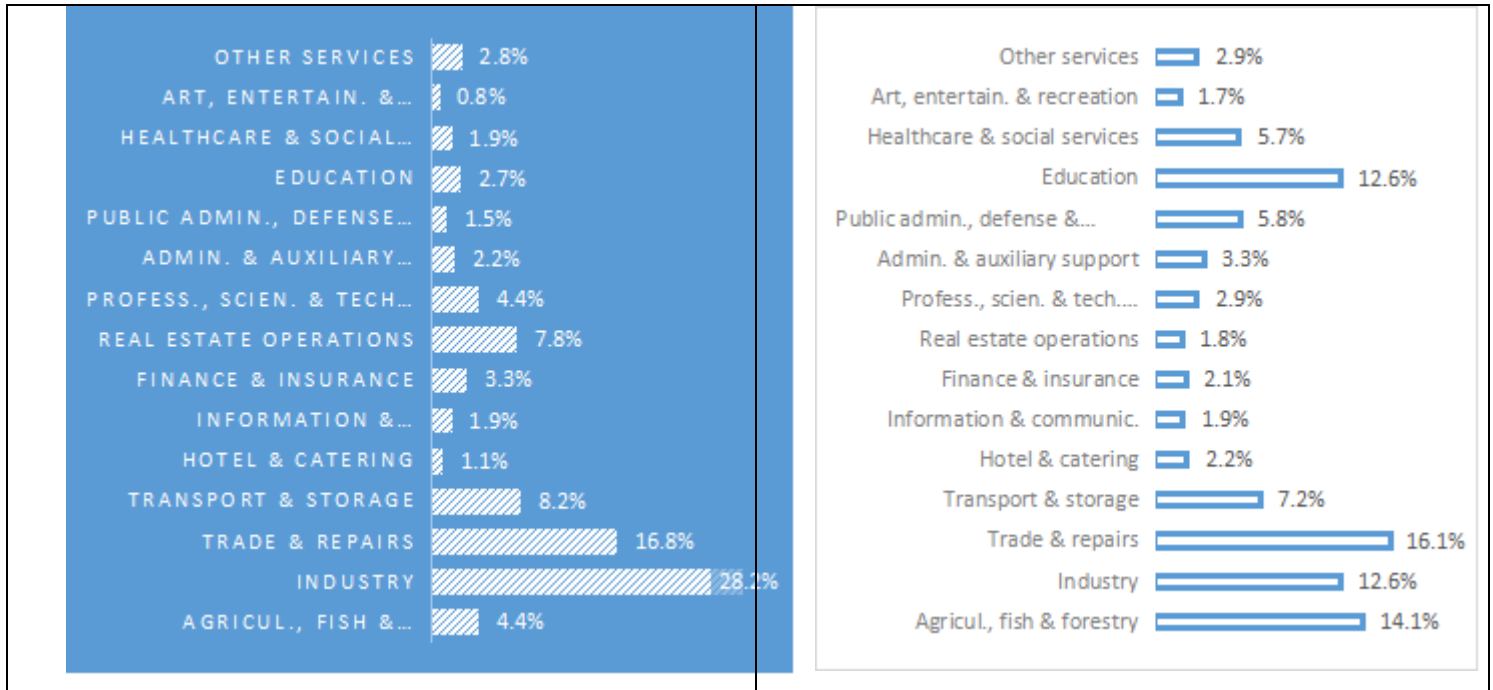
### **4.3 Labor Market in Kazakhstan**

The impressive growth performance of Kazakhstan since 2000 has enabled to recover the ground lost during the transition to the market economy in the 1990s. The unemployment rate fell from 10% to 4%, whereas the labor force participation rate increased from 77% in 2000 to almost 80% in 2013, the latter being in line with that of many advanced economies including Germany, Australia and Norway (OECD, 2016a). As of 2020, the labor force reached 9.2 million people with 5.4 million (59%) being the urban population and 4.5 million (48.5%) being women (BNS, 2021). Overall, the economy employed 8.7 million people, 4.5 million of whom were men and 4.2 million were women (48.2%), while the employment-to-labor force rate in the country amounted to 95.1% and the employment-to-population aged above 15 years and older reached 65.9% (BNS, 2021). In the structure of the employed, the majority (76.4%) were people aged 25-54 years, 12.1% - young people aged 15-24 years, and 11.5% - persons aged 55 years or older (BNS, 2021). According to the official data, in 2020 the rate of unemployment rate stood at around 4.9% with 448.8 thousand individuals being unemployed. Although the official rates of unemployment are relatively low, many argue that the real levels are much higher. For example, the unemployment rate in the younger workers group (15-28) is 3.9%, but according to the information of the National Chamber of Entrepreneurs "Atameken", in some regions of the country the actual number of the unemployed is almost fivefold higher than indicated by the official statistics (Bodaukhan et al., 2019).

Since independence the structure of Kazakhstan's economy has transformed away from agriculture towards extractive industries (oil, gas and mining). The share of industry in value added increased from 20% in 1990 to 33% in 2010, mainly driven by the extractive sectors, while agricultural GDP fell 57% from 1990 to 1998 (OECD, 2016a; Strokova et al., 2016). Similar trends took place in employment patterns across the economic sectors. Employment has also shifted from agriculture, the share of which fell from 35% to 24% for the period 2001-2014, towards services and construction (OECD, 2016a). As shown in the left panel of Figure 3, according to the official statistics for 2018 the

agricultural, forestry and fish sector contributes only 4.4% of total GDP, while the extractive sector's share is about 14.9% with the value added of the industry on the whole being 28.2% and the contribution of the service sectors combined make up 55.5% of output.

Figure 3. Shares of economic sectors in GDP and employment by sector, 2018



Source: BNS

According to the 2018 statistics shown in the right panel of Figure 3, the agricultural, forestry and fish sector employs about 14.1% of the labor force, whereas the service sectors account for more than 66% of total employment (Bureau of National Statistics, 2021). Though the industry's share is about one third of the country's GDP, it employs 12.6% of all workers with the extractive sector around 3.3%. The analysis of the data across 5 year intervals illustrates the trend of employment shifting from agriculture to services and the growth of the knowledge-intensive services such as information and communications, finance and insurance, as well as professional, scientific and technical services as well as education, healthcare and social welfare.

However, the shifts in employment across economic sectors haven't lead to qualitative changes in labor productivity. Even with recent progress, Kazakhstan still suffers from a lag in labor productivity with it being the lowest in the informal and self-employed sectors (OECD, 2018a). Despite the increase in labor productivity in Kazakhstan over the years, it is relatively low compared to more advanced countries and there are wide disparities across sectors (OECD, 2018a). The labor productivity is significantly lower in agriculture and education compared to the extractive and manufacturing

sectors and knowledge-intensive services such as information and communications, finance and insurance, and professional, scientific and technical services (Bureau of National Statistics, 2021; Li et al., 2019). While it is agriculture with below average productivity where the largest relative decrease in employment occurred, high labor productivity sectors experienced little increase in the share of employment and it is low and below average productivity sectors, such as education, wholesale and retail trade, and construction that mainly contributed to employment growth (Strokova et al., 2016). The growth of labor productivity in the services sector is quite weak, which is reflected in the weak growth of real wages and limited to the low-productivity public sector including education, health care, and public service delivery (Halyk Finance, 2019). With agriculture taken into account, these sectors employ 40% of all workers, while having labor productivity three times lower than the average across industries (Halyk Finance, 2019). As noted by the OECD experts (OECD, 2016a), since there is little room for further expansion of the labor force participation, sustained economic growth of the country is associated with increases in the productivity of jobs in the agricultural sector and shifting employment towards other more productive sectors.

The structural shifts in employment has resulted in a decline in self-employment. The main reason for the decline in the self-employed is the gradual reduction in employment in agriculture since almost half of the self-employed are listed as employed in agriculture (Halyk Finance, 2019). While in 2001 salaried workers amounted to 58% of all workers (OECD, 2016a), in 2010 66.7% of the employed were salaried workers and by 2020 the share of salaried employees had risen to 76.6% with the decrease in the number of the self-employed from 33.3% to 23.4% (Bureau of National Statistics, 2021). These changes can be considered positive processes towards greater transparency and reduction of the shadow economy (Halyk Finance, 2019). But, the solid employment figures of the country disguise a discrepant quality of jobs. The quality of jobs varies across economic sectors and regions. Of particular concern, as said above, is the agriculture sector, where the self-employment rate is approximately 50% which is associated with a low labor productivity (OECD, 2017b). The main feature of the self-employed is their greatest prevalence in rural areas, especially in the densely populated regions of the southern part of the country (Halyk Finance, 2019). Nearly half of the self-employed are concentrated in the regions of Turkestan, East Kazakhstan, Zhambyl and Almaty (Bureau of National Statistics, 2021). For example, in the Turkestan region, where 80% of the population live in rural areas, almost half of the employed are self-employed. Without appropriate education and qualifications and due to the lack of alternatives and opportunities self-employed individuals from rural areas can get employment mainly in low-productivity niches as sellers, drivers, and unskilled laborers

(Halyk Finance, 2019). That said, there are doubts about the quality of the official data on self-employment, with a possibility of that number being deduced according to the residual principle so as to maintain an acceptable indicator of the unemployment rate (Halyk Finance, 2019).

Approximately one fifth (20%) of the working population are employed in the informal sector—usually with low pays, poor social security and labor protection coverage, and limited opportunities for training (OECD, 2018a). This is considered not to be high given the sectoral composition of the economy and the country’s development stage (OECD, 2016a). Employers’ incentives to avoid taxes and circumvent administrative burdens, the low level of social security benefits, and difficulties in gaining access to the labor market either due to insufficient job creation in certain sectors or other group-specific barriers to labor market participation are highlighted as factors correlated with the informal sector in the country (OECD, 2018a). Similar to other emerging economies, in Kazakhstan youth, older workers, and the low-skilled are more subject to informality than other categories of workers. The large representation of the young (22% of employed youth aged 15-29 years) (OECD, 2017a) among informal workers may suggest that informal employment represents either an initial point to enter the labor market or an opportunity to get employed as a last resort (OECD, 2016a).

In the context of widespread informal work and self-employment as well as low productivity salaries in Kazakhstan are often low by world standards, in particular those of rank-and-file workers and opportunities for flexible work arrangements are lacking (Halyk Finance, 2019; OECD, 2018a). Around 28% of the working population earn low wages, a very high rate on an international scale given the prevalence of low pay across informal workers and the self-employed (OECD, 2018a). The disparity in the level of remuneration of managers and mid-level employees in the country is fairly high. For example, in metallurgy, the difference between the salary of a manager and the average one varies tenfold, in the financial sector - eight-fold, in construction - fourfold with the twofold gap being the smallest in the public sector (Halyk Finance, 2019). Relatedly, Kazakhstan has a very low level of the minimum wage by international standards. At around 18% of the average wage, it is well below the OECD average of 40% and those of many emerging economies (OECD, 2017a). The potential negative effects of such a low level may include failing to tackle in-work poverty, lowering workers’ incentives to work productively, and falling short of reflecting differences across regions and workers (OECD, 2017a).

There are substantial disparities in labor market outcomes across socio-demographic dimensions and regions. Although labor force participation rates don’t differ much across regions and different groups of the population, different types of employment are related to considerable gaps in

access with people in the bottom 40% of the consumption distribution facing a higher risk of living in underperforming regions, being unemployed, or being in low productivity jobs, such as self-employment or personal farmstead (Stroková et al., 2016). As in many other countries, women and low skilled workers encounter greater barriers in access to the labor market. Women are over-represented in the “feminized” sectors of the economy and earn less than men on average, about 67% of what men do (OECD, 2018a). Notably, the unemployment rate is higher among women than among men, 5.4% vs. 4.4%, with the proportion of women among the unemployed being greater (BNS, 2021). As for low-skilled workers inactivity rates are higher among people with primary education or lower, which may suggest that informal jobs are oftentimes the sole opportunity for unskilled workers to enter the labor market, while people with disabilities struggle to get employed in the labor market (OECD, 2018a).

Although, overall the country enjoys a low level of unemployment, it is relatively higher in southern regions such as Turkestan oblast, Shymkent, and Almaty compared to the other regions. Notably, regional differences are observed in terms of employment and education opportunities for recent graduates as well. The share of the youth who are neither in employment nor in education or training (NEET) varies across regions. In particular, such regions as Zhambyl, Karaganda, Kyzylorda, and Turkestan have the highest percentages of such youth (Bureau of National Statistics, 2021).

Labor resources are unevenly distributed across regions, as demonstrated in the Report on determining the need for personnel in the Republic of Kazakhstan, carried out by the National Chamber of Entrepreneurs “Atameken” (Atameken, 2020). This large-scale study is based on the data from the survey of over 600 thousand business entities, the results of screening businesses and households, and the Electronic Labor Exchange portal. Demographic imbalances across regions represent one of the systemic problems affecting both the labor market and further economic development of the country and its regions. The population density is much higher in the south of the country, but there is a shortage of jobs in this region. At the same time, such regions as Pavlodar, East Kazakhstan, Kostanay, and North Kazakhstan experience a large labor shortage. According to the forecast assessment of experts, the population of the country will make up 24.5 million people by 2050, with the population of the northern regions decreasing by 0.9 million people and the southern regions experiencing an increase in population by 5.3 million people (Atameken, 2020). In view of this, currently the government is creating an internal labor emigration from the southern regions to the north to address the demographic imbalances across regions by means of the resettlement Program for the Development of Productive Employment and Mass Entrepreneurship. The program is designed to provide material support and training for all who want to get a job which will help reduce unemployment in the country.

As such, within the framework of this program the voluntary resettlement of citizens from the labor-surplus regions to the labor-deficient regions is assisted to stimulate territorial mobility of labor force.

The study of Atameken (2020) provides evidence for substantial demand and supply imbalances in the labor market of the country. On the whole, the need for personnel in the country is 148,526 people, in particular for workers with tertiary education - 20 732 people (14%), with secondary vocational education - 79 804 people (54%), for professions that do not require special education - 47,990 people (32%) (Atameken, 2020). The comparative analysis of the labor demand and supply of graduates by education level shows that the number of graduates with tertiary education is almost 5.3 times the need for tertiary-educated specialists, whereas the number of graduates with vocational education is 1.7 times as large as the need for them (Atameken, 2020). All regions of the country appear to experience an imbalance between the labor supply and demand.

Table 1. Labor demand and supply across regions of Kazakhstan

Region	Colleges		HEIs	
	Demand for college-educated workers	# of graduates	Demand for university-educated workers	# of graduates
<b>Kazakhstan</b>	<b>79675</b>	<b>141715</b>	<b>20732</b>	<b>121161</b>
Akmola	2514	6578	909	3926
Aktobe	3640	8208	1257	5735
Almaty	4483	10453	1821	1361
Atyrau	2700	5426	1998	3519
East Kazakhstan	5477	11098	544	7004
the city of Almaty	9144	18018	3171	26323
Nur-Sultan	6941	7379	1403	9568
the city of Shymkent	2545	8251	1169	27109
Zhambyl	7984	7083	1051	6439
West Kazakhstan	2548	6476	397	6855
Karaganda	6625	12038	2711	7801
Kostanay	4007	6644	962	3824
Kyzylorda	985	6606	497	3040
Mangystau	1120	6330	844	629
Pavlodar	5793	5792	1261	4427
North Kazakhstan	1779	3712	492	1679
Turkestan	11390	11623	300	1913

*Source: Atameken (2020)*

These imbalances are quite well reflected in the structure of the unemployed population profiled by education level. As of 2020, of the unemployed 76.9 thousand people (17.1%) have general

secondary education, 165.9 thousand people (37%) are tertiary educated, and 180.3 thousand people (40.2%) have secondary vocational education, and every third unemployed person was unemployed because of the lack of any job, whereas 21.2% were fired of their own will, and 14% dismissed due to family-related reasons (BNS 2021).

Other challenges that the country is facing include automation and digitalization that have been changing the demand for skills in the labor market and external migration of highly skilled workers. In the context of the digital world enormous changes related to production automation and new technologies are taking place throughout the world and the labor market of Kazakhstan is not an exception. It is expected that the structure of employment will undergo changes, such as the reduction of low-skilled jobs and a simultaneous increase in demand for highly skilled labor force (Atameken, 2020). According to expert opinions, tens and possibly hundreds of thousands of workers such as sellers, accountants, drivers, security guards can fall victim to automation (Halyk Finance, 2019). Of particular concern for the labor market is an increasing outflow of skilled population leading to the negative balance of migration. As shown by Abdulla (2021), the period 2010–2017 has seen net migration losses, which is indicative of the increase in the outflow of labor resources. The country suffers large losses of qualified specialists, while accepting people mainly with a lower level of education (Halyk Finance, 2019). As such, the analysis of the data points to the rise in the outflow of migrants with tertiary and secondary vocational education and inflow of migrants with general secondary education (KISI, 2017).

The main institutions engaging in the managing the system of the country's labor market includes the central and local governments, the Ministry of Labor and Social Protection, its subordinate organizations, including public employment agencies. Against this background the government is implementing measures to promote mass entrepreneurship and employment. Several programs such as the above-mentioned Programme on Development of Productive Employment and Mass Entrepreneurship and The Employment Roadmap 2020 have been adopted to enhance the quality and potential of labor resources by providing opportunities of professional training, among others, create workplaces, and involve the unemployed and self-employed population in productive employment.

The country continues to reform its labor market regulation. In this regard, on 1 January 2016 the government put into effect labor law reforms that were announced to reduce regulation and increase flexibility on the labor market. However, these reforms generated considerable controversy in the society being criticized for limiting the freedom of association and assembly, shifting power from employees to employers, and failing to address job quality (OECD, 2018a). Specifically, the new labor

code makes provisions for extended probation periods, reduced overtime allowances, alleviated dismissal of workers, and tightened collective bargaining (OECD, 2018a).

## **Chapter 5. Research Design**

### **5.1 Use of Mixed Methods**

The study is designed as a mixed-method research, suited to the goals and objectives of the study. Quantitative and qualitative inquiries are implemented, following the sequential explanatory design (Creswell et al., 2003; Ivankova et al., 2006). The use of both quantitative and qualitative data enables to better understand a complex phenomena such as educational mismatch. It has the advantage of understanding the research problem by analyzing rich, individual-level quantitative data, on the one hand, and obtaining detailed interpretation and analysis of the contextual factors, on the other hand.

The assessments of the prevalence of educational mismatch, determining factors and earnings effects are based on using quantitative data. The data used for these purposes in the quantitative part of the study are derived from the Labor Force Survey of Kazakhstan (LFS), for its five recent waves (years 2014-2018), obtained from the Statistics Committee of the Ministry of National Economy (currently the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan), in a fully de-identified (anonymized) form and according to the procedure established by the authorized body (according to the Law on Public statistics).

The qualitative research through focus groups is carried out to complement and elaborate further the findings from the quantitative part of the study by exploring multiple perspectives of experts on the issue of education-job mismatch in the domestic labor market. Thus, the qualitative phase of the study helps implement a more in-depth exploration of the issue of educational mismatches, elucidate the importance of education-job match, determine underlying reasons and implications of educational mismatches, as well as the role of the education-system and labor market-related factors by invoking the specifics of the functioning of the national education system and labor market conditions. The choice of focus groups as a research method was motivated by the purpose and research questions of the study due to their value in providing authentic voices, perspectives and evaluations of participants. The open-ended questions and comfortable and permissive focus group setting designed to facilitate self-disclosure among participants provided them opportunities to listen, respond to others, re-consider and re-explain, and, hence, co-construct and co-interpret meanings. The desire to gain an understanding of the educational mismatch issue based on perceptions and collective meaning constructions of focus group participants makes the focus group most appropriate.

The literature provides many definitions of focus groups which are widely used as a qualitative research method. According to many scholarly definitions focus groups are considered group interviews. “Focus groups are in-depth group interviews employing relatively homogeneous groups to provide information around topics specified by researcher” (Hughes & DuMont, 2002, p. 258). The element of interaction within focus groups is particularly emphasized by many of those definitions. According to Bryman (2012, p. 502), the focus group method is a form of group interview of several people on a particular topic with the emphases on interactions among the group members and the joint construction of meaning. As a research method the focus group enables to interview people who bear a relation to a particular issue or question, elicit different views on a particular issue from participants who build up their views out of interactions occurring during the discussions, and importantly, identify additional issues related to a focus group topic that participants consider important (Bryman, 2012). Morgan (1997) also defines focus groups as group interviews but not in the sense of an alternation between a moderator’s questions and the focus group participants' responses, but that rely on interaction within the group that leads to the production of data and insights that would be less achievable without this group interaction.

The analysis of the methodological literature and empirical studies allows to identify the following major features of focus groups: 1) relative homogeneity of the group; 2) a typically small size of the group (6-8 people); 3) interaction among participants; 4) a skilled moderator structuring the general outline of the discussion, facilitating the focus group discussion, and establishing a rapport with participants; 5) the focus group interview schedule to ensure consistency across focus groups; 6) warm, friendly and comfortable environment, etc.

For the purposes of the current study considering the Covid-19 situation and its implications, the decision was made to conduct online focus groups. In fact, due to the widespread development of Internet technologies, ever increasing online platforms for interacting with others have tremendously raised the utility of online focus groups becoming popular for use in studying various policy issues (Liamputtong, 2015; Murray, 1997; Field, 2000; Nilsson et al., 2014; Dicker et al., 2019). As noted in the relevant literature, online focus groups have a number of merits since they allow for increased convenience of participation, anonymity and “informality” of the format leading to higher openness on the part of participants, greater access to a broad range of potential research participants, a more

effective coordination, relatively lower organization costs, and easy recording, among others (Stewart & Shamdasani, 2017; Abrams & Gaiser, 2017).

## **5.2 Ethics**

Appropriate privacy and confidentiality protections were put in place. Each focus group participant's consent was sought prior to the beginning of the focus group sessions. Informed consents for online focus group participation were obtained from individuals who agreed to participate in online focus group discussions via e-mail. The voluntary and confidential character of participation in the online focus group was stated in the informed consent form as well as the online focus group participation e-mail invitation.

Anonymity and confidentiality were guaranteed to the focus group participants to the maximum extent possible so as to ensure the protection of the identity and facilitate free exchange of opinions among participants. Prospective focus group participants were notified in the e-mail invitation that they could ask questions or ask for additional information about the study. The contact information for these purposes were provided in the informed consent form. Also, the consent form stated that the online focus group discussion would be recorded for the purposes of the subsequent analysis, and that participants should not record the focus group for any purpose and comments made during the focus group session should not be repeated outside the focus group session.

Further, appropriate measures were undertaken to protect the focus group participants' privacy and data confidentiality. Specifically, the data collection process was thoroughly administered by the researcher alone who transcribed the focus group recordings by de-identifying the focus group participants: all direct identifiers were removed, codes and transcription data files are maintained in separate secure locations with access only to the researcher, the video recordings of the focus group sessions were deleted. The computer with the transcription and code files are protected with a secure password. The findings from the focus group discussions are formulated in de-identified terms in the resulting documents, including this thesis. These procedures undertaken make re-identification impossible since re-identification is related to socio-economic (affecting employment and/or economic well-being) and psychological risks that could arise from inadvertent data disclosure or unauthorized access to data. It is believed that these risks are manageable and can be averted with appropriate

measures undertaken to protect the focus group participants' privacy and data confidentiality. Moreover, the online focus group participants were notified about the possibility of using nicknames when participating in the ZOOM focus group session. Whether participants followed the recommendation depended on their choice and will.

### **5.3 Quantitative Survey Research**

#### **5.3.1 Data description and variables**

The data used in this study come from the Labor Force Survey of Kazakhstan. Considering the availability of data on individual income five recent waves of the survey for the years 2014-2018 are analyzed for the purposes of this study. This nationally representative household study provides cross-sectional individual level data containing information, among others, on a set of individual socio-demographic, economic and job characteristics. We focus on currently employed individuals aged 18-65 who have at least primary vocational education. The summary table of the variables used in the study with their main descriptive statistics and definitions is provided in Table C1 of the Appendix. Omitting observations with missing values and pooling the recent five consecutive cross-sections of the LFS we had a sample of 930 803 observations in the logit models. For the earnings regressions we could analyze a sample of 595 480 observations.

The study relies on subjective measures of education-job mismatches collected in the LFS. To determine the mismatch status, vertical mismatch and horizontal mismatch variables are constructed based on individuals' self-reports of the fit between their educational qualification and the job and between their specialty and job performed, respectively. Vertical mismatch is defined in terms of individuals' self-assessments of the correspondence of their educational qualification to the job performed, allowing to determine whether respondents are working above or at or below their qualification level. The vertical mismatch variable is constructed as dummy coded 1 if a respondent answered “No, it is below my qualification” to the survey question about the correspondence of the job to his qualification and such an individual is categorized as a vertically mismatched or overeducated worker and 0 if an individual chose the response option “Yes”. Undereducated individuals who opted for the response “No, it is above my qualification” and those who chose the response “No, the qualification is the same but in a different field” are excluded from the analysis since less than 3 % of the respondents selected these answers.

Horizontal mismatch is measured from the responses to the question asking if a respondent works in a job according to the specialty obtained as a result of education. Here, respondents could choose between the options: (1) “Yes”, (2) “No”, and (3) “Didn’t study”. Those who responded “Didn’t study” are dropped and the other two assessments are coded into a dummy variable with value 1 if the respondent marked the answer category “No” and value 0 when the respondent selected the answer option “Yes”. Thus, a worker is defined as horizontally mismatched if he reported working in a job that didn’t match his specialty. The double mismatch category (being both vertically and horizontally mismatched) is obtained from the combination of vertical and horizontal mismatches. Accordingly, individuals who reported both vertical mismatch (overeducation) and horizontal mismatch are considered to be in double mismatched jobs.

Another dependent variable of main interest income used in the earnings regressions is treated both as a continuous variable and a categorical variable in two different types of regression models. The OLS specification employs the log of monthly individual earnings used as a continuous measure derived from twelve income brackets as the mean point of each interval. The value of 500 000 tenge is assigned to the last open-ended bracket (more than 500 000 tenge). The observations with zero income are dropped. As a categorical variable, income is coded into the high income category (coded as 3), the middle income category (coded as 2), and the low income category (coded as 1).

The human capital variables used in the analysis are the level of education, labor market experience, and current job tenure. Differences in educational attainment among individuals are controlled for by the level of education, which is operationalized in four distinct categories: primary vocational, secondary vocational, unfinished tertiary and tertiary education including postgraduate education level. Thus, the education variable is used as a categorical variable in the analysis, with primary vocational education being the reference category. An individual's potential work experience is calculated based on his age and years required to complete the respective education level. Its quadratic term is also included in estimations to allow for the possible non-linear relation between income and work experience. Finally, current job tenure is included as a categorical measure of firm-specific human capital. The job tenure categories such as 6-12 months, 1-3 years, 3-5 years, and >5 years with the category “less than 6 months” being the base group are included in the study as defined in the survey.

The analysis includes such socio-demographic variables as gender, place of residence, and marital status. Gender and place of residence are modeled as binary variables. The variable marital status describing the person’s current marital status has four categories: unmarried/never married,

married, widowed, and divorced. The respective dummies are created to represent these groups. Another set of independent variables included in the study are categorical variables related to employment characteristics, such as self-employment status, full-time versus part-time job status, and firm size. The employment status variables enter the analysis as dummies, while firm size as a categorical variable. The estimations additionally include controls for industry level and regional characteristics as well as year effects. The relevance of industry level characteristics is accounted for by industry dummies. Regional and year dummies in estimations are used to take into account year- and region-specific effects.

It should be noted that the LFS questionnaire doesn't contain a question on fields of study completed by respondents. Since many educational mismatch studies include fields of study (fields of education) as one of the explanatory variables, its inclusion in the LFS questionnaire could be valuable in terms of expanding the scope of future research on the issue of education-job mismatch in Kazakhstan.

### 5.3.2 Methodology

Following Witte & Kalleberg (1995), Robst (2007b), Wolbers (2003), Hensen et al. (2009), Boudarbat & Chernoff (2012), Robert (2014), and others, we estimate binary logit models of the determinants of overeducation, horizontal mismatch, and double mismatch. The following regression is used to estimate the probability (P) that the observed value y takes the value 1:

$$P(\text{mismatch})_i = \Lambda(\beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i) = \frac{e^{x'\beta}}{1 + e^{x'\beta}} \quad (1)$$

where  $P(\text{mismatch})_i$  is the probability of being mismatched to a job of individual  $i$ ,  $X_i$  represents a vector of socio-demographic characteristics (gender, place of residence, marital status),  $Y_i$  is a vector of human capital variables (education level, work experience, current job tenure),  $Z_i$  refers to a vector of employment characteristics (self-employment, full time/part-time employment, firm size). Regional, industry and year dummies serve as additional controls to account for different labor market conditions across regions and industries as well as time effects. For vertical mismatch, the logit regression estimates the likelihood of working in a job below one's qualification level. For horizontal mismatch, the logit regression estimates the likelihood of not working in a job according to one's specialty. The reference category for both models is having a similar level of education but working in a vertically matched job or a horizontally matched job, respectively. For double mismatch, the logit regression

estimates the likelihood of working in a job below one's qualification level which is also unrelated to one's specialty. Separate regressions are estimated on a combined sample, a males only sample and a females only sample since many studies document gender differences in the likelihood of being mismatched.

The wage effects of education-job match have been commonly studied by extended Mincer's earnings function using the standard OLS method (Allen & Van der Velden, 2001; Robst, 2007b, Green & McIntosh, 2007; Nordin et al., 2010, McGuinness & Sloane, 2011, and many others). Whether being in a mismatched job affects an individual's earnings is determined from the following regression:

$$\ln(w)_{it} = \beta_0 + \beta_1 M_{it} + \beta_2 X_{it} + \beta_3 Y_{it} + \beta_4 Z_{it} + \varepsilon_{it} \quad (2)$$

where  $\ln(w_{it})$  is the log of last month's earnings for individual  $i$  in cross-section  $t$ ,  $M_{it}$  is a variable for the mismatch status of individual  $i$  specified by non-overlapping categories: well-matched (the reference category), vertically mismatched but horizontally matched (vertically mismatched only), horizontally mismatched but vertically matched (horizontally mismatched only), and both vertically and horizontally mismatched (double mismatched).  $X_{it}$  represents a vector of socio-demographic characteristics (gender, place of residence, marital status),  $Y_{it}$  is a vector of human capital variables (education level, work experience, current job tenure),  $Z_{it}$  refers to a vector of employment characteristics (self-employment, full time/part-time employment, firm size), and  $\varepsilon_{it}$  is an error term. The earnings regression also includes dummies for regional, year and industry effects. According to Equation (2), a worker in one of the mismatch categories is compared to another worker with the same level of education but who is employed in a job that matches both his qualification level and specialty.

Alternatively, the ordered probit model is estimated using income as a categorical variable. These models are used to compute the marginal effect each explanatory variable has to each level of income, accounting for the ordinal nature of the income categories<sup>15</sup>.

The ordered probit specification based on a latent regression framework has the following form:

$$y_i^* = \beta' x_i + \varepsilon_i \quad (3)$$

<sup>15</sup> The ordered logit and ordered probit estimations provide very similar results; hence, the ordered probit model with the error terms normally distributed was chosen.

where  $y^*$  denotes the latent continuous variable which refers to the income category of individual  $i$ ,  $\beta$  is the vector of parameters to be estimated,  $x_i$  is the vector of explanatory variables describing individual  $i$ , and  $\varepsilon_i$  is the random error term following a standard normal distribution. The set of explanatory variables contains the variables which represent individuals' socio-demographic attributes, human capital and employment characteristics listed above.

The observed income variable,  $y_i$ , is determined from the model as follows (4):

$$y = \begin{cases} 3 \text{ (high income)} & \text{if } y_i^* > \mu_2 \\ 2 \text{ (middle income)} & \text{if } \mu_1 < y_i^* \leq \mu_2 \\ 1 \text{ (low income)} & \text{if } y_i^* \leq \mu_1 \end{cases}$$

where  $\mu$  are the threshold values for all income levels that define  $y_i$ , and 3 is the highest ordered income level. From the above, the probability of individual  $i$  falling in any ordered income category can be expressed as follows (5):

$$P(y = n) = F(\mu_n - \beta' x) - \Phi(\mu_{n-1} - \beta' x)$$

As usual, for this classical ordered probit model, the values of parameters are determined by the Maximum Likelihood Estimation function.

We estimate several model specifications. We will begin with a model containing the variables of main interest, the education-job mismatch variables with year dummies. The second specification adds the human capital variables (education, experience and tenure), the third one includes the socio-demographic variables for gender and marital status. Specification 4 adds controls for place of residence and regional effects. Specification 5 incorporates industry effects and, finally, specification 6 includes the employment status and job type variables. The LFS doesn't contain data on variables to control for unobserved individual heterogeneity such as ability or skills or motivation, etc. Considering that the standard OLS methodology reflects the impact of mismatch on the mean of the conditional distribution of earnings, the study additionally estimates the mismatch effects for the below median and above median income groups using the positions of individuals within the earnings distribution as a proxy for their ability level.

## **5.4 Qualitative Research: Focus Groups**

### **5.4.1 Research Design**

The qualitative research is implemented through focus groups. For the purposes of the current study focus group interviews have been conducted to explore multiple perspectives of experts on the

issue of education-job mismatch based on focus group participants' insights, background experience, knowledge and information on the topic.

Following the literature on designing and conducting focus groups (Bryman, 2012; Robinson, 2014), the selection of participants for focus groups has been carried out mainly by the purposive sampling strategy and marginally by the snowball sampling technique. Thus, in line with the purposive sampling units possessing the most information on the characteristic of interest were mostly randomly selected within the sampling frame. After acquiring an approval of the Institutional Review Ethical Committee of the GSPP, Nazarbayev University, individual invitations outlining the theme of the online focus group, its date and procedures as well as the voluntariness and confidentiality of participation were sent out to potential participants. Prior to the online focus group session, participants were sent an informed consent form and the ZOOM link to the online focus group session. An informed consent was collected from those who agreed to participate. There were potential participants who couldn't attend the focus group due to different unexpected circumstances, but the majority of the individuals who agreed to participate attended the scheduled meetings.<sup>16</sup>

Primary data were collected from 7 online focus groups, each with 6 to 10 participants, the optimum number of participants, recommended in the literature. In total, 51 participants took part in the online discussions. Focus groups were held via the Zoom Video Conferencing platform to enable the participation of experts from three geographic destinations, namely Nur-Sultan, Almaty and East Kazakhstan. The focus group participants were drawn from among individuals who have a certain experience or expert opinion about the topic. Therefore, the online focus group participants included individuals involved in the education and/or employment policy making and/or practices. Purposive sampling was employed to carefully recruit participants, that ensured the representation of individuals from the following groups:

- 1) Labor market policy-makers and experts, scholars, consultants (including NGOs);

<sup>16</sup> The focus groups provided the researcher with invaluable hands-on experience in conducting focus groups. A number of useful lessons were learned from this experience, including the need for effective time management, building up organizational and moderator skills, having mental preparedness, establishing a rapport with potential participants from the very beginning, handling all possible ethical considerations, and over-inviting focus group participants. Importantly, the arrangement of the focus group shouldn't be too much ahead of time.

- 2) Education policy-makers and experts, scholars, consultants (including NGOs);
- 3) University instructors and employment officers;
- 4) College instructors, deputy directors of academic affairs and work-study issues;
- 5) Representatives of public and private sector organizations (on the part of employers) and HR agencies.

It is important to study the perspectives of these stakeholders/agents because they have a stake in or have a direct link to the issue of education-job match. In their everyday work they encounter the analysis and evaluation of education and labor market policies and practices, and/or participate in the formulation, decision-making and implementation of education and labor market policies, or engage in teaching, training, employment counseling, hiring processes and taking personnel decisions.

Each focus group, which lasted approximately 60 minutes, was moderated by the researcher. A brief introduction to the topic was presented at the beginning of each session and a list of key questions were asked to guide the discussion.

The core questions for the discussions included the following:

1. How important is the match between education and job?
2. What are the reasons of the mismatch between education and work?
3. Do our vocational and higher education institutions provide labor market relevant knowledge and skills?
4. What are the features, strengths and weaknesses of the education and training system in our country with regard to meeting labor market needs?
5. What is the role of labor market-related factors in explaining education-job mismatches?

And also, the focus groups sought to elicit policy recommendations for addressing the gap if any revealed between the education system and labor market needs. Thus, the qualitative inquiry was designed for discussing the importance of education-job match, identifying potential determinants and implications of mismatch in terms of the alignment of the education system output and labor market needs, revealing the strengths and weaknesses of the education and training system, and labor market constraints. As a result, this study was expected to lead to the formulation of relevant policy recommendations in terms of improving the coordination between the labor market and education systems.

The focus group discussions of an hour long each were conducted through the Zoom Video Conferencing platform. The researcher (I) acted as a moderator of each focus group discussion. Each session was video-recorded for the subsequent transcription and analysis. The findings from the focus

group discussions have been integrated with the results of the quantitative research in the Analysis of the findings section of the thesis.

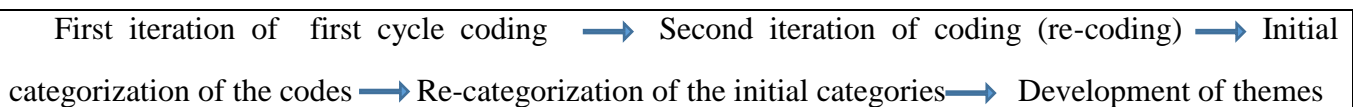
#### 5.4.2 Data Collection and Analysis

Over a 10-week period 7 focus groups were held with 6 to 9 participants per group. The focus groups were facilitated in a similar way and participants were encouraged to express their opinions on all questions. To mitigate against researcher effects, the main research questions remained central to the data collection process across all focus group sessions. The language of conducting the focus groups was Russian.

The focus group sessions were recorded and later transcribed verbatim before analysis since qualitative data analysis software such as NVivo is not available in the Russian language, but on the other hand as a beginning Qualitative data analyst this activity was important for me to gain hands-on experience. To mitigate against researcher effects, the data gathering process centered around the major research questions. A separate coding Word document was created for participant identification codes. Using Microsoft Word data tables were created for each focus group transcript with columns for coding of participant responses, categorizing, and theme coding. The combination of several coding methods was employed to analyze the focus group transcripts. The appropriateness of coding methods is conditioned by the goals of the qualitative research and nature of the research questions.

The researcher read and re-read the focus group transcripts and applied the combination of the first cycle coding methods, namely In Vivo coding, Values coding, Evaluation coding and Versus Coding for initial data analysis (Saldaña, 2010). For second cycle coding and subsequent data analysis, she used Pattern coding. The data analysis resulted in detailed notes and codes for analysis that were developed by an iterative approach with core categories and themes identified. After multiple re-readings and applying coding techniques to the data, themes evolved. The data analysis process followed the scheme set out in Figure 4.

Figure 4. The scheme of analysis of the focus group data



Code validation was performed by re-analyzing participant responses, assigned codes and categories as well as themes several times. Further, text descriptions of the themes and participant quotes were developed to further illustrate each theme.

## Chapter 6. Results

### 6.1 Quantitative Research Results

In the following analysis, first, we document the prevalence of education-job mismatches across different individual, human capital and employment characteristics. Second, we focus on the factors correlated with education-job mismatches. Third, we examine the implications of educational mismatches for individual earnings.

#### 6.1.1 The incidence of education-job mismatches

Table 2 shows the distribution of respondents across combinations of vertical and horizontal match/mismatch categories. The majority of workers appear to use knowledge and skills they acquired during educational training in their employment as about 70.7% of individuals report that they work according to their qualification level and specialty, i.e. being fully matched to their job. About 21.5% of employees report that neither their job and specialty are related nor the work they perform correspond to their educational qualification level.

	Obs.	Percent
Matched	812,891	70.66
Vertically mismatched but horizontally matched	8,970	0.78
Horizontally mismatched but vertically matched	81,372	7.07
Double mismatch	247,144	21.48
Total	1,150,377	100

Table 2. Incidence of education-job match and mismatches

The extent of horizontal mismatch is greater than that of overeducation. Only about 0.78% of respondents declare their jobs being lower than their qualification level while working according to their specialty, whereas 7.07% report working in jobs unrelated to their specialty while being vertically matched. Accordingly, the overall rates of vertical mismatch and horizontal mismatch are determined

by taking into account those who are double mismatched. In total, about 22.3% of employees report being overeducated, while 28.6% report that their job and specialty don't match.

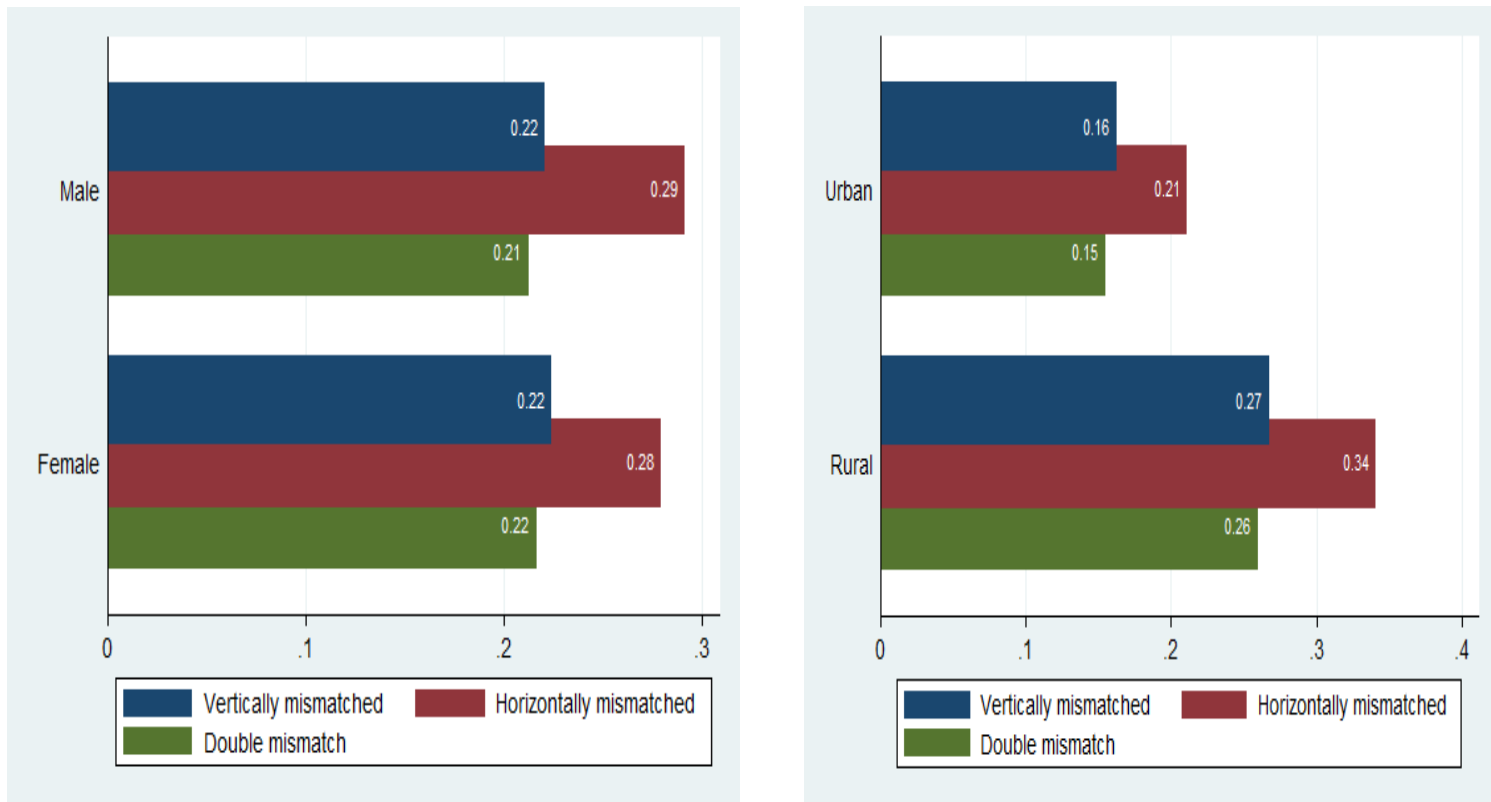


Figure 5. Incidence of education-job mismatches (shares of mismatched workers) by gender and place of residence

The incidence of educational mismatches among workers across different characteristics provides interesting insights into education-job match/mismatch patterns in the labor market of the country. Figure 5 illustrates the incidence of educational mismatches by gender and place of residence.<sup>17</sup> Approximately equal proportions of men and women are both vertically and horizontally mismatched (double-mismatched). About 22.4% of women and 22.1% of men report having surplus education, while around 28% of women and 29.2% of men report being horizontally mismatched. Much higher proportions of rural inhabitants report both being overeducated and horizontally mismatched as well as double mismatched. The reported incidence of mismatch also differs across age categories. Both vertical and horizontal mismatches as well as double mismatch are most prevalent among workers aged older than 55 years, followed by workers aged younger than 25 years. Individuals aged between 25 and 45 years most often report being matched to a job. Thus, the rates of educational

<sup>17</sup> Table C2 of the Appendix shows the rates of education-job match, mere vertical mismatch, mere horizontal mismatch and double mismatch

match and mismatch across age categories appear to be U-shaped. Across the categories of marital status widowed persons are the group that report the highest rates of all types of educational mismatch. As such, vertical mismatch (27.2%), horizontal mismatch (34.2%) and double-mismatch (26.3%) are most common among the widowed, followed by unmarried persons. The incidence of each type of educational mismatch is the lowest among married persons.

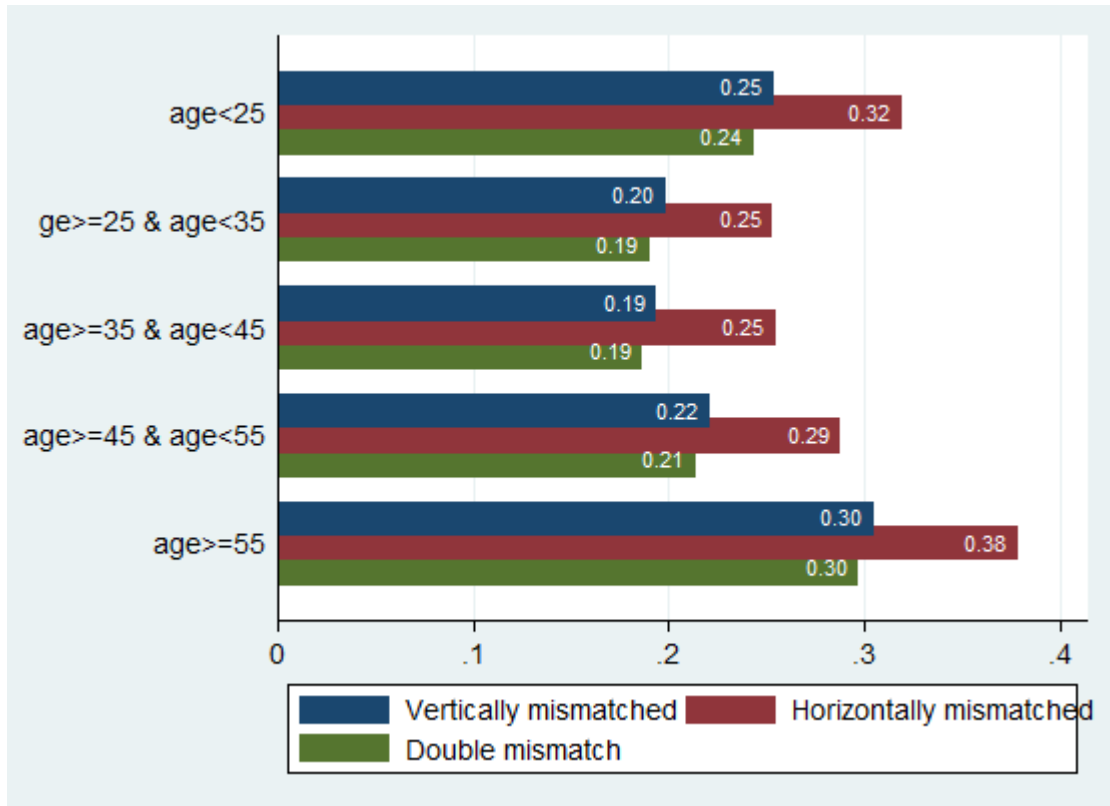


Figure 6. Incidence of education-job mismatches (shares of mismatched workers) by age category

According to the distribution of mismatches across educational levels the lowest incidence of both types of mismatch and double-mismatch is reported among individuals with the highest level of educational attainment. Those who attended universities and those who acquired postgraduate degrees most often report being in jobs that match their level of qualification or specialty or both qualification level and specialty. Vertical mismatch and double mismatch are most common among secondary vocational degree holders and individuals with unfinished tertiary education, while horizontal mismatch is most often reported by individuals with primary vocational education. The match between a worker's education and the job is the most prevalent among tertiary-educated individuals (about 84%), while the incidence of match among workers with a lower level of education is just somewhat above 60%.

The rates of educational mismatches demonstrate consistent decrease as current job tenure increases. Vertical mismatch, horizontal mismatch and double mismatch are lower among those who have higher tenure in their current jobs. The shares of mismatched workers are much lower among workers with current job tenure of more than 5 years compared to individuals with the shortest tenure of less than 6 months: the rates of vertical mismatch decreases from 39.8% to 17.4%, horizontal mismatch from 47.5% to 23.5%, and double mismatch from 38.8% to 16.8%.

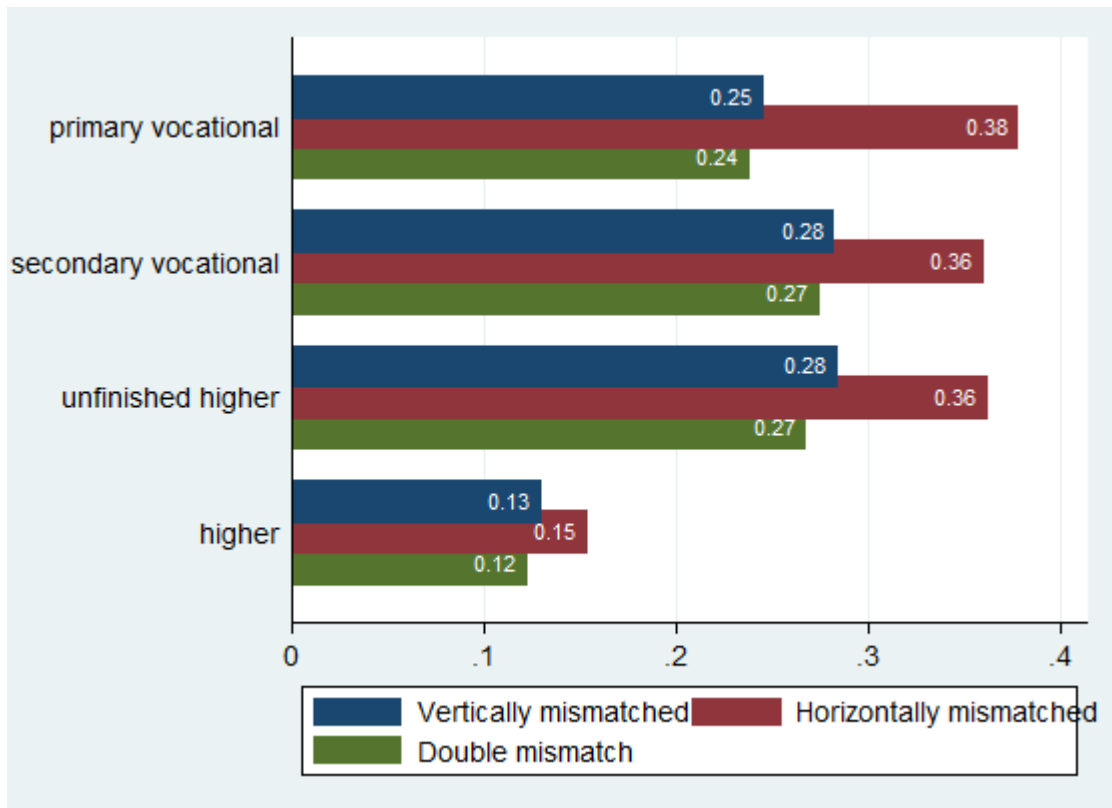


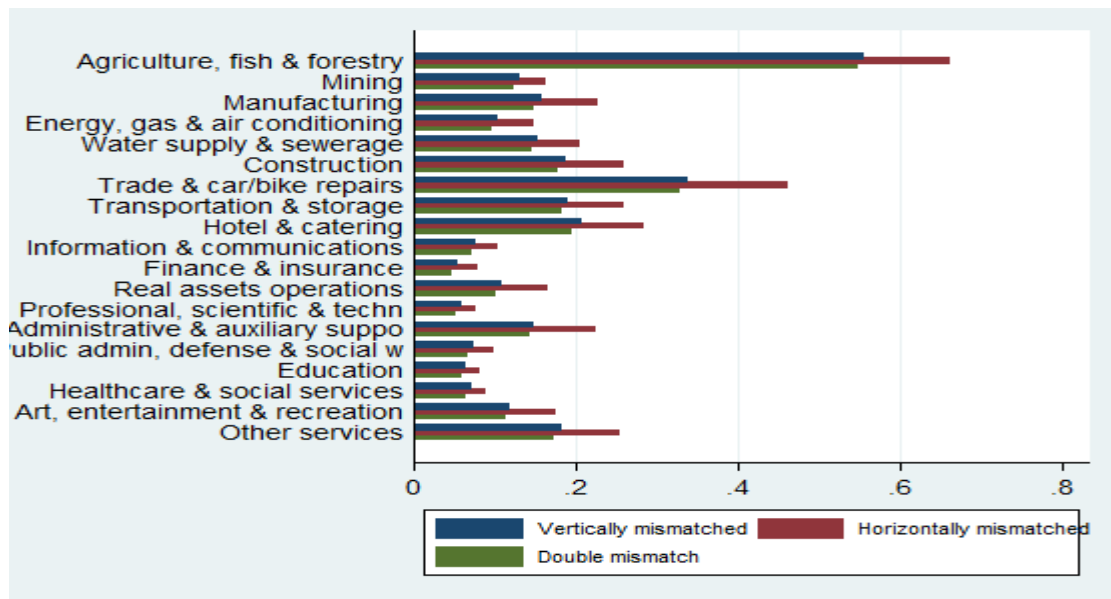
Figure 7. Incidence of education-job mismatches (shares of mismatched workers) by level of education

However, the incidence of education-job mismatches doesn't decrease linearly with firm size. The highest incidence of all types of mismatch is among workers in small firms of less than 5 employees. About 30.1%, 40.2% and 29.1% of employees working in the smallest firms report vertical mismatch, horizontal mismatch, and double mismatch, respectively. The rates of education-job mismatches fall up to the category of 51-250 employees, and are lowest among individuals working in these small and medium-sized firms. Relative to them, mismatches rise for those who work for medium-sized and large firms of 251-500 and more than 500 employees.

The reported incidence of education-job mismatches by employment status differs strikingly. The lowest proportions of vertically mismatched, horizontally mismatched and double mismatched

workers are found among self-employed and part-time workers than wage workers and full-time workers, respectively. About 53.2% of self-employed workers report double mismatch, 54.2% vertical mismatch, and 66.5% horizontal mismatch. About 33% of the self-employed report match vis-a-vis 81% of wage workers. In terms of the full-time and part-time job status, overeducation and horizontal mismatch are reported most often by part-time workers. About 57% of part-time workers report double mismatch, 58.1% vertical mismatch and about 66% horizontal mismatch. Meanwhile, about 33.4% of part-time workers report match, while the share of matched full-time workers is 76.3%.

The incidence of education-job mismatches varies across industries. The distribution of mismatches by industry suggests the possibility that vertically and horizontally as well as double mismatched workers are more likely to be employed in lower skilled industries<sup>18</sup>. The agriculture, fish and forestry sector stands out with about 56% and 66% of workers reporting that they are overeducated for their jobs and working in jobs unrelated to their specialty, respectively. About 54.9% of employees agriculture, fish and forestry report double mismatch. Following the agricultural sector, all types of education-job mismatches are reported most often by employees in the wholesale/retail trade & car/bike repairs, hotel and catering, transportation and storage and construction industries, followed by other services, and manufacturing. These all belong to lower skilled industries, according to our relative classification.



<sup>18</sup> The skill intensity of the industries is determined using the average education level of workers across industries. The industry groups determined according to the average education level of workers are as follows: Lower skill industries with the average years of education less than or equal to 13 years; Higher skill industries with the average years of education above 13 years. The industry groups defined by skill level are given in Table C4 of the Appendix.

Figure 8. Incidence of education-job mismatches by industry

On the other hand, the lowest proportions of employees report vertical mismatch, horizontal mismatch, and double mismatch in finance and insurance, professional, scientific and technical activities, education, and healthcare and social services. The incidence of vertical mismatch falls to 5.3% of employees in finance & insurance, horizontal mismatch to about 7.6% of workers in professional, scientific & technical activities, and double mismatch to 4.7% of employees in finance and insurance. These industries require relatively higher levels of skills and qualifications. More generally, lower skilled industries are located at the high end of reported prevalence of education-job mismatch, while higher skilled industries are located at the low end of reported incidence of mismatch.

Educational mismatch is less often reported by an individual if he is an urbanite, aged 25-45 years, married, has the highest level of educational attainment, has longer tenure in current job, works in firms with between 51 and 250 employees, is a wage worker, works in a full-time job, and in a higher skilled industry.

### **6.1.2 The determinants of education-job mismatches**

Binary logit regressions were run to identify the factors affecting the probability of being employed in a mismatched job. Table 4 reports the marginal effects from the logit model, estimated at the means of the explanatory variables, for the sample as a whole and separately for men and women for three types of education-job mismatch. These marginal effects are partial derivatives representing the change in the probability of being educationally mismatched to a job associated with a unit change in one of the independent variables. Table C5 in the Appendix reports the odds ratios estimated for all employees and by gender as well. Odds ratios indicate the change in the probability of being educationally mismatched relative to the probability of working in a matched job associated with each of the independent variables. The likelihood ratio (LR) tests for the joint significance of all regressors and their statistically significant p-values indicate that the full models fit better than the models with no predictors. The LR chi2 statistics show that all the models are significant at the 1% level. In terms of the prediction accuracy of the models, the models work quite well. Table 3 compares fitted outcomes with actual outcomes.

Logistic model for vertical mismatch				Logistic model for horizontal mismatch			
True				True			
Classified	D	~ D	Total	Classified	D	~D	Total
+	12096	9037	21133	+	31391	24532	55923
-	120499	789171	909670	-	147042	727838	874880
Total	132595	798208	930803	Total	178433	752370	930803

Table 3. Comparison of predicted outcomes with actual outcomes

The percentage of correctly specified values for the vertical mismatch model is about 86.08. In this case, 9037 observations are misclassified as 1, and 120499 observations are misclassified as 0. The remaining 801267 observations are correctly specified. The percentage of correctly specified values for the horizontal mismatch model is about 81.57. In this case, 24532 observations are misclassified as 1, and 147042 observations are misclassified as 0. The remaining 759229 observations are correctly specified.

To check for multicollinearity among the independent variables, we looked at the results of the variance inflation factor (VIF) test after the regression using the rule of thumb that a variable whose VIF value is greater than 10 may require attention. The VIFs for the independent regressors are much below a value of 5, except for the variables experience and its square. But, we know that they are related and they are fine as experience may have a quadratic relationship with the dependent variables. The VIFs for the rest of the variables look fine.

The marginal effects and odds ratios provide similar results on the effects of the explanatory variables on the probability of being educationally mismatched to the job. The variable gender is found to be significant in all models. The estimated marginal effect of the gender dummy variable indicates that, all else equal, relative to men, women have a lower probability of being vertically mismatched to a job by about 0.3% points, 1% point for horizontal mismatch and 0.28% points for double mismatch. Similarly, the odds ratios less than 1 imply that the odds of being overeducated or horizontally mismatched or double mismatched are lower for women compared to men. With respect to the place of residence the findings reveal that keeping everything else constant, compared to urbanites those living in rural areas are less likely to be mismatched. The only exception is for men's chance of being horizontally mismatched. The evidence reported shows differential effects of the types of marital status

on the probability of all types of educational mismatch which are found to be significant in almost all sample models except for widowed men in case of vertical and double mismatches and married women. In comparison with unmarried individuals, married individuals have the probability of vertical mismatch, horizontal mismatch and double mismatch decreased by about 0.5%, 0.7% and 0.4% points, respectively, for the total sample, and by about 0.6%, 0.64% and 0.5% points, respectively, among men. The respective estimated odds ratios also suggest that the probability of education-job mismatch among married males is less than the probability of mismatch among unmarried male individuals. But, this effect isn't significant for women. On the contrary, relative to unmarried individuals the widowed are about 1-1.8% points more likely to be vertically, horizontally and double mismatched. The effect isn't significant for widowed men with respect to vertical and double mismatches. Being divorced increases the probability of educational mismatch for both men and women, compared to being unmarried.

Particularly interesting are the impacts of the human capital variables on the probability of education-job mismatch. Relative to having primary vocational education, both holding secondary vocational degrees and having uncompleted their tertiary education increase the probability of being educationally mismatched to the job (increase in the range of about 2-7% and 3.4-10% points, respectively, depending on the type of mismatch and gender), except for women who have a lower probability of being horizontally mismatched. Similarly, the odds ratios of larger than one indicate that individuals in these education categories have greater odds of experiencing vertical and horizontal mismatches and double mismatch compared to individuals with primary vocational education, holding all other variables constant. The findings are quite mixed with respect to the effect of tertiary education. Compared to men with primary vocational education, tertiary educated men are significantly more likely to be overeducated and double mismatched, by about 2.6% and 2.3% points, respectively, while tertiary educated women, on the contrary, have lower odds of being vertically and double mismatched to their jobs, relative to women with primary vocational education, all else equal. Among all employees, and in the male and female samples, taken separately, the level of higher education including postgraduate degrees, i.e. tertiary education, has a significant negative effect on the probability of horizontal mismatch. We have additionally examined the effects of the education variable by changing its reference category to secondary vocational education. Then, compared to secondary vocational education, having tertiary education lowers the probability of all types of educational mismatch both in the whole sample and in the male and female samples. Unfinished tertiary education is found to be associated with higher odds of being mismatched, while primary

vocational education with a lower probability of all types of educational mismatch except for horizontal mismatch among women.

Experience appears to have a slight but significant positive effect on the probability of each type of education-job mismatch for all samples except for men in cases of vertical and double mismatches. The estimated marginal effects and odds ratios of 1 on experience squared, where found to be statistically significant, suggest that there is hardly any association between this variable and the binary response outcome. As shown in Table 3, another human capital variable current job tenure is a significant determinant of the probability of being educationally mismatched to a job. Job tenure is found to reduce the risk of educational mismatch. Relative to having tenure of less than 6 months in the current job, each subsequent level of longer tenure is associated with a higher decrease in the probability of being educationally mismatched (a reduction from around 1% point for the tenure category of 6-12 months to over 14% points for the category of > 5 years). Similarly, the respective odds ratios suggest that longer tenure is associated with lower odds of being vertically, horizontally and double mismatched for both men and women.

Table 4. Logit model results for determinants of education-job mismatches<sup>19</sup>

	Vertical mismatch			Horizontal mismatch			Double mismatch		
	All	Men	Women	All	Men	Women	All	Men	Women
Female	-0.00307*** (0.0007)			-0.00906*** (0.0008)			-0.00276*** (0.0007)		
Rural	-0.00891*** (0.0007)	-0.00422*** (0.0011)	-0.0126*** (0.0009)	-0.00219** (0.0008)	0.00379** (0.0013)	-0.00668*** (0.0011)	-0.00902*** (0.0007)	-0.00447*** (0.0011)	-0.0125*** (0.0009)
<i>Marital status (Ref. = unmarried)</i>									
Married	-0.00458*** (0.0009)	-0.00585*** (0.0014)	0.0000421 (0.0012)	-0.00658*** (0.0011)	-0.00642*** (0.0017)	-0.00204 (0.0014)	-0.00371*** (0.0009)	-0.00484*** (0.0013)	0.000453 (0.0011)
Widowed	0.0137*** (0.0019)	0.00705 (0.0041)	0.0118*** (0.0020)	0.0181*** (0.0024)	0.0101* (0.0049)	0.0141*** (0.0025)	0.0134*** (0.0019)	0.007 (0.0039)	0.0115*** (0.0019)
Divorced	0.00665*** (0.0014)	0.00925*** (0.0025)	0.00674*** (0.0016)	0.00627*** (0.0017)	0.00887** (0.0031)	0.00578** (0.0019)	0.00663*** (0.0013)	0.0100*** (0.0024)	0.00627*** (0.0015)
<i>Level of education (Ref. = Primary vocational)</i>									
Secondary vocational	0.0536*** (0.0010)	0.0714*** (0.0012)	0.0197*** (0.0018)	0.0344*** (0.0014)	0.0696*** (0.0017)	-0.0385*** (0.0029)	0.0519*** (0.0009)	0.0690*** (0.0011)	0.0198*** (0.0017)
Unfinished tertiary	0.0759*** (0.0029)	0.101*** (0.0044)	0.0361*** (0.0040)	0.0538*** (0.0036)	0.0899*** (0.0052)	-0.0189*** (0.0052)	0.0706*** (0.0028)	0.0931*** (0.0042)	0.0343*** (0.0039)
Tertiary	0.00269** (0.0010)	0.0256*** (0.0014)	-0.0340*** (0.0019)	-0.0562*** (0.0015)	-0.0238*** (0.0019)	-0.125*** (0.0030)	0.00201* (0.0010)	0.0234*** (0.0013)	-0.0321*** (0.0018)

<sup>19</sup> Mismatch patterns may differ among different age cohorts. This may be due to various changes in the economy, including structural changes, policy changes, cyclical changes, etc. Although this isn't the major focus of the current study, we additionally checked for the effects of belonging to different cohorts on the incidence of educational mismatches, as shown in Table C6 of the Appendix. Overall, the results suggest that respective to cohort 1 aged less than 25 years, belonging to another age cohort is associated with a positive significant effect on the probability of being educationally mismatched to a job. This can be explained by the possibility that older cohorts may find it more difficult to adapt to changing conditions than younger cohorts. Thus, it may be much easier for younger cohorts to respond to new challenges and requirements on the labor market, by acquiring new knowledge and skills under different conditions.

Experience	0.000286*	-0.00025	0.000624***	0.00103***	0.000441*	0.00125***	0.000316**	-0.000167	0.000621***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Experience^2	0.0000138***	0.0000215***	0.00000965**	0.00000219	0.00000870*	0.00000301	0.0000117***	0.0000186***	0.00000787*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
<i>Current job tenure (Ref.= &lt;6 months)</i>									
6-12 months	-0.0117***	-0.00509	-0.0166***	-0.0138***	-0.00209	-0.0239***	-0.0103***	-0.00421	-0.0148***
	(0.0026)	(0.0039)	(0.0034)	(0.0030)	(0.0045)	(0.0041)	(0.0025)	(0.0037)	(0.0033)
1-3 years	-0.0493***	-0.0469***	-0.0492***	-0.0620***	-0.0567***	-0.0649***	-0.0462***	-0.0442***	-0.0456***
	(0.0022)	(0.0033)	(0.0030)	(0.0026)	(0.0038)	(0.0036)	(0.0022)	(0.0032)	(0.0029)
3-5 years	-0.0778***	-0.0798***	-0.0722***	-0.0959***	-0.0963***	-0.0922***	-0.0740***	-0.0760***	-0.0683***
	(0.0023)	(0.0033)	(0.0030)	(0.0026)	(0.0038)	(0.0036)	(0.0022)	(0.0032)	(0.0029)
>5 years	-0.112***	-0.116***	-0.103***	-0.137***	-0.141***	-0.129***	-0.106***	-0.110***	-0.0962***
	(0.0022)	(0.0032)	(0.0029)	(0.0026)	(0.0037)	(0.0035)	(0.0021)	(0.0031)	(0.0028)
<i>Firm size (Ref.= &lt; 5 employees)</i>									
6-10 employees	-0.0332***	-0.0339***	-0.0295***	-0.0406***	-0.0443***	-0.0323***	-0.0329***	-0.0355***	-0.0278***
	(0.0015)	(0.0024)	(0.0018)	(0.0018)	(0.0029)	(0.0022)	(0.0014)	(0.0023)	(0.0017)
11-20 employees	-0.0496***	-0.0506***	-0.0452***	-0.0604***	-0.0620***	-0.0530***	-0.0463***	-0.0487***	-0.0411***
	(0.0014)	(0.0023)	(0.0018)	(0.0017)	(0.0028)	(0.0021)	(0.0014)	(0.0023)	(0.0017)
21-50 employees	-0.0598***	-0.0654***	-0.0523***	-0.0740***	-0.0805***	-0.0630***	-0.0565***	-0.0634***	-0.0481***
	(0.0014)	(0.0022)	(0.0017)	(0.0017)	(0.0027)	(0.0020)	(0.0013)	(0.0022)	(0.0016)
51-250 employees	-0.0693***	-0.0825***	-0.0540***	-0.0860***	-0.104***	-0.0637***	-0.0658***	-0.0800***	-0.0499***
	(0.0014)	(0.0022)	(0.0017)	(0.0016)	(0.0026)	(0.0020)	(0.0013)	(0.0021)	(0.0016)
251-500 employees	-0.0511***	-0.0645***	-0.0344***	-0.0671***	-0.0857***	-0.0415***	-0.0500***	-0.0646***	-0.0323***
	(0.0019)	(0.0028)	(0.0027)	(0.0022)	(0.0033)	(0.0032)	(0.0018)	(0.0027)	(0.0025)
>500 employees	-0.0724***	-0.0934***	-0.0425***	-0.0917***	-0.117***	-0.0556***	-0.0700***	-0.0917***	-0.0402***
	(0.0018)	(0.0026)	(0.0027)	(0.0021)	(0.0031)	(0.0031)	(0.0017)	(0.0025)	(0.0025)
Self-employment	-0.0118***	-0.0223***	-0.00350*	0.0259***	0.0230***	0.0267***	-0.0114***	-0.0219***	-0.00307*
	(0.0011)	(0.0016)	(0.0015)	(0.0017)	(0.0026)	(0.0022)	(0.0010)	(0.0015)	(0.0014)
Part-time employment	0.0103***	0.00714**	0.0124***	0.00688***	-0.00301	0.0128***	0.0105***	0.00676**	0.0127***
	(0.0014)	(0.0024)	(0.0017)	(0.0017)	(0.0028)	(0.0020)	(0.0014)	(0.0023)	(0.0016)

*Industry (Ref.= Agriculture, fish & forestry)*

Mining	-0.0932*** (0.0022)	-0.0720*** (0.0027)	-0.122*** (0.0044)	-0.116*** (0.0025)	-0.0978*** (0.0030)	-0.142*** (0.0049)	-0.0905*** (0.0022)	-0.0693*** (0.0026)	-0.120*** (0.0042)
Manufacturing	-0.0907*** (0.0021)	-0.0628*** (0.0026)	-0.145*** (0.0034)	-0.0867*** (0.0024)	-0.0575*** (0.0031)	-0.151*** (0.0038)	-0.0874*** (0.0020)	-0.0602*** (0.0025)	-0.140*** (0.0033)
Energy, gas & air condition.	-0.129*** (0.0023)	-0.120*** (0.0027)	-0.144*** (0.0046)	-0.145*** (0.0027)	-0.146*** (0.0032)	-0.148*** (0.0053)	-0.125*** (0.0022)	-0.116*** (0.0025)	-0.141*** (0.0044)
Water supply & sewerage	-0.0896*** (0.0033)	-0.0731*** (0.0041)	-0.127*** (0.0056)	-0.0980*** (0.0038)	-0.0835*** (0.0049)	-0.140*** (0.0062)	-0.0861*** (0.0032)	-0.0692*** (0.0040)	-0.124*** (0.0054)
Construction	-0.0832*** (0.0021)	-0.0570*** (0.0025)	-0.137*** (0.0040)	-0.0869*** (0.0024)	-0.0620*** (0.0029)	-0.146*** (0.0045)	-0.0811*** (0.0020)	-0.0559*** (0.0024)	-0.133*** (0.0039)
Trade & car/bike repairs	-0.00834*** (0.0021)	0.0119*** (0.0030)	-0.0539*** (0.0032)	0.0275*** (0.0024)	0.0413*** (0.0035)	-0.0211*** (0.0036)	-0.00865*** (0.0020)	0.00986*** (0.0029)	-0.0521*** (0.0031)
Transport & storage	-0.0876*** (0.0020)	-0.0649*** (0.0024)	-0.131*** (0.0037)	-0.101*** (0.0022)	-0.0839*** (0.0027)	-0.138*** (0.0041)	-0.0850*** (0.0019)	-0.0635*** (0.0023)	-0.126*** (0.0036)
Hotel & catering	-0.0821*** (0.0029)	-0.0436*** (0.0056)	-0.132*** (0.0037)	-0.0797*** (0.0034)	-0.0357*** (0.0067)	-0.139*** (0.0043)	-0.0808*** (0.0028)	-0.0400*** (0.0055)	-0.130*** (0.0036)
Information & communications	-0.148*** (0.0024)	-0.130*** (0.0030)	-0.186*** (0.0039)	-0.175*** (0.0028)	-0.168*** (0.0036)	-0.208*** (0.0045)	-0.142*** (0.0023)	-0.124*** (0.0029)	-0.181*** (0.0038)
Finance & insurance	-0.166*** (0.0022)	-0.136*** (0.0033)	-0.213*** (0.0034)	-0.192*** (0.0027)	-0.166*** (0.0042)	-0.239*** (0.0039)	-0.159*** (0.0022)	-0.129*** (0.0032)	-0.205*** (0.0032)
Real assets operations	-0.128*** (0.0030)	-0.0997*** (0.0043)	-0.177*** (0.0043)	-0.135*** (0.0036)	-0.114*** (0.0053)	-0.184*** (0.0051)	-0.124*** (0.0029)	-0.0972*** (0.0041)	-0.171*** (0.0041)

Professional, scientific & technical activities	-0.165*** (0.0021)	-0.143*** (0.0027)	-0.209*** (0.0033)	-0.199*** (0.0024)	-0.182*** (0.0033)	-0.244*** (0.0037)	-0.160*** (0.0020)	-0.139*** (0.0025)	-0.202*** (0.0032)
Administrative & auxiliary support	-0.0711*** (0.0027)	-0.0425*** (0.0035)	-0.126*** (0.0044)	-0.0512*** (0.0032)	-0.0156*** (0.0042)	-0.125*** (0.0050)	-0.0665*** (0.0026)	-0.0385*** (0.0034)	-0.120*** (0.0042)
Public admin, defense & social welfare	-0.158*** (0.0017)	-0.142*** (0.0021)	-0.193*** (0.0030)	-0.185*** (0.0019)	-0.176*** (0.0024)	-0.222*** (0.0032)	-0.152*** (0.0017)	-0.136*** (0.0020)	-0.187*** (0.0029)
Education	-0.156*** (0.0017)	-0.111*** (0.0023)	-0.204*** (0.0028)	-0.188*** (0.0018)	-0.139*** (0.0027)	-0.240*** (0.0030)	-0.149*** (0.0016)	-0.106*** (0.0022)	-0.197*** (0.0027)
Healthcare & social services	-0.157*** (0.0018)	-0.117*** (0.0028)	-0.206*** (0.0028)	-0.196*** (0.0020)	-0.147*** (0.0033)	-0.248*** (0.0030)	-0.152*** (0.0017)	-0.113*** (0.0027)	-0.199*** (0.0027)
Art, entertainment & recreation	-0.117*** (0.0026)	-0.0820*** (0.0040)	-0.167*** (0.0037)	-0.125*** (0.0030)	-0.0916*** (0.0048)	-0.179*** (0.0042)	-0.112*** (0.0025)	-0.0792*** (0.0038)	-0.161*** (0.0036)
Other services	-0.102*** (0.0025)	-0.0814*** (0.0035)	-0.145*** (0.0037)	-0.116*** (0.0029)	-0.0929*** (0.0043)	-0.168*** (0.0041)	-0.0985*** (0.0024)	-0.0795*** (0.0034)	-0.140*** (0.0036)
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	930803	459796	471007	930803	459796	471007	930803	459796	471007

*Note: For the dummy variables, the marginal effects are estimated as the differences in probabilities when the binary indicator changes from 0 to 1. Robust standard errors in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$*

The probability of being educationally mismatched appears to be strongly influenced by employment characteristics. Firm size and employment status have statistically significant effects on the probability of being overeducated, horizontally mismatched and double mismatched for the whole samples and across both genders except for horizontal mismatch among part-time male workers. The results show that compared to a firm with less than 5 employees working for a larger firm lowers the probability of being vertically, horizontally and double mismatched to one's job. The marginal effects of the firm size suggest that this effect is largest for being employed in firms with 51-250 and over 500 employees, with the probability of mismatch reduced by about 12% points at most. The results presented in Table 4 indicate that mismatch probabilities do vary by employment status and job type. All else equal, relative to a wage worker, a self-employed worker is significantly more likely to be horizontally mismatched to his/her job, but have a lower probability of being overeducated or double mismatched. The part-time status of the job increases the probability of educational mismatch, except for horizontal mismatch among male workers. Thus, on the whole, part-time employment appears to increase the risk of overeducation, horizontal and double mismatches, but self-employment increases the probability of only horizontal mismatch.

Since education-job mismatch implies underutilization of knowledge and skills of an individual, mismatch is supposed to be more associated with lower skill industries, as found in Green & McIntosh (2007). The industry of employment appears to have a significant effect on the mismatch probability. The estimations provide expected results on the effects of different industries on the probability of being educationally mismatched to the job. Working in the agriculture, fish & forestry sector is associated with a higher probability of being vertically overeducated, or horizontally or double mismatched across both genders compared to employment in the other sectors except for trade & car/bike repairs, holding all other variables constant. Almost all other industries of employment have values of odds ratios less than one, presenting lower odds of being educationally mismatched in those industries compared to the reference industry of agriculture. Relative to agriculture, fish & forestry, men working in the trade & car/bike repairs sector reported a higher likelihood of working in a mismatched job. In comparison with agriculture, fish & forestry, the probability of experiencing vertical mismatch in finance & insurance, professional, scientific & technical activities and information & communications decreases at most by about 21% points in the former two sectors and by about 18.6% points in the latter, the probability of being horizontally mismatched is reduced by about 23.9%, 24.4%, and 20.8% points, respectively, and the probability of double mismatch by about 20.5%, 20.2% and 18.1% points, respectively, among women. The evidence also suggests a reduction of about

12-18% points in the probability of any type of educational mismatch among men in these industries of employment relative to working in agriculture, fish & forestry. These industry-related differences are consistent with the data on the prevalence of educational mismatches across industries.

More generally, with a few exceptions, notably with respect to the effects of education level the results are consistent across both genders. All socio-demographic, human capital and employment factors are found to be important determinants of the probability of being educationally mismatched to the job. At the same time, the estimated marginal effects indicate that human capital and employment characteristics appear to have much more impact on the probability of educational mismatch than individuals' socio-demographic characteristics.

We have also run cross-sectional logit regressions for each year using the full sample data, the outputs of which are commented here in general terms to save space. The estimations provide results similar to those found from the pooled logit regressions with only a few differences. So, overall, the findings from the pooled logit regressions remain quite robust when separate yearly logit regressions are estimated as a robustness check. Again, the magnitudes of the estimated marginal effects suggest that human capital and employment characteristics appear to have more impact on the probability of educational mismatch than individuals' socio-demographic characteristics.

### **6.1.3 The income effects of education-job mismatch**

The effects of different types of education-job mismatch on individual earnings are modeled using both the OLS method and ordered probit models. The estimations provide robust results across the two methods. Table 5 reports results of the pooled OLS regressions, with  $\ln(\text{income})$  as the dependent variable for the years 2014-2018. The marginal effects of explanatory variables on income from the ordered probit models are presented in Table 6. We estimated nested specifications to observe changes in the magnitude and significance of the coefficients on the mismatch variables with new controls added sequentially, and thus, assess the explanatory power of independent variables in accounting for the variation in individual earnings. We focus on the effects of the mismatch variables, and with the estimation results largely consistent with those from the existing empirical literature, additionally highlighting some findings worth noting regarding the independent variables.

The baseline specification (Column 1 of Table 5) presents the OLS estimates for the three categories of educationally mismatched workers - vertically mismatched only, horizontally mismatched only, and both vertically and horizontally mismatched (double mismatched), with the reference group of both vertically and horizontally matched individuals (full match). All three types of education-job

mismatch have statistically significant negative coefficients. Ceteris paribus, relative to the well-matched case, being only vertically mismatched and only horizontally mismatched have negative effects on income of about 12% and 17%, respectively. However, when a worker is in a job which is neither in his field of study and nor of his qualification level, all things being equal, the income loss increases up to about 30%.

	(1)	(2)	(3)	(4)	(5)	(6)
Vertical mismatch only	-0.12*** (-22.63)	-0.10*** (-19.81)	-0.10*** (-20.68)	-0.083*** (-18.67)	-0.083*** (-19.69)	-0.074*** (-17.85)
Horizontal mismatch only	-0.17*** (-92.81)	-0.12*** (-67.10)	-0.12*** (-69.51)	-0.093*** (-56.95)	-0.085*** (-52.85)	-0.079*** (-49.80)
Double mismatch	-0.30*** (-273.49)	-0.25*** (-227.92)	-0.25*** (-225.72)	-0.19*** (-186.72)	-0.16*** (-141.98)	-0.14*** (-117.80)
<i>Level of education (Ref.=Primary vocational)</i>						
Secondary vocational		0.067*** (47.49)	0.086*** (61.39)	0.072*** (53.26)	0.063*** (48.53)	0.059*** (46.56)
Unfinished tertiary		0.16*** (42.85)	0.18*** (50.20)	0.11*** (33.54)	0.11*** (34.49)	0.10*** (32.50)
Tertiary		0.24*** (145.45)	0.27*** (163.11)	0.21*** (134.86)	0.22*** (143.13)	0.22*** (142.67)
Experience		0.0056*** (34.35)	0.0058*** (33.48)	0.0053*** (34.07)	0.0042*** (27.55)	0.0036*** (24.27)
Experience <sup>2</sup>		-0.00012*** (-34.32)	-0.00012*** (-34.92)	-0.00010*** (-31.96)	-0.000068*** (-21.59)	-0.000055*** (-17.57)
<i>Current job tenure (Ref.= &lt;6 months)</i>						
6-12 months		0.047*** (18.73)	0.050*** (20.09)	0.049*** (21.21)	0.036*** (16.08)	0.031*** (14.16)
1-3 years		0.099*** (44.50)	0.098*** (44.72)	0.099*** (47.87)	0.082*** (41.06)	0.075*** (37.76)
3-5 years		0.15*** (62.36)	0.14*** (60.34)	0.14*** (63.94)	0.12*** (57.41)	0.11*** (54.70)
>5 years		0.16*** (71.43)	0.15*** (69.84)	0.16*** (78.22)	0.15*** (74.28)	0.14*** (71.98)

Female			-0.15*** (-150.75)	-0.14*** (-159.43)	-0.11*** (-124.63)	-0.11*** (-117.73)
<i>Marital status (Ref. = unmarried)</i>						
Married			0.011*** (7.46)	0.0092*** (7.14)	0.015*** (11.93)	0.016*** (13.18)
Widowed			0.041*** (15.58)	0.024*** (9.93)	0.026*** (11.21)	0.028*** (12.10)
Divorced			0.060*** (27.32)	0.035*** (17.71)	0.030*** (15.81)	0.031*** (16.33)
Rural				-0.16*** (-161.79)	-0.10*** (-98.05)	-0.099*** (-97.17)
Region				Yes	Yes Yes	Yes Yes
Industry						
Self-employment						Yes
Part-time employment						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Constant	11.1*** (12197.2)	10.8*** (3834.25)	10.8*** (3856.67)	10.9*** (3493.00)	10.8*** (3377.35)	10.8*** (3365.85)
<i>N</i>	595480	595480	595480	595361	595361	595361
<i>R</i> <sup>2</sup>	0.13	0.18	0.22	0.35	0.40	0.41

Table 5: Income effects of education-job mismatches<sup>20</sup>

Note: The dependent variable in columns is income; *t* statistics in parentheses; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

When controlling for human capital characteristics (education, work experience and job tenure), the effect of mismatch on earnings somewhat decreases, but the coefficients on each type of education-job mismatch remain statistically significant. Relative to well-matched employees, for those being vertically mismatched only, earnings losses are estimated to be about 10% and for workers who are horizontally mismatched only the penalty is found to be 12%. The income penalty is stronger for double mismatched employees who earn up to 25% less than similarly educated but well-matched employees. We can assume that some of the difference in the earnings between matched and mismatched workers is explained by human capital characteristics of individuals. This specification slightly improves the model fit, resulting in the adjusted  $R^2$  of 0.18.

<sup>20</sup> The OLS regressions are estimated with heteroskedasticity-robust standard errors.

The results reveal statistically significant positive effects from an increase in human capital of an individual. We observe quite large differences in earnings returns between different educational levels. The higher levels of educational attainment show expected positive effects on income relative to the reference group of primary vocational education. Secondary vocational education is associated with an income increase of about 6.7%, attaining university education including postgraduate degrees yields an income rise of 24%, while income gains of about 16% accrue to those having unfinished higher education. Work experience has an anticipated non-linear impact on individual earnings. As for another human capital variable, current job tenure, we find a consistent increase in income as current job tenure increases compared to having tenure of less than 6 months.

When we add socio-demographic characteristics, namely gender and marital status in Column 3, the magnitude of the coefficients on the mismatch variables doesn't change. Consistent with the findings of many studies the results indicate a significant gender gap in income. Female workers are likely to earn about 15% less than their male counterparts. Once we also control for location of residence and regional effects in specification 4, the impact of mismatch on individual earnings decreases. The coefficients for being vertically mismatched only, horizontally mismatched only and both vertically and horizontally mismatched fall to 8.3%, 9.3% and 19%, respectively. Next, when we add the controls for industry characteristics in specification 5, the earnings effects of mere horizontal mismatch and double mismatch slightly diminish to 8.5% and 16%, respectively. These findings imply that, human capital characteristics, place of residence, regional and industry effects explain some of the differences in earnings between matched and mismatched workers, and the effects are statistically significant. The model fit improves significantly as we add new controls, resulting in the adjusted  $R^2$  of 0.40 in the much richer specification of the earnings equation in Column 5. And, finally, when we additionally control for self-employment status as well as full-time versus part-time job status, the effects of education-job mismatches decrease to 7.4% for mere vertical mismatch, 7.9% for horizontal mismatch, and 13.6% for double mismatch.

The ordered probit models using income as a categorical variable yield qualitatively similar estimates of the effects of education-job mismatches in individual earnings. Table 6 shows the change in the probability of having a particular level of income for an infinitesimal change in the continuous explanatory variable, and for a one-unit change in the case of a discrete variable, while holding all other variables at their means. A positive value of the marginal effect implies that an increase in the magnitude of the regressor increases the probability that income will be of a specific category. Marginal effects of the independent variable must sum to zero and, therefore, the reduced probability of

earning low income equals the sum of increased probabilities of earning middle-sized income and high income, and vice versa.

According to Column 1, the probability of having a particular level of income is significantly influenced by education-job mismatch. The effect of education-job mismatch is measured relative to the matched case. Controlling for other independent variables, the presence of vertical mismatch only is associated with about 12% higher probability of earning low income and with about a 6.5% and 5.3% lower probability of earning middle-sized income and high income, respectively. The same patterns are observed for horizontal mismatch only and double mismatch. As seen, horizontally mismatched individuals are 18.3% more likely to fall in the low income group, 10.8% less likely to have middle-sized income, and 7.5% less likely to earn high income. Double mismatched individuals are associated with a higher chance of earning low income ( $P = 0.322$ ) than mere vertically or mere horizontally mismatched individuals. Double mismatched individuals are also associated with a lower chance of earning middle-sized income ( $P = -0.214$ ) or high income ( $P = -0.108$ ) and than mere vertically or mere horizontally mismatched individuals. This points to greater negative effects of double mismatch on individual earnings, as suggested by the OLS findings as well.

When additional controls added, the earnings effects of educational mismatch remain highly statistically significant, albeit somewhat decrease. As shown in Column 6 of Table 6, only vertically mismatched individuals have about a 9.2% increase in the probability of earning low income, 7.2% lower probability of having middle-sized income, and about 2% lower probability of earning high income, relative to well-matched workers. Only horizontally mismatched individuals are 11.2% more likely to be in the low income category, and 8.9% and 2.4% less likely to be in the middle income and high income groups, respectively. The income penalty appears to be larger for double mismatched employees. The probability of earning low income increases by 19.6%, whereas the probability of earning middle-sized income and high income is reduced by about 16.1 and 3.5%, respectively.

	1	2	3	4	5	6
<i>Vertical mismatch only</i>						
Low income	0.119*** (0.0063)	0.101*** (0.0064)	0.107*** (0.0064)	0.0928*** (0.0065)	0.0996*** (0.0066)	0.0918*** (0.0066)
Middle income	- 0.0652*** (0.0040)	- -0.0607*** (0.0042)	- -0.0665*** (0.0044)	- -0.0670*** (0.0050)	- -0.0767*** (0.0053)	- -0.0717*** (0.0054)
High income	- 0.0534*** (0.0024)	- -0.0404*** (0.0022)	- -0.0402*** (0.0020)	- -0.0259*** (0.0015)	- -0.0230*** (0.0012)	- -0.0201*** (0.0012)

*Horizontal mismatch only*

Low income	0.183*** (0.0022)	0.132*** (0.0023)	0.138*** (0.0023)	0.119*** (0.0024)	0.115*** (0.0025)	0.112*** (0.0025)
Middle income	-0.108*** (0.0015)	-0.0815*** (0.0016)	-0.0885*** (0.0016)	-0.0875*** (0.0019)	-0.0893*** (0.0020)	-0.0889*** (0.0021)
High income	- 0.0750*** (0.0008)	-0.0501*** (0.0008)	-0.0494*** (0.0007)	-0.0316*** (0.0006)	-0.0257*** (0.0005)	-0.0236*** (0.0005)

*Double mismatch*

Low income	0.322*** (0.0013)	0.281*** (0.0014)	0.281*** (0.0014)	0.247*** (0.0016)	0.219*** (0.0017)	0.196*** (0.0018)
Middle income	-0.214*** (0.0011)	-0.196*** (0.0011)	-0.200*** (0.0012)	-0.194*** (0.0013)	-0.179*** (0.0015)	-0.161*** (0.0015)
High income	-0.108*** (0.0005)	-0.0850*** (0.0005)	-0.0804*** (0.0005)	-0.0522*** (0.0004)	-0.0403*** (0.0004)	-0.0351*** (0.0003)

*Level of education (Ref.=Primary vocational)**Secondary vocational*

Low income		-0.0796*** (0.0020)	-0.102*** (0.0020)	-0.0941*** (0.0021)	-0.0880*** (0.0021)	-0.0846*** (0.0021)
Middle income		0.0608*** (0.0016)	0.0808*** (0.0016)	0.0795*** (0.0018)	0.0769*** (0.0019)	0.0743*** (0.0019)
High income		0.0189*** (0.0004)	0.0215*** (0.0004)	0.0146*** (0.0003)	0.0111*** (0.0002)	0.0103*** (0.0002)

*Unfinished tertiary*

Low income		-0.203*** (0.0047)	-0.238*** (0.0048)	-0.164*** (0.0050)	-0.175*** (0.0051)	-0.169*** (0.0051)
Middle income		0.142*** (0.0030)	0.173*** (0.0030)	0.134*** (0.0039)	0.148*** (0.0041)	0.143*** (0.0041)
High income		0.0608*** (0.0018)	0.0657*** (0.0018)	0.0298*** (0.0012)	0.0273*** (0.0011)	0.0252*** (0.0010)

*Tertiary*

Low income		-0.281*** (0.0021)	-0.322*** (0.0021)	-0.288*** (0.0023)	-0.315*** (0.0024)	-0.312*** (0.0024)
Middle income		0.183***	0.217***	0.218***	0.246***	0.245***

	(0.0016)	(0.0016)	(0.0019)	(0.0020)	(0.0020)
High income	0.0977***	0.105***	0.0695***	0.0689***	0.0663***
	(0.0007)	(0.0007)	(0.0006)	(0.0006)	(0.0005)
<i>Experience</i>					
Low income	-0.00683***	-0.00720***	-0.00767***	-0.00628***	-0.00548***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Middle income	0.00454***	0.00492***	0.00587***	0.00501***	0.00441***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
High income	0.00228***	0.00228***	0.00180***	0.00127***	0.00107***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)
<i>Experience^2</i>					
Low income	0.000150***	0.000159***	0.000156***	0.000109***	0.0000895***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Middle income	-0.000100***	-0.000109***	-0.00012***	-0.00009***	-0.000072***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
High income	-0.0000503***	-0.0000504***	-0.000036***	0.0000221***	-0.0000175***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
<i>Current job tenure (Ref.= &lt;6 months)</i>					
<i>6-12 months</i>					
Low income	-0.0433***	-0.0477***	-0.0477***	-0.0333***	-0.0283***
	(0.0037)	(0.0037)	(0.0039)	(0.0040)	(0.0040)
Middle income	0.0339***	0.0379***	0.0414***	0.0295***	0.0252***
	(0.0029)	(0.0030)	(0.0034)	(0.0035)	(0.0036)
High income	0.00944***	0.00986***	0.00635***	0.00379***	0.00313***
	(0.0008)	(0.0008)	(0.0005)	(0.0004)	(0.0004)
<i>1-3 years</i>					
Low income	-0.104***	-0.105***	-0.114***	-0.0972***	-0.0903***
	(0.0032)	(0.0033)	(0.0034)	(0.0035)	(0.0035)
Middle income	0.0788***	0.0810***	0.0965***	0.0843***	0.0787***
	(0.0026)	(0.0026)	(0.0029)	(0.0031)	(0.0032)
High income	0.0255***	0.0243***	0.0177***	0.0129***	0.0116***
	(0.0007)	(0.0007)	(0.0005)	(0.0004)	(0.0004)
<i>3-5 years</i>					
Low	-0.166***	-0.161***	-0.177***	-0.160***	-0.154***

income	(0.0033)	(0.0034)	(0.0035)	(0.0036)	(0.0036)
Middle income	0.120*** (0.0026)	0.120*** (0.0027)	0.145*** (0.0030)	0.136*** (0.0032)	0.131*** (0.0032)
High income	0.0456*** (0.0008)	0.0416*** (0.0008)	0.0315*** (0.0005)	0.0246*** (0.0005)	0.0230*** (0.0005)
<i>&gt;5 years</i>					
Low income	-0.184*** (0.0032)	-0.182*** (0.0032)	-0.212*** (0.0033)	-0.203*** (0.0034)	-0.198*** (0.0035)
Middle income	0.132*** (0.0025)	0.133*** (0.0026)	0.171*** (0.0029)	0.169*** (0.0031)	0.166*** (0.0031)
High income	0.0525*** (0.0007)	0.0488*** (0.0007)	0.0408*** (0.0005)	0.0346*** (0.0005)	0.0329*** (0.0004)
<i>Female</i>					
Low income		0.179*** (0.0013)	0.193*** (0.0013)	0.162*** (0.0014)	0.156*** (0.0014)
Middle income		-0.121*** (0.0009)	-0.146*** (0.0010)	-0.129*** (0.0011)	-0.124*** (0.0012)
High income		-0.0582*** (0.0005)	-0.0469*** (0.0004)	-0.0337*** (0.0003)	-0.0312*** (0.0003)
<i>Marital status (Ref. = unmarried)</i>					
<i>Married</i>					
Low income		-0.0124*** (0.0019)	-0.0112*** (0.0019)	-0.0189*** (0.0020)	-0.0206*** (0.0020)
Middle income		0.00864*** (0.0013)	0.00867*** (0.0015)	0.0152*** (0.0016)	0.0167*** (0.0016)
High income		0.00380*** (0.0006)	0.00256*** (0.0004)	0.00370*** (0.0004)	0.00388*** (0.0004)
<i>Widowed</i>					
Low income		-0.0404*** (0.0037)	-0.0223*** (0.0038)	-0.0265*** (0.0039)	-0.0289*** (0.0039)
Middle income		0.0274*** (0.0025)	0.0171*** (0.0029)	0.0212*** (0.0031)	0.0234*** (0.0031)

High income			0.0130*** (0.0012)	0.00519*** (0.0009)	0.00526*** (0.0008)	0.00554*** (0.0008)
<i>Divorced</i>						
Low income			-0.0744*** (0.0029)	-0.0455*** (0.0030)	-0.0412*** (0.0030)	-0.0423*** (0.0030)
Middle income			0.0490*** (0.0019)	0.0344*** (0.0022)	0.0328*** (0.0024)	0.0339*** (0.0024)
High income			0.0254*** (0.0010)	0.0111*** (0.0008)	0.00845*** (0.0006)	0.00833*** (0.0006)
<i>Rural</i>						
Low income				0.209*** (0.0014)	0.138*** (0.0015)	0.138*** (0.0015)
Middle income				-0.153*** (0.0010)	-0.107*** (0.0012)	-0.108*** (0.0012)
High income				-0.0565*** (0.0005)	-0.0304*** (0.0004)	-0.0295*** (0.0004)
Region				Yes	Yes	Yes
Industry					Yes	Yes
Self-employment						Yes
Part-time employment						Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	595480	595480	595480	595361	595361	595361

Table 6. Marginal effects from income level ordered probit models

Note: Robust standard errors are in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Other explanatory variables are all statistically significant. The behaviour of these independent variables is as expected and confirms the previous OLS results. Relative to primary vocational education, each subsequent higher level of education is associated with a lower probability that the respondent would have low income, and a higher probability that the respondent would earn middle-sized or high income. As such, relative to the reference group, tertiary educated individuals are associated with a much lower probability of earning low income ( $P = -0.312$ ) and a higher probability of earning middle level or high income ( $P = 0.245$  and  $0.066$ , respectively) than individuals with secondary vocational education ( $P = -0.085$ ,  $P = 0.074$  and  $P = 0.010$ , respectively for low, middle level and high income). The marginal effects in Table 6 show that experience has an expected quadratic

relationship with earnings. Relative to the reference case of job tenure of less than 6 months, an increase in current job tenure significantly decreases the likelihood for individuals to have low income and increases the likelihood of earning middle level or high income. And, these effects become larger with an increased level of job tenure.

The findings with respect to the gender and location dummy variables are similar to the OLS results. Women are found to be about 15.6% more likely to have low income, while the probability for them to have middle level or high income decreases by 12.4 and 3.1%, respectively, compared to men. Living in a rural area is associated with an increase in the probability of earning low income by 13.8%, and a decrease of about 10.8 and 3% in the probability of earning middle-sized income and high income, respectively, relative to urban dwellers. Relative to unmarried individuals, being married, or widowed or divorced are all associated with lower probabilities that the respondent would report his or her income as low and higher probabilities that the respondent would report a middle level or high level of income. Overall, the ordered probit results are consistent with the OLS findings and importantly confirm the earnings penalty associated with education-job mismatches.

The estimation results of our study may be biased due to unobserved heterogeneity such that the probability of being mismatched may be correlated with individual ability and mismatched individuals may earn lower wages due to lower ability. Therefore, to check the robustness of the obtained results, the paper estimates the income effects of education-job mismatch attempting to control for unobserved individual characteristics. Unfortunately, the LFS doesn't contain data on tests of individual ability or any other proxy indicators for it. Following McGuinness and Bennett (2007) we adopt the hypothesis that an individual's relative level of ability will be approximately reflected by his place within the income distribution which implies that higher ability individuals will have elevated positions. We split the sample at the median level of income and estimate the model separately for the upper and lower halves (Columns 2-3 Table C7 of the Appendix). The findings show lower income losses for all types of mismatch compared to the baseline specification (Column 1 Table C7). However, the effects of education-job mismatches remain negative and statistically significant. Furthermore, the earnings penalty for being both vertically and horizontally mismatched is much larger in the upper half of the income distribution amounting to around 8.2% vis a vis 3% than in the lower half. These results imply that double mismatched workers in the higher ability segment of the income distribution experience greater income disadvantages relative to their well-matched counterparts. To the extent that the mismatch earnings effects are present and even greater in the upper half of the income distribution (in particular, for double mismatch), the findings suggest that it is incorrect to restrict vertical and

horizontal mismatches exclusively to lower ability/skill workers. Presumably, regardless of individual ability, educationally mismatched workers earn less than their matched counterparts and lower earnings don't necessarily reflect lower ability. It should be noted here that future research could address the role of unobserved individual heterogeneity by employing more direct indicators for ability.

To sum up, in all cases of education-job mismatch there is a significant negative effect on earnings from being in a non-matching job. Vertical and horizontal mismatches appear to impose productivity constraints preventing workers from earning an income equal to their marginal product.

As a robustness check we have also run cross-sectional yearly wage regressions for the full OLS specification. The effects of education-job mismatches are provided in Table C8 of the Appendix. The yearly results also show negative effects of educational mismatches on individual earnings. The estimations provide evidence for wage penalty being largest for double mismatched workers ranging from about 10 to 14% in the yearly regressions. The statistically significant negative effects of being only horizontally mismatched varies from about 4.2 to 9.7% in the yearly OLS specifications. The statistically significant negative effects of about the same size are obtained for being only vertically mismatched in 2014-2016 as well. The effects of mere vertical mismatch are found to be not statistically significant for 2017 and 2018, although still remaining negative. The F-test results for the joint significance of the coefficients on the educational mismatch variables show that all the mismatch coefficients are jointly statistically significant in all the OLS regression models.

## **6.2 Qualitative Research Results**

This section presents the findings of the qualitative inquiry laid out across themes and major categories that emerged from the focus group discussions. The sub-section "Determining factors" comprises several major themes with categories analyzed below each theme.

### *Importance of education-to-job matching*

There is substantial quantitative evidence in the economics literature suggesting the importance of education-job match for both individuals and the economy as a whole. More generally, most of the focus group participants who spoke up on the significance of education-job match noted the importance of educational match. In particular, several education experts expressed their belief in the importance of educational match, in particular of the match between what's taught and job requirements and highlighted that it should be pursued. Reflective of this strand of opinion were also the views of some representatives of HR and tertiary education organizations. Some focus group respondents provided

good examples from their professional lives. Many highlighted the topicality and benefits of studying the issue for calling attention and raising awareness as well as framing recommendations to guide the relevant policy-making areas. Some university instructors and labor market experts demonstrated a more analytic stance on the issue about the importance of the match between education and work, analyzing it from different perspectives, as can be seen from the selected quotes in Table 7.

Table 7. Selected quotes about the importance of education-to-job matching

Important	<p>“Perhaps, this is very important. In my opinion, this is what we should strive for.”</p> <p>“The match between what’s taught and job requirements is important. This is very important.”</p> <p>“This (education-job match) is very important because any university graduate, no matter in what specialty trained, is expected to have certain skills, especially considering the field in which he plans to work.”</p> <p>“I think that the match between job and education is important, particularly taking into account that the workable period in our life is still not so long. ... It would be simply a pity to lose this time.”</p>
Different rationales for the importance and less importance	<p>“Well, of course, based on the grounds of income, from the viewpoint of the availability of qualified personnel, then, of course, the match between education and subsequent employment is important. But, nevertheless, today, for example, in today's world, it is quite normal to have, to change professions, I would even say, throughout lifetime. This is already considered normal. Before it used to be that I graduated from a university, I went to work and I work in one specialty all my life. If I change, then I lose my qualifications. Now this is quite normal, it is a very fast changing world ... .”</p> <p>“On the one hand, this (education-job match) may be important, but on the other hand, under the realities of our market, actually, it becomes less important for a number of reasons. Firstly, how to say this, there is some</p>

	<p>kind of historical or cultural feature of ours remaining, that higher education is a kind of an end in itself. If we look at many school graduates who go to university, in the end by and large, they may even understand themselves that they are not going then to end up working in their chosen specialty. Moreover, a number of job positions, for which they then apply and plan to apply, in fact, as such, don't require higher education.”</p> <p>“In general, it is important to work in your specialty. But we must understand that this refers to very narrow areas, specialties, where “hard” knowledge is needed, (such as) IT, medicine, finances, something narrow, well, something in the environment, where soft skills are not needed. I would like to emphasize soft skills. ... I wanted to point this out, once again I will sum up, it is not necessary to work in your specialty. I am now advocating for having them (soft skills) among my students, especially the Management program students.”</p>
Not principally important	<p>“ ... one can observe a huge number of cases when people do not work in their specialty, or when the work in itself does not imply any kind of professional training.”</p> <p>“I think it (educational match) is not indispensable. Currently, there are a lot of professions, specialties, professions in the labor market, for which just competencies that a person owns are important. Let's take, for example, a sales representative. Competencies such as communication skills, the ability to persuade, and maybe some others of internal nature, language competency, for example, are very important for him, in the case of Kazakhstan, competency in Kazakh and Russian.”</p> <p>“This is, of course, the ideal case when a person works in his specialty, but one may encounter different life circumstances and, of course, sometimes it happens that a person is brought into the area where he finds himself, and given that he may be successful there too.”</p>

*Existing studies show that education-job match is particularly important for graduates from fields of study that train for more occupation-specific skills (Robst, 2007a; Nordin et al., 2010; Reis, 2018). They provide evidence for greater wage losses associated with being in jobs unrelated to one's field of study for those who have acquired narrower, less-transferable skills than general ones.* On a similar note, one focus group participant highlighted that the match between specialty and job was mainly important for graduates who acquired occupation-specific knowledge and skills and recommended that graduates from programs providing more general skills should sophisticate their soft skills.

More generally, on the more negative side, some respondents suggested that education-job match is not principally important under current environments and conditions. Specifically, some education and employment experts mentioned the presence of cases, in which people don't work in their specialty, or when what is important for the job is particular competencies. When the importance of educational match discussed, several labor market experts and economists highlighted the role of skills, life-long learning and the increasingly changing labor environment. Notably, one employer representative rightfully pointed out the impacts of different life factors on one's career, while some labor market experts stressed the role of human factors, such as changes in individual preferences and wishes, the search for self-realization, and the need for more attention to be paid to life-long learning.

Altogether, the focus group discussions revealed in-depth and somehow nuanced perceptions and perspectives of the focus group participants on the importance of education-job match. In general, most of the experts who expressed their opinions about the significance of education-job match noted that educational match is important. Some focus group participants emphasized the role of particular competencies, soft skills, and life-long learning for individual labor market outcomes in the changing labor market setting.

#### *Implications of education-job mismatches*

The focus group discussions revealed several adverse implications of education-job mismatches. In this light, several focus group participants showed quite deep understandings of the nature of the phenomenon of educational mismatches. A university instructor noted that the better the skill, the better education-job match, the more productive the worker's. It was rightfully suggested that if a person

continued to study further according to their obtained specialty, improving their skills during additional training and courses, acquiring a master's and doctoral degrees, i.e. if a person pursued the same direction all the time and further went to work in the same field, having the highest qualifications, his income would be relatively higher.

As noted in the literature review, educational mismatches may be related to substantial costs to individuals, businesses and the state. Some representatives of the labor market policy-making and employment experts emphasized additional retraining costs for the government as well as individuals. Several discussants highlighted associated extra costs for the public budget. As such, a representative from the labor-market policy-making domain noted a great deal of money spent on education coming from both the state budget and parents' purses. As revealed, another implication of educational mismatch is related to an inefficient use of individual time. In this regard, based on her job experience an HR agency representative noted her observations about people's loss of their time, and, accordingly, money, arising from education-job mismatch.

Table 8. Selected quotes about the implications of education-job mismatches

Income and productivity effects	“... people who, let's say, studied for a certain specialty, who continued studying thereafter, improving their skills at various additional, let's say, training, courses, obtaining a master's degree, a doctoral degree, and the like, so if a person proceeded all this time in one area and further went to work in the same field, then naturally, he would have a degree, he would possess the highest qualification and, accordingly, his income would be higher.”
Additional costs	“Having acquired tertiary education and not being able to apply it, a person has to retrain at work and one is lucky if the organization spends on training.”  “The state is trying to regulate (the situation) with the levers that are available today. The state is spending a lot of money on this, there are programs, if we take the Enbek program, retraining or remedying the flaws of our society and keeping our state to float around, in order to

	<p>reduce the unemployment rate, to reorient people. It's budget money. And now this training is free for many. Higher educated persons go and retrain.”</p> <p>“Part of the students who enter our universities in principle should not be there initially. Perhaps they do not need this, this is extra costs for the education system as such and something like what we call college would be preferable (for them), with some kind of learning activity which is possibly shorter, something more applied is obtained rather than broader knowledge which is taught at university.”</p>
Public distrust	<p>“If we talk about the consequences, one of the consequences is distrust of the education system as a whole, given that individuals acquire education and do not find themselves in their specialty or do not find a job that matches the education they acquired.”</p>

Education-job mismatches may also be associated with citizens' distrust in the quality of public service delivery. It was least frequently mentioned but rightly highlighted during the discussions. This adverse implication of education-job mismatches, to the best of our knowledge, not yet discussed in the educational mismatch literature, was mentioned by an economist and in our opinion deserves getting on the research agenda within the educational mismatch topic. Finally, another implication of educational mismatches is emigration of highly qualified specialists, as mentioned by an education expert.

Overall, it should be noted that the focus group participants demonstrated quite a broad understanding of the consequences of educational mismatches. They noted such implications of mismatches as labor productivity effects, additional costs to the government, employers and individuals, time loss for individuals as well as damage to general public trust in the government.

### *Determining factors*

While analyzing the focus group participants' reported opinions about the factors that may cause education-job mismatches, several themes and a number of categories have emerged. The further

analysis enables to cluster the categories under the following major themes: Constrained career choices; Labor demand-supply gaps; Flaws in the education system; Lack of career guidance; Inflated job expectations; Unsatisfying employment conditions; Unfavourable macroeconomic setting.

*Constrained career choices*

The following categories of factors are identified as contributing to constrained career choices: parental and/or other people's values or influence, students' low awareness of their future professions, societal values, attitudes and perceptions (mentality), the availability of educational grants, and passing scores.

Wrong career choices by students are a concern that was highlighted in most of the focus groups. In the opinion of many experts, young people often make not fully conscious choices of their future professions under the influence of other people, mainly their parents and others. As noted by an education expert, when choosing a future profession, students tend to follow the path of one of their parents, while by the time of university entrance, those who haven't decided on their future career, have this choice imposed on them and, as a result, by the end of the training they realize that they don't want to be in professions for which they have studied. Similarly, in the opinion of an HR agency representative, career choice often occurs on the advice or under the influence of parents or on the recommendation of somebody else and a person may unconsciously make a decision at a young age. According to an HR representative, many school students choose professions recommended or insisted on by their parents, or even it is parents themselves who make career decisions for their children. A university instructor also related the mismatch problem to applicants initially choosing wrong professions, that they might not like, or making decisions based on some arguments suggested by their parents, or on friends' advice, instead of following some kind of analytical decision. This may allegedly lead to the situation when having already completed a few years of studies at the university a person may realize that he might not be interested in his field of study at all.

Many focus group participants including representatives of both education and employment sectors emphasized a low level of awareness among students of what work would be involved in their chosen career fields. A representative of the labor market policy-making domain provided an example of young people studying in the 4th year at a university who had poor knowledge about what they were

training for and suggested that, on graduation such persons wouldn't like their profession, and accordingly, would simply go to work in a different field. As noted by a college representative, many young people oftentimes have a low awareness of their future profession, choosing among educational institutions according to some external features such as prestige, the availability of government funding and scholarship.

Table 9. Selected quotes on constrained career choices

<p><i>Constrained career choices</i> <i>Parental and/or other people's values or influence</i></p>	<p>“They (school children) don't know what they want to become. Those who have decided choose the profession of one of their parents. If either the mother or father is a teacher, they choose the teaching career. They are inclined towards social professions. And therefore, by the time of university entrance, those who haven't decided on their future career, have the career choice imposed on them, they are told by someone “to go there”, “to go here”, so that he won't be left without work. As a result by the end of training, the qualified, credentialed person realizes that he doesn't want to engage with this at all.”</p>
<p><i>Low awareness</i></p>	<p>“9 and 11<sup>th</sup> grade students graduating from school have no idea of what specialty they are going to study in the future. As a rule, our young people are mainly guided by their parents or go where they have a financial opportunity or simply, for example, many people from other regions try to get to Almaty, Nur-Sultan, because it is more prestigious there and if their passing scores allow them, they just start taking wild guesses as to any university (to enter) regardless, and there having some idea or even without any they choose a department not having awareness of what they will be doing in the future.”</p> <p>“There is a problem related, so to speak, to the child's wrong understandings about the profession. He could have chosen a wrong profession as a whole. Well, having completed the first couple years</p>

<p><i>Mentality</i></p>	<p>one realizes that it is not “his” but there is no way back, now matter he wants it or not, he has to complete (his education).”</p> <p>“... this is probably our mentality that any young man, any young woman must definitely graduate, have a higher education, no matter whether she (he) needs it or will not need it in the future.”</p> <p>“Parents still think it is necessary to acquire higher education, it is important that one sit in an office, have a stable job, which has some prestige, that he become a deputy or start his own business. And it is these working professions that young people do not aspire to. Although a person may have inclinations towards them not many people realize that they have an interest in, may be fascinated by them. A person doesn’t have an understanding of the profession, where perhaps he could realize himself.”</p> <p>“Nowadays in the society education is largely a status for young people. This is what we come to, that he must have a diploma, he must have education, both parents and young people (think so).”</p> <p>“Since we have this mental stereotype in our society, that you must complete higher education once you have enrolled in, people are afraid of changing, taking risks, and rarely does anyone dare to shift to somewhere else, step over. And again there are many nuances including the financial aspect.”</p>
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More generally, many focus group participants shared their perceptions of educational mismatch as stemming from students’ low awareness of their future professions/jobs and, hence, wrong career decisions.

Mentality, another influential factor revealed by focus group participants, which in this context can be defined as societal values, attitudes and perceptions of the role of education and the prestige of occupations and jobs that are popular in the society and have an impact on individual career choices. In the opinion of one economist, there is some kind of a historical or cultural feature of ours remaining, according to which higher education is a kind of an end in itself, despite the fact that for a number of positions actually higher education as such is not needed, and in the context of our labor market some part of students in principle should not be in HEIs in the first place. Similarly, a representative of the labor market policy-making body noted that mentality mandating that everyone acquire tertiary education.

Notably, young people appear to make career decisions based on some entrenched social and cultural values and stereotypes. According to some labor-market experts, blue-collar occupations aren't prestigious and young people don't aspire or want to choose these professions. In particular, as noted, there are a lot of specialties, such as accounting, economics, law, which aren't allocated government-financed grants, but students themselves, their parents or families pay for studying in these specialties, despite little demand for them in general. Indeed, the overproduction of specialists from the fields of social sciences such as economics, law, business, and administration has been observed in other transition countries as well (Jonbekova, 2015; Rudakov et al., 2019). During the Soviet period only public universities provided high education according to the State order approach and only a small part of all those willing to get enrolled in higher education had this opportunity (Shevchenko et al., 2014). In the post-independence period when people got the opportunity to receive higher education on a paid basis without passing difficult exams, a large number of private universities appeared ready to meet the unmet demand of the population (Shevchenko et al., 2014). Therefore, the oversupply of graduates in social sciences may be explained not only by the rise in popularity of these professions in light of the political and economic changes in these societies that generated demand for these specialists, but also by a rapid expansion of HEIs that were willing to meet the demand of the population for higher education in the fields in which it was much easier to train. As a result, later graduates face difficulties in getting matched employment. In this respect, one university instructor noted our preference towards having our children study in prestigious professions. As noted by an economist, economics and law

specialties still remain popular among students. Or, as mentioned by an expert in vocational education, due to a heavy workload a graduate may look for a more prestigious job rather than working as a school teacher according to his specialty. The influence of mentality was highlighted in most of the focus group sessions. As suggested by an education expert, students' career choice may be guided by other factors as well including the desire to obtain a state-funded educational grant or an incomplete understanding of future employment conditions and requirements.

These findings are consistent with those found in the study of the factors that influence Kazakhstani high school students' career choices (Bidanov, 2017), according to which factors such as immaturity or unpreparedness of students to take informed career decisions, the state grant allocation system inducing students to choose fields of study for which the grant can be easily won, collectivist culture and parental influence and expectations prevent students from making effective career decisions.

#### *Labor demand-supply gaps*

Study participants clearly identified imbalances between labor demand and labor supply as one of the explanatory factors for educational mismatches. Individual preferences for prestigious specialties and universities and colleges training in accordance with this demand and in some cases graduating specialists according to the ineffective state grant allocation but not in line with labor market demands are revealed as accounting for the gaps between demand and supply. As noted by a labor market expert, we are facing the shortage of some specialists who are "in demand". Particularly, it was stated that there was an oversupply of highly qualified specialists, mostly social science majors, but a shortage of technical specialists (techies). A representative of a labor market policy-making body pointed out that while blue-collar workers were really needed, we had an overabundance of lawyers and economists. Another labor market expert noted that many tertiary educated persons don't work in qualified jobs, being overqualified, since there are not enough jobs matching the level of their qualification.

Low prestige and a lack of social standing attached to vocational education are highlighted in existing studies (Pimpa & Suwannapirom, 2008; Abrassart & Wolter, 2020). There has always been this suspicion that vocational curricula provide a lower-class education and divert some categories of

the population such as lower class or lower caste, racial minorities, and women from academic education and higher status and higher-paying jobs (Grubb, 1985). Further, the State Order approach according to which government-issued grants are awarded to college and university applicants is questioned in terms of effectively fulfilling its purpose being based on incomplete information about labor market needs (OECD, 2017b).

It should be noted that apparently the gaps between labor demand and labor supply may stem from our mentality preferring “prestigious” professions. A university instructor and a labor market expert suggested that individuals choose to study in “prestigious” specialties which mightn’t be in demand. An expert in vocational education expressed concern about the demand for specialties colleges are currently training for. As noted by several college representatives, the number of college graduates in some blue-collar professions exceeds the demand for them. For example, many college educated turners will not be likely to be in demand in the labor market.

Table 10. Selected quotes on the labor demand-supply gaps

<p><i>Labor demand-supply gaps</i></p>	<p>“One of the reasons is that they did not find a job (of an appropriate level), that there are no jobs for them. It means that they had looked for, were looking for, but they had to go to lower positions, to job positions, where lower qualifications are required, in order to make living somehow at least. They cannot sit there, wait until they find a job that matches their qualification.”</p> <p>“We have a large gap between the university and the labor market, i.e. universities train for certain specialties but by some point in time the demand for these specialties in the labor market falls. And universities are generally not very ready or do not change quickly probably due to bureaucracy, which is characteristic of the design of some new</p>
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	<p>educational programs. Universities can't change very quickly to meet labor market demands"</p> <p>"I think this issue is not to be solved at our level because, you know, we graduate, for example, 15 turners. They cannot all get a job, they do not need so many turners in the town."</p>
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As noted by a university instructor, as a result of individuals' preferring prestigious specialties and universities training in accordance with this demand eventually we run the risk of facing an oversupply of respective specialists. It appears to be the case that universities exist on their own graduating lawyers, economists, while there is no so much demand for them anymore in the labor market. In this context, in the opinion of an economist, there appears to exist an imbalance between the employers' demands and professional choices made by university applicants. Prospective students' applications for state grants were referred to argue that for those specialties on which the state orders had been placed and which were in demand by employers, there were large shortfalls of applicants. In this context, as highlighted above, supply-demand imbalances may be also related to our mentality that higher education is considered a must-have for any young person, while some job positions which graduates apply for may not require higher education. Moreover, the focus group discussions suggest that the state educational grant allocation process may also contribute to education-job mismatches due to a lack of labor demand analysis, in particular of the local market. As noted by one university instructor, during the educational grant distribution which lacks proper monitoring a lot of grants are allocated to some specialties, whose graduates turn out to be subsequently employed in educationally mismatched jobs. A graduate employment office representative mentioned ecologists finding it difficult to find jobs in their field of study, although the enrollment at universities was ongoing for this specialty.

*Flaws in the education system*

Flaws in the education system were one of the most discussed themes across all focus group sessions. Low quality of education, a weak link between the content of education and job requirements, and the lack of practice-oriented teaching and employer engagement were the major concerns expressed by focus group participants.

*Unsatisfactory quality of education*

As noted by an economist, since good quality education is the foundation for a future specialist's capability of effectively performing job tasks and engaging in the working process, all depends on the quality of education. And, a labor market expert rightfully labels the quality of education as one of the cornerstones. Therefore, as a vocational expert pointed out, regarding why employers can't find specialists who have the required skills and abilities, first of all, we should probably talk about the quality of education. This is because, as mentioned by a HR agency representative, the extent of the quality of professional training of a person acquired by the time of graduation from an educational institution is what will be reflected in the workplace.

The perception of unsatisfactory quality of education was shared by a number of the focus group participants. As highlighted by one college representative, it is not always the case that in practice the diploma really shows a person's knowledge and qualifications, and after all, one can be a good specialist even without a diploma. A representative of the labor market policy-making domain described the resulting situation as the one involving a tertiary educated specialist, on the one hand, and an employer, on the other hand, who doesn't get quality work from this specialist.

Education quality is influenced by many factors. The factors mentioned by a university instructor, education expert, include a low level of wages of teaching staff at universities, what makes many of them uninterested in doing something for such a low salary and the lack of adequate facilities and resources as well as sponsors in the majority of universities. Similarly, some college representatives mentioned the problem with the quality of the teaching staff. Specifically, as noted, the release of the Law on the Status of a Teacher may lead to large differences in salaries in schools and colleges, making college instructors to transfer to school. And, this turns out to be reflected in the quality of teaching and personnel shortage. A college representative mentioned the lack of leverage that

could motivate and financially stimulate the teaching staff as well as the difficulty of attracting trainers from industry.

The lack of flexibility and adaptability was highlighted by a university graduate employment office representative who noted the existence of a substantial gap between the university and the labor market and the lack of readiness or quick adaptation to the changing environment. A university instructor outlined the differences in the organization of the educational process in general between the public funded university and the private university in terms of the influence of autonomy. Specifically, the former seems to exercise more creativity and freedom in decision-making with respect to the educational process, but, on the other hand, many operational processes may become quite bureaucratic. Meanwhile, at private universities, which survive at their own expenses, operational processes are not always well structured which may sometimes negatively affect the quality of education, but can go faster and more flexibly. Another university instructor, education expert stated that HEIs were heavily regulated by the state and didn't possess the declared amount of academic freedom.

The concern about the quality of education is related to the questions about quality assurance in the education sector. For example, as noted by a representative of the policy-making body, currently colleges evaluate themselves, issue diplomas and, so to speak, send graduates to the labor market. In this regard, according to an education expert, certification bodies are not currently developing as much as desired due to the lack of demand for certification which is related to the list of regulated professions. As suggested, teaching must be among the regulated professions as the quality of training in all other specialists depends on teachers.

Regarding the quality of education, some labor market experts emphasized that nowadays what we have is not vocation for educating, but business, when all educational organizations are chasing after applicants and more profit. As noted by a representative of the labor market policy-making domain, each university trains specialists of all shades, though being ill-fitted for this, but guided by the profit incentive. And this chain further persists with a graduate of an educational organization thinking only about where to make more money, which doesn't result in quality work, as mentioned by an expert in vocational education.

The focus group findings are supported by the results of other studies. In this regard the findings of the international comparative studies are quite revealing. According to the Survey of Adult Skills (PIAAC), which assesses the proficiency of adults aged 16-65 in literacy, numeracy and problem solving, the differences in proficiency between tertiary-educated adults and adults with below upper secondary education are relatively small in Kazakhstan (in both literacy and numeracy) which is partly explained by tertiary-educated adults scoring more than 30 points below the OECD average in these domains (OECD, 2019d). Moreover, in Kazakhstan, according to PIAAC, proficiency among younger adults (aged 25-34) is similar to those of older adults (aged 55-65) despite the fact that a much larger share of younger adults have attained a tertiary qualification (OECD, 2019d). As suggested by an education expert, we may observe a kind of stagnation, when younger generations don't become more progressive, more functionally literate than previous generations.

Several focus group participants clearly stated that in general education institutions didn't provide the knowledge and skills that are in demand in the labor market. The gap between what was taught and what is required on the job appears to be the case in many instances. Although one education expert mentioned that it was the norm in any organization to retrain anybody who had just come from educational training to learn some features of production and technologies some focus group participants noted huge differences between what was taught and the job requirements. In the opinion of an HR agency representative vocational and higher education institutions most likely don't provide the knowledge and skills that are in demand in the labor market. As noted, very often a young specialist faces the situation when in the workplace he learns everything from the very beginning. Another HR agency representative was also less sanguine noting that in fact education didn't provide specialists with knowledge and skills so that they could immediately enter the position and be in the profession needed. This allegedly leads to one's learning and retraining and employers working at qualification and adaptation of many specialists. One college representative also mentioned that educational institutions weren't always able to meet employers' needs due to some kind of systemic errors and the quality of education. As noted by an employer representative, our universities still do not prepare at the level at which employers would like to see. Particularly, the practical applicability of knowledge appears to be at an insufficient level.

Table 11. Selected quotes on the flaws in the education system

<p><i>Flaws in the education system</i></p>	<p>“Today the education system has turned into business. Therefore, there is no quality of education.”</p>
<p><i>Low quality of education</i></p>	<p>“Today the quality of education leaves much to be desired. This is indeed the case. Basically, there is a lot of formalism, a formal approach.”</p>
<p><i>The gap between what is taught and the job requirements</i></p>	<p>“There are a lot of requirements that in my opinion are no longer needed. Our educational standards, education in general are so detached from the reality that sometimes it seems that I don’t see for what we teach, why our children study for appearances' sake in order just to get the diploma.”</p>
<p><i>Lack of employer engagement</i></p>	<p>“The issue in vocational education is about the interaction with employers, i.e. about the extent to which employers are now ready to hire college graduates. This is problem number one. Employers are not always ready to hire graduates who do not have work experience, who do not have specific practical skills. What he went through during internship while studying is not enough at all.”</p> <p>“Today employers do not engage with colleges as much as it would be desirable, so that later graduates could find their place in life in order to apply those acquired knowledge and skills, etc.”</p>
<p><i>Unsatisfying quality of internships</i></p>	<p>“But my friends studied at a Polytechnic</p>

	<p>University and I know what they did, and what labs they had, and what practicum they had, and that for practicum they went to enterprises and did some kind of real things. Not just like today, when what a student does during the internship is “going and making a photocopy, pouring some tea, bringing tea, going for some cracker”. This is the maximum that students do. Before, they took it somehow seriously because I don’t know, there was responsibility on both sides.”</p>
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Several focus group participants expressed their belief that the education system has turned into making money and attributed unsatisfactory quality of education to this approach.

#### *Lack of employer engagement*

The focus group discussions suggest that the link between the labor market and the education system isn’t as strong as needed. According to one educational expert, our higher education institutions for the most part don’t provide labor market demanded knowledge and skills. As noted, educational standards were often written by people who didn’t have complete understanding or relation to education, to the practical part of education. One of the categories highlighted by several education experts was the National System of Qualifications, designed to ensure the match between the content of education and job requirements in terms of skills and competencies. A representative of the education policy-making body expressed concern about the quality of professional standards related to difficulties in transferring the language of production into the language of education while developing educational programs. Moreover, as noted by another education expert, most of the professional standards elaborated and approved refer to blue-collar occupations and a much smaller share covers tertiary education.

The lack of interactions between education institutions and the industry was among frequently expressed opinions. An HR agency representative suggested the problems with education be related to the weak link between employers and education. The lack of employer engagement was highlighted by several education experts as well. In the opinion of an expert in vocational education the issue with vocational education is about interactions with employers. A university instructor also pointed to the gap in the dialogue between these two parties. This appears to be reflected in the way of training students in educational institutions. As outlined by a university instructor, economist, our university professors are not detaching themselves much from the university system and do not see what is happening in the labor market, reading about this only in the news, or newspapers, or on the radio, and the like. Similarly, a representative of a labor market policy-making body noted that modern day professors didn't not leave their office and that the education system lacked an elementary feeling of patriotism about training for the future of the society.

At the same time, the focus group discussions suggest that as a result of recent developments there has been some progress in this regard. An expert in vocational education provided several examples of colleges closely cooperating with employers. As pointed out by this expert, these examples vary depending on the college, the region, and the specifics of the specialty. According to an expert in vocational education, following the experience of HEIs academic freedom has been introduced in colleges and currently many colleges appear to have sufficient freedom in writing their educational programs, which ranges from 40 to 80% and in some cases up to 100% for making changes in educational programs, more freedom appears to be given in training specialists in the way aligned with regional needs and taking into account any experience without restrictions. Continuous equipping, taking into account all the requirements, both Kazakhstani standards and international experience, holding professional skills contests and participating in WorldSkills International Skills Competitions are all mentioned as developments taking place at present in colleges. A college representative noted that colleges provided basic skills, especially in blue-collar specialties, owing to the coordination of educational programs with employers, in regards to topics and needed skills. Another college representative stated that knowledge provided by colleges matched labor market needs and provided an example of an experimental introduction of a dual form of education for jurists and lawyers, when 60%

of time students studied at the training center and the remaining 40% they studied the theory in colleges. According to a college representative if it suits other specialties, the prevalence of dual training system will be expanded. As can be seen, all these endeavors have been implemented since recent times and the processes are underway. Disadvantages such as poor pay and the quality of the teaching staff were mentioned as well.

With respect to tertiary education, an education expert noted that universities were developing programs based on professional standards, taking into account qualification requirements and inviting industry representatives to the academic committee to make it easier for the graduate to adapt and integrate into the labor market environment. According to a university professor, economist, nowadays many universities are undergoing restructuring processes by creating laboratories, business incubators so that their students could work on some real projects, with real companies within the framework of educational programs, as well as engaging more practitioners into teaching to involve students in professional activities. Similarly, another university instructor noted that today many universities were trying to solve the problem by striving to establish the communication between the employer and the university, with several universities in Nur-Sultan specifically organizing special working groups as a kind of an advisory body. As clarified further, practitioners from the industry are invited to universities and asked about actual issues that are now in the industry in order to reflect these questions and problems in the educational process.

Although several examples of improving the connections between the education system and employers, the lack of employer engagement is highlighted by some as one of the major current problems in the education sector. As noted by a representative of an education policy-making body, although the framework of academic independence and educational standards, norms enabling practice-oriented programs have been adopted, one of the problems is that many important initiatives undertaken on the part of the education system to bring together labor market needs and the content of education are not heard by business. According to a college representative currently employers have somehow turned their backs on educational institutions, they want to get ready-made specialists. As noted, though students need to consolidate their knowledge in practice, in the workplace, employers are not interested in engaging with students.

### *Unsatisfying quality of internships*

Another concern frequently mentioned by many experts across focus groups was the quality of internships. According to experts, the implementation of internships is not always at the proper level. Some focus groups participants associate this with the disorganized communication between the academy and the industry. According to an HR agency representative, universities do not work with interns, students, given a very low level of communication between the employer and the university. As noted, when internship is well organized, students will gain a good understanding of what they will be doing in the future and either immediately change the profile of their education or continue studying in the same direction.

Some employment representatives note low quality of the implementation of internships. According to a university instructor, in most cases the actual implementation of internships isn't not so good, when students don't get familiar with the specifics of the work. Or even worse, as noted by an HR representative, many students undergo internship formally, getting a letter certifying that they went through internship, when in fact they didn't. Another concern related to students' internships is their short duration in some specialties. One graduate employment office representative noted that except for pedagogical specialties students in non-pedagogical specialties undergo internship for only a month. Despite the importance of practice-oriented teaching for better understanding of theory, as mentioned by a university instructor, there are many specialties such as ecology, chemical technology, organic technology, oil and gas business, life safety, where dual training is lacking and work in research labs differs from being at production sites.

### *Career Guidance*

One of the most dominant themes that emerged from the focus group discussions is career guidance. Both education and labor market experts highlighted the significance of career guidance. In this regard the results of international studies are quite informative. According to the findings of the OECD Programme for International Student Assessment of education and career expectations of 15-year-old students (OECD, 2019a), about seven in ten students attended schools in Kazakhstan where some kind of career guidance was provided. But further data are less encouraging. As suggested by the

data, most Kazakhstani teenagers may not have a clear notion of what they need to do to achieve their career goals. 77% of students held high expectations for their career, specifically reported expectations of working in a high-skilled occupation, however, less than 60% of students expected to complete tertiary education and, in particular, by socio-economic status, around 45% of disadvantaged students and over 20% of advantaged students who expected to work in a high-skilled career held lower expectations of future education that is usually required for these kinds of occupations (OECD, 2019a). As OECD experts point out, one of the reasons for such misalignment may be the lack of information about what is required for achieving career aspirations (OECD, 2019a).

As one representative of a labor market policy-making body concludes it all depends on education and in this respect career guidance is of primary importance. The need for career guidance, as noted by an HR agency representative, appears much earlier than a person matures, and therefore the issue of career guidance is highly important. According to the opinions of several experts, educational mismatches are initially related to a low level of career guidance work. A university instructor stated that the initial problem was about the career guidance, when students went for bachelor's degree, they didn't not always realize what their specialty's about, which had impact on their unwillingness to work in the related field in the future.

Table 12. Selected quotes on the lack of career guidance

<i>Lack of career guidance</i>	<p>“Why are there mismatches between specialties and education? I think it is because career guidance is not actively carried out in schools.”</p> <p>“This work (career guidance) is not carried out either by parents or by school. Everyone is busy with their own narrow functionality.”</p>
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At the same time, a few focus group respondents noted that nowadays career guidance work was underway. One expert in vocational education mentioned school teachers, college teachers trying hard to do this work. A university instructor noted specialized career guidance centers established in many universities, which is quite a novelty though. The majority of focus group respondents who

spoke up about career guidance pointed out the lack of career guidance and even its complete absence. As noted by the representatives of the labor market and education domains, school graduates don't always have an idea about what specialty they are going to study in the future, given that there is no career guidance as such among students, graduates of secondary educational institutions. And, as noted by a focus group participant, as a result, a person goes where his parents, close relatives advise him without attention paid his personal inclinations, talents, etc. Some representatives of the labor market policy-making bodies and an HR agency clearly noted the absence of career guidance work in schools. With respect to unemployed persons, a university instructor noted the problem of information asymmetry and red tape in relation to obtaining short-run career guidance within one of the employment programs operating in the country.

### *Inflated job expectations*

Some focus group participants' opinions point to the role of graduates' inflated job expectations in education-job mismatches. These inflated employment expectations may stem from particular cultural values or mindset. Because of personal and parental expectations of getting immediately higher levels of job positions and conditions individuals may feel mismatched in their jobs or may consider themselves over-qualified for their current position. A labor market expert noted the findings of the psychological study of 2019 that had showed that over 50% of respondents wanted to be executives, while only 14% were inclined to take up physical labor.

Table 13. Selected quotes on inflated job expectations

<i>Inflated job expectations</i>	“The main problem is that students, having invested a lot of time and money (in education), want to immediately become executives there with some kind of managerial status, what is expected of them by their parents as well. But, in firms, employers want to start only with the lowest echelons, so that they (graduates) first learn the profession, put in efforts and get a rise
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	when they are ready. But students themselves do not want this. They immediately want to start with some good salary, a good position and these are their demands they have and accordingly the match does not take place.”
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As noted by one university graduate employment office representative, supposedly due to a cultural factor or mentality, not everyone is willing to go for a job that pays 100 000 tg., while employers, as mentioned by one economist, may prefer to postpone their promotion decisions until employees become more proficient in the workplace. Graduates may also have inflated expectations about future working conditions. There was an example of veterinarians who went to work in unrelated fields despite the shortage of veterinarians in rayons and villages because some of them wanted to study on scholarship, some had a low awareness of their future profession thinking about working in modern clinics, nobody didn't think about working in a remote village.

#### *Unsatisfying employment conditions*

The above-mentioned inflated job expectations may come into conflict with actual employment conditions such as the level of wages, working conditions, and the extent of workload. Very often there may be discrepancies in salary expectations and what employers are ready or willing to pay for labor. As suggested from a labor market expert's opinion, the employer may need a super-qualified worker but pay very little as labor remuneration and low wages may lead people to transfer to mismatched jobs. As a result, the employer has to hire the less qualified and the skilled are employed in those jobs for which they are over-qualified. One college representative noted that given that vocationally educated persons only graduated from college they're employed in jobs of a much lower level even not the ones for which they could apply.

Moreover, as mentioned by some experts in vocational education the level of labor remuneration varies across industries, activity fields and sometimes college graduates have to get employed in any job to earn some money. Another college representative also noted low wages,

because of which blue collar workers, for example, turners mostly go into business, opening their own limited liability partnership or sole proprietorship, generally working outside their specialty.

Table 14. Selected quotes on unsatisfying employment conditions

<p><i>Employment conditions</i></p>	<p>“For example, we have a specialty a postal service operator. The employer offers them (students) a job, but students who study in this specialty, on graduation do not want to go there because of low wages. So, after graduating they won’t go there, although during the final certification employers choose and invite them, offer their conditions, but during the practice they saw the huge workload and therefore they do not agree to this salary, they don’t go.”</p> <p>“Moreover, another reason for mismatches is probably related to salary. We go where they pay more. Besides, among women, I query, they get employed closer to home to devote time to their family.”</p>
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College and university graduates may be unhappy with other working conditions as well. As noted by a vocational education expert, a person with a teacher's diploma may not go to school because of a large workload, a lot of routine work, especially with parents, children, and the public, and instead look for a more prestigious job. Thus, more generally, low pay, unsatisfactory working conditions and undesirable workload may lead people to work in mismatched jobs.

*Unfavourable macroeconomic factors*

The educational mismatch studies suggest that being mismatched depends not only on a person’s education, skills, and capabilities but also on the structure of the economy. As such, the

economic structure of a given country mayn't correspond to the graduates' profiles, providing not enough matching job opportunities that leads to an ineffective use of the available stock of human capital of workers (Kupets, 2015b; Neycheva, 2021). Several focus-group participants mentioned the structure of our country's resources-based economy as a factor conducive to educational mismatches. An education expert noted that at the macro level in our economy oriented towards the extractive sector many tertiary educated individuals simply can't realize their potential and, as a result, we have high statistics on young highly qualified people leaving the country. The labor market depends, as highlighted by an HR agency representative, on the economic situation and the strategy of the country. In this vein, because of the poor job opportunity structure existing in the labor market many tertiary educated individuals have to work in blue-collar jobs, exemplifying the cases of double mismatch.

In addition to the above discussed major themes the focus groups participants mentioned some other additional factors that could help explain educational mismatches. One economist noted that education-job mismatches depend on the type of specialties. As such, economics, legal studies, and management are broad specialties which are associated with a large extent of mismatch. Some focus group participants mentioned a number of personal characteristics that might be conducive to educational mismatches. An individual's personality, traits, talents, and professional qualities all appear to affect his employment prospects in the labor market.

The analysis of the focus group data reveals that the explanatory factors for educational mismatches are oftentimes intertwined, when the interplay of several factors can lead to situations of educational mismatches. As illustrated by the quote shown in Table 15, for example, parental demands and educational institutions following these demands because of their own financial interests might contribute to education-job mismatches.

Table 15. Selected quotes on interplay of multiple factors

<i>Interplay of multiple factors</i>	“For example, as for colleges, given the size of the country there is a very large number of colleges and a lot of private ones. And private ones are mainly guided by parents' demands. This refers to economics, humanities, legal studies. Because you don't have to buy equipment. It means you open courses, find teachers, you receive
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	state orders and teach, and students are ready to pay for such humanitarian specialties and graduate. And then, in fact, it is more difficult for them to compete in the labor market.”
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### *Dynamic environment and its challenges*

Both education and labor market experts noted the dynamism of the labor market environment. As noted, knowledge quickly becomes obsolete, one won't work in a profession for a long time, everything changes quickly. As pointed out by several focus group participants, the education system does not catch up to respond to the labor market. This problem apparently exists because by the time a person graduates from an educational institution he finds technologies having already gone forward. Google translate and other mobile applications mentioned by a graduate employment office representative can be provided as relevant examples of this. Noting that knowledge quickly becomes obsolete, an HR agency representative suggested the education system should shorten academic courses, the cycles of studies. Similarly, one education expert considers it unnecessary to teach specific skills that are now in demand in the market, for example, some programming skills for 4 years.

Some focus group participants mentioned the trend of automation when talking about the world changing quickly. As noted by an expert in vocational expert, the spheres where people, human labor are replaced by machines become more visible, including the banking sphere, where we all deal with ATMs. It was highlighted that Kazakhstani enterprises were gradually automating their production. Similarly, an HR agency representative underscored the robotization going on, and a lot of labor being replaced.

More generally, experts highlighted that business and the labor market developed at a faster pace than the education system. The IT sphere was noted by one labor market expert as changing very quickly, with new programs, applications, and languages appearing. In addition, particularly after the Covid-19 pandemic, the labor market appears to undergo changes, with flexible forms of employment, alternative employment, and new trends on environmental friendliness setting in. The effects of Covid-19 and subsequent adaptation to new realities were also noted by some experts through the example of

remote mode (online) of working. It appears to be a new experience for university instructors, for example, who didn't earlier use some kind of online systems, such as Zoom, Moodle, and online learning management systems. Or as noted by a college representative, while introducing new specialties according to the Atlas of new professions<sup>21</sup>, colleges experience difficulties in finding some specialists, for example, in the field of information security.

As noted by an HR agency representative, labor really changes rapidly. In this context, the focus group discussions revealed a systemic problem related to labor market forecasting. Several experts underscored the problem of making forecasts about actual labor market needs. In this vein, a graduate employment office representative noted that because of a dynamic time we couldn't predict what specialties would be in demand in 20 or 10 years. As noted by education experts, even short-term forecasting of labor demand is rather problematic. According to them, employers can't provide clear answers about their demands even over a short-term horizon. It is likely that under current conditions of Covid-19 and in case of not winning tenders, given that many enterprises perform public procurement, forecasting becomes more difficult. In this light what is possible, as noted by an education expert, is annually making a realistic snapshot, for example, of how much the labor demand is, how much laying off is going to occur. A representative of an educational policy-making body underscored the lack of clear guides with respect to labor market needs but intuitive approaches to determining state educational orders.

Another strand of opinions that emerged during the focus groups concerned the implications of changes in the job requirements and the need for response to these changes on the part of the education system. Several focus group participants noted the employer's need for soft skills, such as communicative, problem-solving and others. Labor market experts highlighted that most employers were not mainly asking for specific skills, but rather soft skills and competencies, alluding to the findings of the analysis of the need for personnel, showing that less than 50% of respondents met these requirements. An HR representative even suggested it unrealistic to graduate, to train a ready-made specialist. As noted by an HR agency representative, another tricky issue existing today is that at times

<sup>21</sup> "Atlas of new professions is a collection of professions that, according to experts of each industry, are already in demand and will appear in the near future. Such a close future for us in this Atlas is defined for 5-10 years". Source: <https://www.enbek.kz/atlas/en/about>.

one job position may implicate several completely disparate professions. Sometimes employers, for example, may look for a professional who has higher medical education, but is also a good economist. Or, according to another HR agency representative, specialties mayn't be always broad enough to answer labor market needs, while labor market requirements may be much wider. As noted by one employer representative, industry-narrow experts may lack a systemic approach and fail to envision the whole picture.

Moreover, according to an HR agency representative, many people who graduated from a university in Soviet times or earlier not having had the opportunity of choosing among such interesting professions or plenty of occupations that exist nowadays are trying to reorient themselves which may explain some education-job mismatch happening nowadays.

#### *Dichotomous perspectives*

Additionally the focus groups revealed informative insights into the issue of educational mismatches based on conflicting perspectives of the participants. These conflicting evidence, practices and opinions are organized into three dichotomies, discussed below.

#### *College education VS Tertiary education (Institutional)*

The focus group data enable to analyze vocational and tertiary education in terms of the amount of work practice and internships that students have and to whom it is more difficult to find a matched job. Various opinions were expressed. With respect to work practice some opinions suggest that practice-oriented learning may be at a higher level in colleges compared to universities. As for the second question, the focus groups identified completely different viewpoints. College representatives underscored that within the framework of the dual training system students would spend a larger amount of study time engaging in work practice at production sites. Hence it was suggested that college graduates would be more prepared for the field of activity that would be their work in the future. Colleges were noted to be focused on practice-oriented learning, especially those which work under the state order cooperating closely with employers. Hence, it was argued that college graduates were prepared for work at the place of production and could start working right away.

One labor market expert noted several strengths of the VET system such as free education for everyone, more work practice due to the dual training system, the availability of competence centers, job training centers, and social partners where college students could undergo industrial training. In the opinion of the labor market expert, in a tough competition colleges display their best qualities, whereas there is no such thing among universities, in particular, universities lack the advantage of dual education. Concern was also expressed about whether adequate quality internship is implemented at universities as well as in colleges. Another labor market expert expressed concern about the quality of internships organized by universities, especially in relation to social sciences. Also, as a shortcoming low scholarship of students was noted as not being enough to cover a person's basic physiological needs, making many students to look for side work, which negatively affects their learning outcomes and professionalism in the future. One education expert suggested that practice-orientation was undeveloped at universities.

One tangential question that was brought up initially by one of the labor market experts and that was later discussed as well in other focus groups was about to whom it is more difficult to find a matched job, college graduates or university graduates. According to one education expert it's different depending on the case, for example, an IT company looking for code developers may prefer college graduates, as they have more practice, but if they need more of an IT analyst, they prefer individuals with tertiary education.

A labor market expert noted that it may be even more difficult for a tertiary-educated person to find a job, since sometimes tertiary educated people take short-term professional courses in order to train for an ordinary blue-collar profession. As mentioned by some college representatives, the demand for college graduates, especially from blue-collar specialties is high. In the opinion of an expert in vocational education, one could draw a conclusion that it is easier for college graduates to find an educationally matched job than for university graduates, since according to the educational process starting from the 2<sup>nd</sup> course students undergo a lot of internships, many find partners and basically work for them while studying. As noted, more vocational training for blue-collar professions that are in demand is being carried out according to the state order. On the other hand, some HR representatives suggested that tertiary-educated persons might be more advantageous. As noted by an HR

representative, while hiring the preference is given to the applicant who has higher education. An HR agency representative stated that in any case, a tertiary-educated person's better positioned and that he would be paid more. Noting that it may be much easier to find a job with higher education, another HR agency representative underscored the role of qualification of a person, job competencies and the personality of an individual.

*Now (Current) VS Then (Soviet) (Temporal)*

The Now VS Then dichotomy is based on comparing educational and labor market practices that we have currently and those that were in the Soviet era. Some of the education and labor market experts pointed out that in the planned economy under the USSR forecasting labor demand was much superior than now, when it was known when, where and what plant would open and how many workers would be required. Some focus group participants underscored the features of the Soviet education system which they spoke highly of. As noted by a representative of the labor market policy-making domain, in Soviet times there were no duplicate specialties across universities, with each university training specialists according to its directions and there wasn't such an oversupply of unneeded specialists in the labor market.

Another Soviet experience was mentioned by a college representative. As noted by this focus group expert, in Soviet times such (specialized) educational institutions belonged to the jurisdiction of respective (sectoral) ministries, for the sphere of which they trained specialists, and not the jurisdiction of the Ministry of Education. It was allegedly the case that the sectoral ministry knew in what direction they needed to train specialists, how many specialists to train, and how to change the content of education. It was suggested that this approach was more advantageous compared to the current case when the Ministry of Education is solely in charge of all (public) educational institutions.

Table 16. Selected quotes on Now (Current) VS Then (Soviet) (Temporal) dichotomous perspectives

<i>Now VS Then</i>	“And that planned economy which was in the post-Soviet era delivered results. And then as planned they knew how many graduates there
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	<p>would be and where they would go to work. And naturally, workers' wages were higher at factories.”</p> <p>“Career guidance in Soviet times was set at such a high level and teachers worked as psychologists. They saw what could be done with this child, what inclinations he had and teachers put their heart into children. Now this is not there.”</p> <p>“But my friends studied at a Polytechnic University and I know what they did, and what labs they had, and what practicum they had, and that for practicum they went to enterprises and did some kind of real things. Not just like today, when what a student does during the internship is “going and making a photocopy, pouring some tea, bringing tea, going for some cracker”. This is the maximum that students do. Before, they took it somehow seriously because I don’t know, there was responsibility on both sides.”</p>
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One HR representative wished we would return to the post-university job assignments system, that was effective in Soviet times. As shown in Table 16, the focus groups underscored some other features of the Soviet system that were considered good practices. It was noted that the Soviet planning and forecasting were of good quality. Moreover, according to some experts, career guidance was allegedly set to a higher standard and the implementation of students’ internships was superior in Soviet times than currently.

*Educational system VS Labor market (Institutional)*

The focus groups captured somewhat opposite views of some representatives of the education and labor market domains regarding on which side the improvement of the educational mismatch situation depends. Although this question wasn't asked, the opinions expressed by the focus group participants suggest that some education and employment experts have quite different stances on this. As noted by one education expert, we need to think about raising awareness on the part of business about initiatives being undertaken by the education system. The business, as stated, is not hearing these initiatives. An expert in vocational education noted that employers should realize that without working together with educational organizations, they would continue to receive specialists who wouldn't meet their requirements, while colleges and universities appear to be eager to find social partners. Likewise, according to a college representative, until the employer is interested in training high quality specialists, colleges will always lag behind.

Meanwhile, many labor market experts underscored the lack of career guidance, low level of education quality, and low quality of the implementation of students' internships. Some labor market experts highlighted that educational institutions following applicants' demands graduate many unneeded specialists. The profit incentive of educational institutions was mentioned several times. An HR agency representative noted that the education system was highly inert and that it was slowly turning to the labor market. It should be noted that this divergence in standpoints wasn't clear-cut. There were education experts who criticized the shortcomings of the education system, as were labor market experts who also commented on labor-market-related factors.

*Concluding remarks*

The focus groups were facilitated by the researcher. There was the guide and all focus groups managed to discuss all the questions that were on the agenda as planned. In general, the focus groups participants for the most part actively shared their opinions. Interesting ideas and examples from both professional and personal experiences were expressed. The participants actively exchanged their opinions, agreements and disagreements, could respond to each other's opinions with clarification, agreement or objection. Here, it should be noted that recruiting participants from three different

locations and relative homogeneity within each group were conducive to facilitating disclosure and fruitful discussions during the focus group sessions.

In view of the findings analyzed above, we state that the qualitative inquiry complements the quantitative study in terms of revealing additional factors and highlighting the implications of education-job mismatches. Importantly, the findings from the focus groups enable to understand the role of the education-system and labor-market-related factors in explaining educational-job mismatches. The qualitative research has also yielded a number of expert suggestions on relevant policy recommendations, which are discussed in Chapter 9. Prior to considering them, in the next sections we present the analysis of the quantitative and qualitative research results and some international practices for the improving the alignment of education systems to labor market needs.

## **Chapter 7. Analysis of the Findings**

The quantitative and qualitative parts of the current study shed light on the issue of education-job mismatch and provide substantial evidence on the importance of education-job match for both individuals and the economy as a whole. According to the qualitative findings from the focus groups, the importance of educational match was noted by most of the focus group participants who spoke up on this question. In particular, several education experts and HR agency representatives expressed their belief in the importance of education-job match, the match between what's taught and the job requirements, and highlighted that it should be pursued. The focus group participants pointed out such implications of mismatches as labor productivity effects, costs to the government, employers and individuals, time loss for individuals and damage to general public distrust to the government.

The quantitative inquiry reveals the incidence, determining factors and earnings effects of educational mismatches in the labor market of Kazakhstan using the pooled cross-sectional labor force data. With regard to the incidence of education-job mismatches among workers in Kazakhstan the situation is relatively comparable to that in other countries (Groot & Van den Brink, 2000; Dolton & Silles, 2008; McGuinness et al., 2018; Somers et al., 2019). The majority of respondents (70.7%) reported working according to their qualification level and specialty. Horizontal mismatch is reported more frequently than vertical mismatch (28.6% versus 22.3%). The incidence of education-job mismatches varies across socio-demographic, human capital and employment characteristics. In terms

of gender, similar shares of men and women reported being mismatched. The mismatch pattern by age group appears to be U-shaped, with all types of educational mismatch being most prevalent among workers aged older than 55 years, followed by workers aged younger than 25 years. This is in part in line with the evidence found by the SWTS study of ILO (2019) that in most low and middle income countries analyzed, younger workers (15–24 years) are more likely to be mismatched to their jobs, relative to their older peers (25–29 years), who have more time to either find an appropriate job or attain the necessary work experience and skills at their current job. Further, the decline in fit with age is plausibly suggestive of decreasing value of knowledge and skills acquired during education and increasing value of human capital acquired on the job (Witte & Kalleberg, 1995). As noted by Kupets (2015a), a large share of older workers is affected by overeducation in transition economies which is in contrast to some empirical evidence in developed economies that suggests a lower likelihood of older workers of being overeducated because of their greater experience, better relevant skills, and more upward mobility opportunities. In transition economies a high share of mismatched older workers can be plausibly explained in part by rapid structural changes making educational diplomas and qualifications acquired under the Soviet system obsolete, as suggested by the study of overeducation in Estonia (Lamo & Messina, 2010). For the variable of location of residence, the data show that the extent of education-job mismatches is much greater among rural inhabitants. As for marital status, each type of educational mismatch is reported to be least common among married persons.

According to the distribution of mismatches across education levels the lowest incidence of all types of educational mismatch is reported by individuals with the highest level of educational attainment. Vertical mismatch and double mismatch are most frequently reported by secondary vocational degree holders and individuals with unfinished tertiary education, while horizontal mismatch is most often reported by individuals with primary vocational education. This is in line with the finding of Kupets (2015b), who documents high rates of overeducation among workers with secondary specialized education varying from 40% in Ukraine to 66% in Georgia largely because the quantity of jobs requiring this level of education decreased during the transition period toward trade and other less knowledge-intensive sectors.

As for job tenure, the rates of educational mismatches demonstrate a consistent decrease as current job tenure increases. As for employment characteristics, the lowest proportions of vertically mismatched, horizontally mismatched and double mismatched workers are found among self-employed and part-time workers when compared to wage workers and full-time workers, respectively. This is, for example, in line with the finding by Handel et al. (2016), who report that rates of overeducation among self-employed workers in the informal sector average 65% and exceed 50% in 12 low and middle-income countries excluding Macedonia. The incidence of education-job mismatches falls up to the category of 51-250 employees. And, notably, the incidence of mismatches by industry of employment suggests that vertically and horizontally as well as double mismatched workers are more prevalent in lower skilled industries than in relatively higher skilled industries.

In general, estimating the impact of various covariates on the probability of being educationally mismatched to the job provides consistent results across both genders, with some exceptions, notably with respect to the effects of education level. All socio-demographic, human capital and employment factors are found to be important determinants of the probability of being educationally mismatched to the job. At the same time, the estimated marginal effects indicate that human capital and employment characteristics appear to have much more impact on the probability of educational mismatch than individuals' socio-demographic characteristics. The results show that, all else equal, women have a lower probability of working below their qualification level, or in a job unrelated to their specialty or both, compared to men. This finding is consistent with those of previous studies (Sloane et al., 1996; Pholphirul, 2017; Rudakov et al., 2019) and could be explained by the possible domination of men's greater likelihood of reporting being mismatched due to career-oriented reasons (pay and promotion opportunities, career mobility interests, etc.) than women's reporting mismatch due to family-related reasons or working conditions.

Further, the findings reveal that overall, compared to being an urbanite, being a rural inhabitant reduces the risk of educational mismatches. This finding is quite surprising given generally more limited job opportunities available to rural residents than to residents of urban labor markets (Bloomquist, 2010; Neill, 2010), and contradicts our expectations based on the distribution of education-job mismatches by place of residence, as shown by our data in the previous section. We assume that this could be due to the inclusion of the variable firm size and industry dummies. When running a separate regression without these variables, the effect of the rural location on educational mismatch becomes positive. The matter is that most of rural residents might work in small-sized firms

and in the agricultural sector. In fact, the data show that about 65% of respondents who reported living in rural areas reported working in small-sized firms as well, while approximately 30% of respondents who reported living in a rural area also reported working in agriculture. It may suggest that part of the association between the probability of being mismatched to a job and the place of residence is captured by these variables.

The types of marital status appear to have differential effects on the probability of being educationally mismatched to the job. The findings show that relative to unmarried individuals the widowed or divorced have a higher probability of being vertically, horizontally and double mismatched, except for widowed men in cases of vertical and double mismatches. On the other hand, the probability of being educationally mismatched to the job is significantly reduced among married persons compared to unmarried individuals. This finding is in line with those of earlier studies (Robst, 2007; Wald & Fang, 2008; Bender & Roche, 2013). But, marriage appears to improve only a man's match, with the effect of being married on the probability of mismatch being insignificant in the female sample. Frank (1978) suggests that given the geographically constrained search for a pair of jobs one or both partners must compromise and accept something worse, and it is expected that husbands on average will make smaller compromises than their wives. It should be noted that it is quite plausible on the whole for married men to compromise less in terms of accepting a job irrelevant to his education than for their spouses in a more or less traditional society such as Kazakhstan. But, since the comparison is made between married men and unmarried men, the finding can be explained by the assumption that married men bear greater financial responsibility to support their family and, hence, have a greater need to fully utilize their education (Sloane et al., 1996).

The findings document interesting results regarding the effects of different levels of education on the probability of education-job mismatches. Relative to the reference group of individuals with primary vocational education, individuals who hold secondary vocational degrees and those who haven't completed their tertiary education are significantly more likely to be overeducated, horizontally or double mismatched to their jobs, holding all other variables constant, except for women who have a decrease in the probability of being horizontally mismatched. With regard to secondary vocational education, such results may be related to the problems and challenges that exist in the VET education system, namely, the mismatch between skills VET graduates possess and the skills needed by employers, mismatch between the occupations chosen by most students at VET schools and the

occupations which are in greatest demand on the labor market, low prestige of VET education, low quality of student intake, lack of highly trained teachers, and, as a result, limited relevance and low quality of vocational education (OECD, 2014b). As for primary vocational education, it can be assumed that individuals with this level of education will be less likely to be mismatched since jobs in which they get employed commonly require at least some level of knowledge and skills, and, possibly, there is quite enough labor demand for workers with the lowest qualifications. Regarding incomplete tertiary education, following the premise of some studies (eg. Matkovič & Kogan, 2012) predicting that tertiary education dropout is negative in terms of job quality, we assume that dropout from tertiary education mightn't provide a positive signal to employers about the job candidate leading to higher rates of education-job mismatches among dropouts. The testing of this hypothesis could be the focus of future studies.

Further, the findings indicate that tertiary educated men are more likely to face the risk of being overeducated and double mismatched, while tertiary educated women, on the contrary, have a lower probability of being vertically mismatched and double matched, relative to their counterparts with primary vocational education, all else equal. But, among all employees, men and women, taken separately, the level of tertiary education including postgraduate degrees has a significant negative effect on the probability of horizontal mismatch, as found in other studies (Robst, 2007; Boudarbat & Chernoff, 2012; Bender & Roche, 2013). This finding might suggest that in general individuals pursue higher education degrees in specific fields of study with the expectation of working in jobs related to them, and tertiary education degree may help lower the risk of working in jobs unrelated to one's specialty. One additional factor contributing to reducing the incidence of mismatch might be a greater migration propensity of highly educated individuals (Brandén, 2013). There is evidence showing that inter-regional migration may improve education-job matching, namely vertical match, and in general increase the likelihood of finding a job (Iammarino & Marinelli, 2015). This could be true to some extent with respect to horizontal education-to-job matching in the labor market of Kazakhstan, in particular, among tertiary educated individuals. This hypothesis can't be tested with the LFS data and warrants investigation in future studies. The additional evidence that the probability of being overeducated or horizontally mismatched or both is lower for tertiary educated individuals compared to those with secondary vocational education may suggest that in general individuals purposefully attain tertiary education degrees with the expectation of working in related jobs and at the appropriate qualification level, and manage to achieve this goal relatively better, which may be in part due to some

employers' preference for hiring tertiary educated professionals than vocationally educated ones, as suggested by some focus group participants.

Finally, as found, tertiary educated men are more likely to experience vertical mismatch than men with primary vocational education, while tertiary educated women have a lower probability of being overeducated compared to their counterparts with primary vocational education. Such a finding for women could be in part explained by greater concentration of female graduates in fields like teaching, social work, and health professions where qualifications fit more closely the actual skill requirements of the occupations (Burriss, 1983) and current trends of women's relatively higher educational performance (Legewie & DiPrete, 2012; Avvisati et al., 2019). And, importantly, tertiary educated men's greater likelihood of being overeducated relative to men holding primary vocational degrees might be related to tertiary educated men's higher upward career mobility rates, when they may be to a greater degree employed in jobs temporarily providing them with skills that enable them to attain better career prospects. More generally, it can be concluded that the topic of education-job mismatch is new in the context of Kazakhstan and additional quantitative studies are needed to be carried out to determine the reasons for accepting non-matching jobs among workers in particular across different education levels and gender.

We further find that longer tenure is likely to reduce the probability of being vertically, horizontally and double mismatched. We assume that human capital obtained via on-the-job training may allow mismatched workers to compensate for the lack of firm and occupational specific knowledge and skills and subsequently move to higher or horizontally matched job positions. Thus, the longer current job tenure, the more likely the individual is going to improve job match quality. This finding confirms those of previous studies (Sloane et al., 1996; Wolbers, 2003; Kiker et al., 1997; Kupets, 2015b) that provide support for the argument that overeducation may stem from a trade-off between education and other components of human capital. Our sample data also show an inverse relationship between tenure and each type of educational mismatch, with mismatch being more common at low levels of job tenure, suggesting some degree of substitutability between these forms of human capital, similar to Sloane et al. (1996). This finding implies that workers who are classified as educationally mismatched in terms of formal education might actually possess lower human capital measured by abilities, skills, and specific on-the-job training than well-matched workers. As for the effects of potential work experience, derived from respondents' ages, it can be expected that the decline in education-to-job matching with age might be attributed to skills acquired during formal education losing their value and relevance (Witte & Kalleberg, 1995). Also, it could be argued that older workers

may face particular difficulties securing well-matched positions such as employer preferences in terms of age that hinder re-matching after job loss which may be quite typical in low- and middle-income countries due to volatile market conditions (Handel et al., 2016).

With regard to employment characteristics, the results indicate that the probability of being educationally mismatched appears to be strongly influenced by employment characteristics. All else equal, the part-time status of the job increases the probability of educational mismatch compared to the full-time job status. These results are similar to the findings of existing literature (Bender & Roche, 2013; Wolbers, 2003; Boudarbat & Chernoff, 2012). However, relative to wage workers, the self-employed are significantly more likely to report only being horizontally mismatched to their jobs. Self-employment is likely to decrease the probability of being vertically or double mismatched compared to wage employment. This finding is similar to Sanchez et al. (2015), for example, that reveals that the average self-employee has a lower likelihood of reporting being skill mismatched. One explanation for our finding may be based on agreeing with Lechmann & Schnabel (2014) who find that the self-employed fulfill more tasks and that their work requires more skills compared to that of paid employees. We can assume that in the environment of fierce competition, self-employed individuals strive to utilize their potential and qualifications to the fullest and, therefore may not feel that they are overqualified for their jobs. As for firm size, working for a larger firm compared to a firm with less than 5 employees is associated with a lower chance of being vertically, horizontally or double mismatched to one's job, all else being equal. This finding is in line with those of earlier studies (Wolbers, 2003; Quintini, 2011; Fleming & Kler, 2008), which find that the rates of education-job mismatch decline with firm size. This finding could be explained by the possibilities that there may be more opportunities to find work commensurate with one's education and skills in larger firms, which may also tend to offer jobs with higher skills content and hire more skilled workers, and such firms may be likely to be more effective in hiring and screening candidates (Kupets, 2015b; Quintini, 2014).

Consistent with the data on the incidence of educational mismatches across industries, the risk of being educationally mismatched to the job is found to be higher in lower-skilled industries. All types of education-job mismatch appear to be most prevalent in the agricultural sector. Working in the agriculture, fish & forestry sector increases the probability of being overeducated, or horizontally mismatched or double mismatched across both genders compared to the employment in other sectors except for trade & car/bike repairs, holding all other variables constant. In comparison with agriculture, fish & forestry, the probability of experiencing vertical, horizontal or double mismatch is reduced when working in higher-skilled industries such as finance & insurance, professional, scientific & technical

activities and information & communications, which are the industries where jobs are mostly skilled and require higher level qualifications. These findings are in line with those found for both developed and developing countries. As documented by Green & McIntosh (2007), the overqualified have a higher likelihood to work in low-skill industries. As shown by Kupets (2015b), overeducation is more prevalent in economic sectors with more unskilled jobs and less developed hiring practices such as trade, accommodation, food services, transport and communication, individual services, industry and construction compared to the sectors of education, health care and public administration as evidenced by the findings for Georgia and Macedonia. The ILO study (2019) also provides evidence that young employees in public services sectors such as public administration, education and health care are significantly less likely to be mismatched than industrial and construction workers, while agricultural workers are more likely to be overeducated for their jobs. In the light of these findings on the effects of industry of employment on educational mismatch, it can be assumed that mismatches may contribute to the well-known low productiveness of the country's agricultural sector which warrants further investigation.

More generally, the examination of the determinants of education-job mismatches suggests that human capital and employment characteristics appear to have much more impact on the incidence of education-job mismatch than individuals' socio-demographic characteristics. This implies that choices made by individuals regarding their human capital accumulation and employment decisions matter a lot for their education-job mismatch status.

Regarding the determining factors of education-job mismatches, the qualitative inquiry provides complimentary evidence as the focus group participants' reported opinions about the reasons for mismatches. The major themes, revealed from the focus group discussions, such as constrained career choices, labor demand-supply gaps, flaws in the education system, the lack of career guidance, inflated job expectations, unsatisfying employment conditions and unconducive macroeconomic setting present additional factors that could contribute to explaining education-job mismatches on the labor market of the country. Many focus group participants shared their thoughts about the educational mismatch issue as stemming from parental and/or other people's values or influence, students' low awareness of future professions/jobs, dominant societal values, attitudes and perceptions (mentality), and students' career choices driven by the availability of educational grants, relative passing scores, which all may lead to wrong career decisions. Study participants clearly identified imbalances between

labor demand and labor supply as one of the explanatory factors for educational mismatches. Notably, both the quantitative and qualitative findings suggest the presence of gaps between labor supply and demand. There seems to be a paradoxical situation when, in particular, on the one hand, we observe the oversupply of graduates and, on the other hand, employers often complain about skills bottlenecks and shortages of workers in certain professions. The misalignment of the universities and colleges' training in accordance with the labor market demands in part induced by individual preferences for choosing prestigious specialties, the lack of jobs matching the qualification level and fields of study of graduates, low quality and labor market relevance of knowledge and skills acquired during the formal education, and inefficiencies in the state grant allocation leading to graduating in some cases "non-demanded" specialists are referred to as the explanatory factors for the labor demand and supply gaps by the labor market and education experts. In this regard, it should be noted that the State Order approach according to which government-issued grants are awarded to college and university applicants appears to fall short of effective functioning. This mechanism is to be used to enrol students in fields of study with projected need for growth, but it doesn't work based on complete information about labor market needs and future trends (OECD, 2017b). Therefore, the fields where state grants are most numerous don't necessarily enroll the desired number of students (OECD, 2017b). This was also highlighted by several focus group participants who pointed to discrepancies between the mix of student enrollments by field of study both at universities and colleges and labor market needs.

Another factor, one of the most discussed and mentioned themes across all focus group sessions was flaws in the education system. In this respect, low quality of education, weak link between the content of education and the job requirements, the lack of practice-oriented teaching and employer engagement were the major concerns expressed by focus group participants, who suggested that these factors contribute to the existence of gaps between the education system and the labor market. Indeed, the quality of education in the country might be one of the major factors explaining vertical and horizontal mismatches, despite the progress in overall educational attainment of the population. In fact, a number of focus group participants voiced a concern about the quality of education at all levels. Our quantitative results provide evidence that vocational training and unfinished tertiary education are associated with relatively greater incidence of education-job mismatches. As noted by OECD (2017a),

in Kazakhstan the qualifications provided by the education system often do not match the skills needed by employers and what is observed are the relative scarcity of people with the skills demanded in the labor market and people who often have jobs which don't correspond to their fields of education. In the manufacturing sector, as many as 80% of the workers receive some training or education, prior to or after joining the firm, with large and medium firms providing relatively more training consistent with their greater perception of having an inadequately educated workforce (OECD, 2016a). Important skills deficits and mismatches between the supply and demand of skills in the country represent a considerable obstacle for firms' growth (OECD, 2017a). It appears that appropriately equipped labor isn't generated in sufficient quantity in the labor market for a number of sectors (OECD, 2016a). As such, for example, high rates of education-job mismatches are present among vocationally educated workers against the background of shortage of specialists to fill vacancies requiring VET-related skills. According to ETF (2020), every year over half of the jobs posted for staff in occupations requiring vocational qualifications remain unfilled.

The low quality and low relevance of education is related to problems that exist at all levels of professional education and training in the country. The still centralized and top-down governance of the education system, absence of a coherent national qualifications framework, characterized by inconsistencies and duplication in occupational standards across sectors, as well as discrepancies between qualifications and labor market requirements, the ineffective quality assurance system, the lack of developed professional associations, a poor coordination and interaction between educational institutions and employers, gaps between the curriculum and academic programs on the one hand, and labor market needs on the other, the problems of high teaching loads, lack of student-centred learning, and inadequate faculty qualifications are among the major problems that are present in the post-secondary educational system nowadays (Sagintayeva et al., 2014; Álvarez-Galván, 2014; OECD, 2017b, 2018a; UNESCO, 2020). Weak introduction of new educational technologies in the instructional processes, insufficient funding of the higher education system, the lack of update of qualification requirements for the qualification levels of specialists, the content of educational programs of higher and postgraduate education falling short of employer requirements, poor developed social partnership, weak connection with science and production, lack of mechanisms for the involvement of employers in the process of creating higher education standards, as well as training and certification of specialists, mismatch of specialists trained by educational institutions with the

requirements of the labor market, low level of remuneration and social protection, lack of stimulating working conditions, high teaching loads and added responsibilities of the university faculty are among the problems in the sphere of higher education highlighted by national educational experts (Aliyev, 2017; Nureseiit, 2015; Nurysheva et al.,2015). The State Program for Education and Science Development for 2020-2025 highlights among others the redundancy of multidisciplinary universities that do not meet the needs of regional development, highly outdated infrastructure of higher education organizations, and low quality of pedagogical education. As noted in SPESD (2019), 70% of employers are not satisfied with graduates' skills and the quality of education causes the outflow of students abroad with over 100 thousand Kazakhstanis studying in higher education institutions in 130 countries of the world. These problems are present in the vocational education system as well. The mismatch between skills VET graduates possess and the skills demanded by employers, mismatch between the occupations chosen at VET schools and the occupations in greatest demand on the labor market, the inadequate quality assurance and progress monitoring system, weak interactions between VET institutions and employers, drawbacks in infrastructure and shortages of teaching and learning materials, teaching staff and masters of industrial training, 2.5-3 times lower expenditures on VET compared to the spending level in developed countries, low prestige of VET education among others contribute to the persistent problem of low quality and relevance of VET education (OECD, 2014b; IAC, 2019; ETF, 2020).

The qualitative findings obtained in the current study confirm the existence of many of the problems discussed by international and national experts. Duplication of HEIs resulting in the overproduction of the same specialists, distortions in the allocation of government-financed grants across fields of study in terms of the needs of the labor market, inadequacy of academic standards, weak ties between the education system and employers are among the many issues raised by education and labor market experts. The analysis of the focus group findings suggests that the education system of the country is to some degree hit by the so-called phenomenon "diploma disease" (Dore, 1997). In this light, existing studies point to the presence of "qualification escalation" (a steady rise in the qualifications required for any particular job), and "qualification inflation" (a steady fall in the job-getting value of any particular level of qualification)" (Dore, 1997, p. 25) to some extent in the context of Kazakhstan. According to Shevchenko et al. (2014), the main reason for the shortage of qualified specialists on the labor market is the low average level of training in the educational institutions of the country. In the post-independence period the accumulated demand, along with the current high demand for higher education, has been reflected in a large number of people willing to pay for education which

spurred the mushrooming of many private universities with wide branch networks, with quite low quality of education provided (Shevchenko et al., 2014). The faculties at these universities were drawn from existing public universities which worsened the state of affairs there too. Further, under the circumstances when having a diploma has become a common feature for most job applicants, which doesn't, however, guarantee the availability of the required knowledge, the value of a diploma has decreased, and employers have got used to unreasonably requiring having higher education, when considering applicants for lower and middle-level vacancies (Shevchenko et al., 2014). From the focus groups with students in Kazakhstan and Tajikistan Jonbekova (2020) also presents findings which suggest the decline in the perceived role of university credentials in future employability, because of the increase in required qualifications in the selection of job candidates as a result of an oversupply of graduates and limited employment opportunities. This makes students to invest more in acquiring more qualifications to differentiate themselves, leading to a greater supply of graduates (Jonbekova, 2020), a vicious circle, what appears to be some evidence for the presence of “the diploma disease”. Several focus group participants expressed their regret over the current situation when the education system has become a matter of business, when the priority for educational institutions is chasing after profit, not providing quality education.

Notably, one of the policy measures having been implemented for over than 10 years to solve the issue of low quality education is the optimization of HEIs and colleges. Several mechanisms such as merging, downgrading in status, closure, general license revocation or revocation of licenses in certain areas of professional training, or prevention from obtaining a state educational order have been applied to educational institutions which violate the requirements of the legislation, showing non-compliance with the established requirements and education standards, poor conditions for high-quality training, lack of material and technical resources as well as scientific and methodological support and qualified teaching staff, low employment level of graduates, non-compliance with the requirements for the minimum student body, lack of study space and dormitories, etc. (Kochinov, 2015; inform.kz, 2019; primeminister.kz, 2020; Kazistaev, 2021). Similar measures including the withdrawal of licence applications for training in specific specialties and qualifications, revocation of general licenses, termination of training in non-demanded specialties are taken with respect to colleges, due to the mismatch of specialties with the qualification requirements and the profile of colleges, inadequate quality of educational programs, lack of teaching staff, necessary material and technical base, as well as educational and laboratory equipment (sputnik.kz, 2021a, 2021b; kapital, kz; 2021). All this provides evidence that low quality and low relevance of both vocational and university education are

recognized as a serious issue at the country level and tackled currently by authorized bodies. Importantly, since recent times the Government has been implementing a number of reforms in order to address the problems that exist in the vocational and university education systems. Nonetheless there is still considerable room for further improvements with regard to education-job matching on the labor market.

Lack of career guidance was identified as one of the most dominant themes that emerged from the focus group discussions. The majority of focus group respondents who spoke up about career guidance, pointed out its lack and even complete absence. Generally, these experts related educational mismatches to the shortage of appropriate career guidance work. Some experts underscored the role of graduates' inflated job expectations, unsatisfying employment and macroeconomic conditions in explaining educational mismatches. The situation appears to be compounded by the dynamic nature of the present-day environment that entails new challenges with regard to individual skills, abilities, and competencies. As such, challenges, among others, include the trends of automation, the emergence of new alternative and flexible forms of employment, as well as new professions, changes in the employer requirements, the systemic problem of labor market forecasting. Both education and labor market experts noted the dynamism of the labor market environment, and the faster pace of the development of the business and labor market compared to the education system. In this light, some focus group participants emphasized the role of lifelong learning in such a dynamic context. It should be rightly pointed out that nowadays the formal education system is not able to meet all modern learning needs of the population and there is a need to improve learning opportunities for all people to develop and maintain strong proficiency throughout life in order to be able to adapt and thrive in a rapidly changing environment (OECD, 2019c; UNESCO, 2020). Despite relatively high educational attainment of the population in Kazakhstan, the working age population has, on average, significantly lower proficiency in literacy, numeracy and problem solving compared to the OECD and other countries (ETF, 2020). Although lifelong learning and adult education are currently recognized and integrated into national strategic programs in Kazakhstan, there is a lack of a full understanding of lifelong learning and a holistic lifelong learning approach and strategy aren't established (UNESCO, 2020). The major shortcoming and challenges for developing lifelong learning in the country include, in particular, promoting adult education policies by the education and employment authorities only to support

employed people and those who need remedial training to find work, the data gap in the area of lifelong learning, the lack of incentives for employers to participate in workforce development through the creation of lifelong learning opportunities, and the absence of mechanisms for the recognition and validation of informal and non-formal learning (ETF, 2020). Since, lifelong learning plays one of the important roles in contributing to the reduction in skill mismatch by helping update or acquire specific and transversal skills demanded by employers (OECD, 2017e), its development requires serious attention and action of policy-makers.

Finally, the quantitative research provides important findings regarding the effects of mismatch on individual earnings. The results are in keeping with the findings of existing studies that document wage penalties associated with education-job mismatch (Green & McIntosh, 2007; McGuinness & Sloane, 2011; Dolton & Silles, 2008; Robst, 2007; Nordin et al., 2010; Iriundo & Pérez-Amaral, 2016; Li et al., 2018; Rudakov et al., 2019). The findings from the OLS regressions show that all three types of education-job mismatch have statistically significant negative effects on individual earnings. We find that overeducated, horizontally mismatched, and double mismatched employees earn less than workers with the same level of schooling but who work in jobs that match both their qualification level and specialty. All things being equal, relative to the well-matched case, being only vertically mismatched or only horizontally mismatched has a negative effect on individual earnings of around 7.4% and 7.9%, respectively. The earnings penalty is greatest for double mismatch at about 13.6%. The ordered probit models using income as a categorical variable yield qualitatively similar estimates of the effects of education-job mismatches in individual earnings. All types of educational mismatch increase the probability of earning low income, but lowers the probability of earning either middle-sized income or high income. The income penalty is found to be largest for double mismatched workers. The probability of receiving low income increases by 19.6%, whereas the probability of earning middle-sized income or high level income is reduced by about 16.1 and 3.5%, respectively. The analysis using the median income level shows lower income losses for all types of mismatch compared to the baseline specification (Column 1, Table C7 in the Appendix), but the effects of education-job mismatches on individual earnings remain negative and statistically significant. To the extent that the mismatch earnings effects are present and even greater in the upper half of the income distribution (in particular, for double mismatch and horizontal mismatch), the findings suggest that it is incorrect to restrict education-job mismatch exclusively to lower ability/skill workers, and that,

presumably, regardless of individual ability, educationally mismatched workers earn less than their matched counterparts.

Other explanatory variables are found to have statistically significant effects on earnings in both the OLS and ordered probit models. Overall, the results suggest that individual human capital characteristics, place of residence, regional and industry effects, and employment characteristics explain some of the differences in earnings between matched and mismatched workers. Our study documents a gender gap in earnings of about 11 % and urban-rural earnings gap of about 10%. The gender earnings differential is persistent across all models and could be explained by possible gender inequality induced by gender prejudices in the hiring and promotion practices in the workplace, interruptions in women's career lives, women's greater engagement in unpaid domestic work, and also by the larger concentration of women in lower paid jobs (ADB, 2018; UN ESCAP, 2019). As predicted by human capital theory, higher educational attainment is found to be associated with higher returns.

From a theoretical point of view, among the major theoretical frameworks discussed in the educational mismatch literature as relevant for explaining education-job mismatches in labor markets, namely the human capital theory, the job competition theory, and the assignment theory, the quantitative findings in this study that individual earnings depend on education level, job characteristics, and the match between education level and/or specialty and job lend support to the assignment theory. The human capital theory, according to which a worker is assumed to be paid his/her marginal product which is an increasing function of the individual's human capital investment, suggests that individual earnings are determined by his/her characteristics from the supply side. But, since the estimation results indicate that earnings differentials among individuals with the same years of education are also determined by their employment characteristics such as, for example, industry of employment and the quality of match between education and job, the human capital theory assumption isn't supported. As for the job competition theory, which assumes that it is the job characteristics that determine individual earnings, as the current study presents evidence that an individual's education affects earnings, the findings do not provide support for the job competition theory either. Since the study finds that both worker characteristics from the supply side such as individual human capital endowments, in particular education level, and employment characteristics from the demand side including the quality of match between education and job have impact on individual earnings, the findings in this research provide support for the assignment theory. Vertical, horizontal and double

mismatches appear to impose productivity constraints preventing workers from earning an income equal to their marginal product. Moreover, the qualitative findings from the focus groups suggest that both the supply side and demand side factors play a role in explaining educational-job mismatches in the labor market. As such, the flaws in the education system, in particular the quality of education and employment and macroeconomic conditions as well as the gaps between the labor demand and supply contribute to accounting for education-job mismatches. All this suggests that the earnings penalty might reflect issues related to the quality or labor market relevance of education, or the quantity and/or quality of jobs or the job matching processes. Therefore, enhancing education quality and relevance, job-creation and the growth of job quality in the economy as well as matching skills, qualifications and available jobs through efficient job placement services and labor market information must be policy priorities.

Summing up, the findings of the present study suggest that education-job mismatch is a highly important issue to consider and enable us to answer all the research questions framed at the outset of the study. We have defined the incidence of education-job mismatches among Kazakhstani workers across socio-demographic, human capital and employment characteristics and determined a number of factors affecting the incidence of educational mismatches. The majority of workers (70.7%) report working according to their qualification level and specialty, i.e. being fully matched to their jobs. About 21.5% of employees report that neither their job and specialty are related nor the work they perform does correspond to their qualification level. The overall rates of overeducation and horizontal mismatch are about 22.3% and 28.6%, respectively. Overall, the educational mismatch rates are quite comparable with those in many developing and developed countries. The quantitative study reveals that human capital and employment characteristics are likely to have much more impact on the probability of being mismatched than individuals' socio-demographic characteristics. All else equal, education-job mismatches are more prevalent in lower skilled industries than in higher skilled industries, which suggests that the structure of the economy and its capacity to generate jobs that enable to effectively utilize the available human capital of the workforce are important factors in accounting for education-job matching on the labor market. The findings from the qualitative research point to a number of education-related and labor-market factors that might contribute to education-job mismatch. We have

also revealed from the focus groups that there are concerns about the capacity of the country's education system to provide labor market relevant knowledge and skills, lack of effective career guidance systems, uninformed career choices, and that the labor market-related factors, including labor demand and supply gaps, unfavorable employment and macroeconomic conditions, in general, represent additional factors that could contribute to explaining education-job mismatches. Importantly, from the quantitative research we have presented evidence for negative effects of education-job mismatch on individual earnings. This allows us to confirm our next hypothesis that, *ceteris paribus*, relative to working in a matching job, being educationally mismatched to a job is associated with earnings loss. Next, the findings of the qualitative study point to the existence of imbalances between demand and supply in the labor market. Also, the focus groups suggest that the better alignment of the education system with labor market needs is conducive to improving the education-job mismatch situation in the country. All these quantitative and qualitative findings of the study have highly important policy implications which are discussed in Chapter 9.

## **Chapter 8. Some International Practices for Improving the Alignment of Education Systems to Labor Market Needs**

Considering the consequences of education-job mismatches for both individuals and the economy, they are addressed at the policy level by means of different measures. At the system level, one policy lever to lower the incidence of mismatch is to develop an anticipative approach to assessing future skills needs. The need to reduce the risk of large skills mismatches negatively affecting both the employability of individuals and the productivity of firms requires anticipating skills (ILO, 2021). There are good practices of skill needs assessment and forecasting used in many EU Member states. Europe has a long tradition of forecasting skills needs, but there are differences in national experiences with respect to the periodicity, methodology used and extent of detail (CEDEFOP, 2008, CEC, 2009). Such countries as Denmark, Spain, Greece, Hungary, Lithuania, Latvia, Portugal, Slovakia and Slovenia use decentralized systems for anticipating skills needs, elaborated mostly at trade, sector or local level, while others including Austria, Germany, France, the Netherlands, Sweden and UK have a comprehensive system nationally coordinating forecasts for the country, regional and sectoral levels (CEC, 2009).

Some countries take this a step further and focus on specifying emerging competences by sector. The European Commission has designed a common approach to determine emerging competences across sectors, which maps the major economic and employment trends and changes, as well as emerging or changing skills and competences with a view to outlining strategic choices to answer the skills needs, implications for education and training, and recommendations (CEC, 2009). In the US the O\*NET system, administered by the Bureau of Labor Statistics (BLS), represents the nation's primary occupational competency data source. It provides occupation-specific descriptors of knowledge, skills, work abilities, work values, experience requirements, training and credentials, work activities, work context and job requirements, and job openings for almost 1,000 different occupations covering the U.S. economy<sup>22</sup>. Besides, there is the Occupational Outlook Handbook from the US BLS, which is a nationally recognized source of career guidance. It presents information on what workers do on the job, work conditions, education, training and other qualification requirements, earnings, and the job outlook for hundreds of occupations<sup>23</sup>.

Insights and knowledge from the systems for assessing, forecasting and anticipating skills needs can be linked to educational systems with respect to curricula and educational programs designed, levels and/or fields of study offered. This contributes to raising the labor market relevance of knowledge and skills acquired during formal education, and fields of study taught in educational organizations. As such, Australia, Turkey and Northern Ireland employ information from skill needs assessments to promote apprenticeships in industry sectors and occupations facing greater demand of skilled labor (OECD, 2014c). Australia does this through the direction of funds to training organizations, while Northern Ireland through the provision of public funds to apprenticeships to candidates of all ages (OECD, 2014c).

In general, governments use a variety of policy levers to help ensure that education systems improve labor market relevance and graduate outcomes. These policy tools include different funding mechanisms, regulation and information levers, as well as organizational resources (OECD, 2017c). The policy levers are increasingly employed across countries. For example, in response to the OECD questionnaire conducted in 2016, the Slovak Republic reported that as a performance-based funding it

<sup>22</sup> <https://www.onetonline.org/>

<sup>23</sup> <https://www.bls.gov/ooh/about/ooh-faqs.htm>

considered the “graduate employment coefficient” in determining the state subsidy for public higher education institutions, the Czech Republic reported providing targeted funding to a private university in the region of Prague to co-finance a nursing programme and programs in foreign languages that are of crucial importance for foreign policy, trade and national security, Estonia reported extending a “specialization stipend” to incentivise students to study full-time in certain STEM fields which are priority for the country, Canada reported about using student loan forgiveness as federal government support of primary health care in remote and rural communities (OECD, 2017c). Policymakers can also use regulatory levers such as laws and regulations, quality assurance mechanisms to influence the labor market relevance and outcomes of higher education systems (OECD, 2017c). For instance, they can set thresholds of quality and performance on institutions and programs through institutional and program accreditation, exercise controls on enrollments through minimum entry requirements, caps on enrollments in certain fields or levels of study and set minimum labor market outcomes as standards for higher education institutions or programs to be used in the selection for participation in a state-sponsored student financial aid (OECD, 2017c). According to the OECD questionnaire, for example, Denmark applies caps to student enrollments in programs the graduates of which have faced systematically and significantly high unemployment rates (OECD, 2017c).

Furthermore, there are various information policy levers that could be utilized to improve the labor market relevance and outcomes of education systems. Information about labor market outcomes and opportunities which might be expected from different programs, such as, for example, data on graduates’ earnings, employment rates, and job satisfaction, or more general information, as projections of future skills needs, will lead to enhancing the labor market relevance and outcomes of programs in educational institutions as considering their own abilities and preferences students can use this information to select programs that will lead to better labor market outcomes (OECD, 2017c). Many countries including Australia, New Zealand, the United States, Germany, the United Kingdom and Canada, regularly survey their graduates in order to collect data on the labor market relevance of their skills and labor market outcomes. Slovenia uses a mechanism for tracking graduates that should help inform policy makers, tertiary institutions and students about the employability of graduates from different studies (EU, 2019). Educational institutions can also use labor market information including

data on graduate labor market outcomes and skills projections in their decision-making processes regarding programs to offer, and the curriculum to develop and revise (OECD, 2017c). And, finally, employers may make use of information about students enrolled in the higher education institutions to plan for their staffing needs and this may also encourage employers' feedback to institutions about their needs (OECD, 2017c). Governments also have at their command a range of organizational policy levers such as strategic planning, drawing on expertise of policy networks including such actors as trade unions, employer associations, and students' unions, organizing government-operated career centers and work-based learning experiences for students (OECD, 2017c).

There are also good practices of projects which aim at enhancing the alignment between the outputs and outcomes of educational systems and labor market needs. For example, the Tuning Educational Structures in Europe project, which started in 2000 and developed by universities enables universities to improve the adaptation of their curricula and determination of degree programs in terms of learning outcomes, which leads to qualifications, that are better aligned with the labor market needs (CEC, 2009). Surveys conducted within this project study the perceptions of graduates, academics and employers concerning curricula, learning outcomes, skills requirements, teaching methods, student workload and quality enhancement (CEC, 2009).

One way of ensuring that educational programs, skills acquired through the education and training system and student preferences are better aligned with labor market needs is to provide students with good career guidance (OECD, 2010; Musset & Kureková, 2018). Today we observe that both education systems and jobs are evolving and diversifying, and, as a result, career choices, and career guidance, are gaining more importance (OECD, 2010). Existing studies suggest a positive impact of career guidance on individual economic, educational, and social outcomes (OECD, 2010; Musset & Kureková, 2018). Career guidance is likely to help students identify their preferences, gain deeper understanding of the relationship between education and employment, encourage successful progression through education and training, leading to better grades and better jobs, increase knowledge of opportunities and improve individuals' decision-making skills, self-confidence, and career maturity (Musset & Kureková, 2018). Given the possibilities of young people's unrealistic labor market expectations and misinformation concerning the diversity of different education and job and

occupation options, gaps between their career aspirations and projected labor market demand, and the impact of social status, gender and ethnicity and other factors on individual career preferences and aspirations, career guidance plays an important role in developing stronger links between the world of education and the world of work (Musset & Kureková, 2018). It is recommended that individual career guidance be built as a part of a comprehensive framework, which includes a systematic career education programme to instruct students about the world of employment from the earliest years, backed by workplace visits and experience (Musset & Kureková, 2018). Considering the scope of our study, we note that interested readers can further look into the issues of designing effective career guidance services, challenges and related policy responses in the relevant studies, including the OECD reports (2010; 2014c), Hofer et al. (2020) and others. Below are some examples of career guidance and labor market information services from different countries. In Switzerland secondary education provides career guidance and information sessions as a mandatory component with all teachers undergoing training on labor market opportunities and students in grades 7 through 9 learning about career options and the main guidance and counselling institutions, BIZ (OECD, 2010). The BIZ centers provide information and counselling for all education and training levels and students can meet with generalist counselors, as well as specialists in different fields (OECD, 2010). The career guidance website “Uplatnenie” (Slovak Republic) presents information about the average duration of graduates’ job entrance, “Job Compass”, an interactive tool on “Utdanning” in Norway and “Utbildningsinfo” in Sweden enable students to explore professions and occupations trajectories, the relations and transition between professions and the respective educational requirements, “Careers” in New Zealand provides information on the effect of education on income and the reasons for skills shortages, “VDAB” in Belgium presents information on shortages across professions and their reasons such as a shortage of appropriate graduates, appropriate programs, or skills among candidates, or working conditions (Hofer et al., 2020).

There are also good international practices in the area of lifelong learning. Many countries provide targeted support to ensure lifelong learning. The public employment agency in Germany provides support for training of low-skilled and older workers through the programme WeGebAU, which grants a 75% subsidy to the training costs of workers aged 45 years and more to SMEs with

micro-enterprises with less than ten workers receiving a 100% subsidy of training costs (OECD, 2019b). In the Netherlands, workers aged 45 and older can obtain insight into the future prospects of their current job, their skills profile and career opportunities as well as develop an individual plan outlining the actions needed to be taken to ensure employment until retirement through their participation in subsidized career development guidance (OECD, 2019b). In Slovenia the new programme entitled “Comprehensive Support to Companies for Active Aging of Employees” provides skills upgrading opportunities to older workers (OECD, 2017d). In addition to the adult programs offered through secondary school centers, which primarily provide training for ICT, communication skills and language and other skills, training is also available through adult educational centers (OECD, 2017d). The Second Career programme in Ontario, Canada, provides some adjustment assistance for older or long-tenured workers affected by economic restructuring with a view to training them for new careers in high-demand fields through the provision of skills training and needs-based income support (OECD, 2015).

Below we outline a range of good practices implemented in Norway, Slovenia and Germany, as country cases, which should contribute to the better alignment of their education systems to labor market needs. The rates of over-qualification and field of study mismatch are lower in Norway compared to the OECD average (OECD, 2016b). Graduates of the Norwegian higher education system generally have good labor market outcomes, which could be largely due to the country’s reforms over the past 20 years to improve the quality of higher education and robust and inclusive labor market (OECD, 2018b). The higher education practices promoting the labor market relevance of skills and good labor market outcomes of graduates include, among others, the use of labor market relevant information by institutions to inform the selection of programs to offer and curriculum design, and to help prospective students make informed choices about field of study, admission processes to ensure better preparedness and match of students with their programs, academic support for students, innovative learning and teaching, extracurricular activities which help develop transversal skills, including communication, leadership and teamwork (OECD, 2018b). Another country, which is found to have relatively lower incidence of over-qualification and field of study mismatch among the OECD countries, is Slovenia (OECD, 2016b). Notably, the employment rate of VET graduates in Slovenia is

high, and currently policies focus on the evaluation of workplace learning quality, setting a register of learning places nationally, introducing a certificate presenting detailed, and internationally comparable information to employers on vocational qualification, strengthening apprenticeships, developing quality assurance, promoting entrepreneurship, innovative methods of teaching and teachers' pedagogical skills (EU, 2019).

An exemplary case of low field-of study mismatch and excellent integration of vocationally educated young people in the labor market is Germany. This is likely to reflect strong work-based training in vocational education, strong supply and demand of STEM skills, a well-developed system of career counselling and orientation, which are part of education in all schools (Hutfilter et al., 2018). Importantly, vocational education programs are adjusted regularly to technological changes with inter-company training centers and subsidies for the procurement of digital equipment by schools put in place (Hutfilter et al., 2018).

Importantly, in the context of the discussion of the issue of education-job mismatch, it should be noted that more and better education isn't necessarily associated with better job opportunities. More and better education can only lead to significant benefits if job opportunities are generated to employ graduates and utilize available knowledge and skills (ILO, 2021). But, in today's world it's not enough just to pursue a good match between available skills and jobs but it's necessary to stimulate the generation of more high value-added and high-skilled jobs, i.e. "to shape" demand for skills in the interests of longer-term economic development (OECD, 2012). Policy makers can foster the creation of new jobs and increase the demand for skills by developing economic-diversification strategies, supporting investment, and promoting policies that foster innovation, competition and entrepreneurship (OECD, 2012). For example, the successful experiences of the Republic of Korea, China, Taiwan, and Singapore made use of strategic government-led coordination promoting a more effective alignment of economic and training policies that ensured that VET programs were effectively linked to the industrialization strategy and led to sustainable investments in higher-level skills (Almeida et al., 2012). The approach of Singapore's Economic Development Board (EDB), which is credited for the successful skills development practice, involved learning effective training strategies through the partnership with leading international firms and establishing company-affiliated training centers that

facilitated the country's industrialization (Almeida et al., 2012). Further, EDB upgraded training curricula and resources by employing further foreign support (Almeida et al., 2012). In India it is the private sector that took the lead in encouraging a better alignment of skills demand and supply. Following the demand for information technology and IT-enabled services, Indian IT firms stepped forward to improve the supply of industry skills by establishing new training courses with relevant content and partnerships with academia and government, and applying standards to assess and certify skills (Almeida et al., 2012).

Such good practices and successful experiences of foreign countries can provide beneficial lessons for Kazakhstan, which could examine the relevance, adapt to local conditions and implement relevant policy measures that would improve the alignment of education with labor market needs.

### **Chapter 9. Policy Implications and Recommendations**

The main policy implication of the study is to facilitate the matching between education and employment. Our quantitative research documents earnings penalties associated with educational mismatches. This makes studying the issue highly relevant since reducing educational mismatches may be tapped as one of the ways of increasing aggregate productivity in the country, especially in lower-skilled industries. Notably, the findings suggest that the earnings penalty might reflect issues related to the quality and/or labor market relevance of education, or the quantity and/or quality of the jobs or the job matching processes. Therefore, enhancing education quality and relevance, job-creation and the growth of job quality in the economy as well as matching skills, qualifications and available jobs through efficient job placement services and labor market information must be policy priorities.

Since, overall, individuals who hold secondary vocational degrees and those who haven't completed their tertiary education face relatively greater risk of experiencing both vertical and horizontal mismatches as well as double mismatch, the quality and relevance of secondary vocational education and completion rates in higher education institutions warrant policy attention. Another policy implication of the quantitative findings is related to the observed patterns of education-job mismatches across industries, which shows higher probability of being educationally mismatched in lower-skilled industries compared to higher-skilled industries. In this light, it may be assumed that low labor productivity in these industries might be also related to the higher incidence of education-job

mismatches and this question deserves further investigation.

The findings from the focus groups provide a number of implications to consider regarding educational mismatches. These policy implications refer to *developing the career guidance system in educational organizations and enhancing labor-market relevance and quality of education at all levels, including structural* (with respect to the orientation of the educational training, its length and the state educational grant allocation) *and processual* (orienting the education system towards labor market needs through aligning the content of education with labor market demands, increasing employer engagement and practice-oriented learning, improving the implementation of internships, and raising public awareness) *implications*. Moreover, individuals, family and the state are important stakeholders whose decisions and actions have important implications for the education-job mismatch situation in the country.

One of the most frequently shared recommendations was the need to develop *career guidance* in all educational institutions. Many experts underscored career guidance as one of the basic prerequisites. They suggested that career guidance should be in place from junior grades throughout the whole way of personal development to enable individuals to make informed career decisions and, importantly, right decisions. This is to help reveal individual abilities and inclinations and develop them further, orient students towards their capabilities and likings, as well as provide knowledge and information about fields of studies, professions, labor market needs and trends. Notably, it was proposed, by one expert, to introduce a career guidance subject or specific program in schools.

*Another major policy implication of this study is the need for enhancing the quality and labor-market relevance of education.* Enhancing the quality of educational programs, developing quality assurance systems, upgrading teaching quality and education infrastructure were mentioned among very important measures. Aside from increasing the quality of professional training in educational institutions, a number of important strategies were noted as contributing to improving education-to-job matching in the labor market. Here, one strand of expert recommendations was of *structural* character. They concern the orientation of the educational training, its length and the state educational grant allocation. Some experts spoke for *increasing the flexibility of educational programs* in the sense that the profile of university training should be wide enough, while teaching specific skills as well. In their opinion, this would provide students some particular freedom to change the direction of study, transfer to a different specialty. According to some focus group participants, as knowledge becomes outdated quickly, there is simply no need for teaching some skills for 4 years or in some specific specialties, we should *shorten the length of educational programs and courses*. The exclusion of unneeded subjects

was proposed, by one expert, among others. There were also some suggestions regarding the state order. It was noted that it's necessary that we take into account supply and demand in the labor market. In this light, the need for the state regulation and proper planning of student enrollment was mentioned to preclude over-supply of certain specialists.

*Processual* recommendations offered by experts refer to *orienting the education system towards labor market needs through aligning the content of education with labor market demands, increasing employer engagement and practice-oriented learning, and improving the organization of internships*. The thrust of all these recommendations is that we should be geared towards labor market demands. As suggested by experts, *aligning the content of education with labor market demands* should include conforming educational programs with employer requirements through developing professional standards, training for "in-demand" job competencies and skills, and, generally, implementing a coherent national qualifications system. Another major action point, suggested by experts, refers to *increasing employer engagement*. With regards to this, the general consensus was that there must be a full-fledged dialogue between the education system, educational institutions and employers, the business. As noted, employers need to actively participate in the elaboration of educational programs and the learning process, so that there will be graduates of high quality, specialists who will be capable of meeting their requirements. Educational institution leaders and employers were invoked to turn to each other, to meet and discuss their issues, initiatives and needs.

The next measures, *enhancing practice-oriented learning and improving the implementation of internships*, are also about the linking the educational process to the production, work practice. Making the learning process more practice-oriented, in particular in those specialties, that require good command of practical skills through extending the dual training system, involving more practitioners into teaching, doing more labs and learning at production sites should enable students to gain an increased understanding of their future professions and be more professionally prepared for their future jobs. On a related note, in the opinion of focus group participants, it is necessary that we *improve the implementation of students' internships*. As noted, an internship of appropriate quality should be based on constant feedback and communication between the educational institution and the place of internship, where an individual undergoes practical training. Notably, some experts spoke for the extending the length of internships, especially for future technologists.

Alongside other processual implications, equally important, as brought up by focus group experts, is *raising public awareness* about labor market trends, labor demand for professions and job competencies, different job opportunity structures across industries, new professions, job requirements,

and the levels of wages across different grades. Both educational institutions and employers, as noted, should take part in this work. Since imperfect information may be one of the possible contributors to educational mismatches, and given the existing evidence indicating that finding a job through a formal agency (public, private, university/school career office) reduces the odds of mismatch (ILO, 2019), promoting the work of employment agencies may be an attractive policy lever. Graduate employment or the so-called career centers in educational organizations should enhance their work to provide quality labor market information to help graduates have actual expectations. There is also a role for individuals who should bear responsibility for their choices and labor market outcomes. They don't only need to have good quality knowledge and skills, but should learn more about labor market trends, demand for different professions, and job requirements. They need to keep up with up-to-date requirements in terms of new skills and competencies. In this respect, *life-long learning* appears to be what is needed to be in demand. In this context, an important stakeholder is *parents* who have a great impact on their children's educational and career decisions. As noted by some experts, relevant work with parents should be carried out, in particular raising the level of their awareness of professions and labor market trends.

As revealed from the focus group discussions, *the state* is a critical agent that has certain responsibilities and resources to affect the educational mismatch situation. Some experts clearly stated that many of the issues that were discussed during the focus groups didn't depend on their level, but needed resolving by the central and local authorities. Importantly, it was suggested that educational institutions should be heard from the bottom up, that education officials go down to universities and colleges and look at how training is conducted, and that the officials engaged in policy-making should have work experience in the field of education. Developing the institutions of statistical analysis and forecasting was highlighted as needed to improve labor market forecasting capabilities of the state. Importantly, the opening of new plants and creation of new jobs were mentioned as important for supporting employment and the demand for education. Another interesting suggestion that is related to the role of the state was reassigning educational institutions to the jurisdiction of respective (sectoral) ministries, as in Soviet times. It is allegedly the case that the sectoral ministry knows better in what direction to train specialists, how many specialists to train, and how to change the content of education. More generally, the focus group discussions suggest that these various strategies and mutual responsibility on the part of individuals, family and the state could facilitate education-to job matching.

Based on the findings of this study we suggest the following policy recommendations to improve the education-job matching situation in the country. Reducing education-job mismatch

requires combined efforts on the part of the *education system, employers, the state and individuals*. The education system needs to be geared towards labor market needs by *providing labor market-relevant knowledge and skills*. Considering our quantitative results providing evidence that education provided by secondary vocational training and unfinished tertiary education are associated with relatively greater incidence of education-job mismatches, efforts need to be undertaken to enhance the quality and labor market relevance, in particular, of vocational education and completion rates in higher education institutions. Regarding vocational training, measures should be taken to align further the study programs with labor market demands and increase the prevalence of apprenticeships in jobs and occupations with favorable job opportunity structures. Based mainly on the existing studies and our qualitative findings, that are partially supported by the quantitative results, raising the labor market relevance and quality of tertiary education needs to be one of the major strands of work as well.

In this respect, among other things, important measures to be implemented should include *enhancing the quality and relevance of study programs, upgrading the quality of teaching, education facilities and infrastructures*. As suggested by OECD (2017b), the development of the modern-day curriculum should include, among others, the coordination of efforts with employers to align the curriculum with the requirements of professions and jobs and the determination of programme outcomes with respect to knowledge, skills and competencies as well as ethics. This requires improving inputs and processes, revamping a heavily centralized approach to governance, enhancing the capacity of education institutions and faculties, promoting active student engagement and practice-centered teaching. In this light, *the development of the quality assurance system* across education organizations is critically important. The relevant measures need to be implemented for education institutions to embrace the culture of quality assurance and adopt the mechanisms to improve processes, inputs, and eventually outputs and outcomes, as suggested by OECD (2017b). The elaboration of rankings and indices across not only universities and colleges but also institutional departments and faculties would also serve to assess and improve the quality of education.

More generally, in terms of raising the quality and relevance of knowledge, an important area of work should focus on further *developing the National System of Qualifications* that could align educational programs with employer requirements and play an important role in reducing the incidence of educational mismatches. *Increasing employer engagement and practice-oriented learning and improving the implementation of students' internships* are needed to orient the education system *towards the labor market*. In this respect, such *structural measures* as changing the orientation of the educational training, its length and the state educational grant allocation warrant further analysis. The

most straightforward measure among these that is worth noting is alleviating inefficiencies in the distribution of educational resources through upgrading the allocation of state educational grants in terms of better alignment with labor market needs.

Of particular importance among processual measures is active engagement of employers. Employers should be actively involved in the dialogue with educational institutions by participating in the elaboration of educational programs and engaging with teaching, providing information about the labor market needs and trends and creating favourable learning conditions for students at production sites. Moreover, more public information on vacancies, job requirements and wage levels across different grades on the part of employers could be helpful in graduates and job seekers obtaining actual job expectations and lowering the incidence of educational mismatches. With regard to increasing employer engagement, one promising approach, as noted by OECD (2017b), may be the development of solid professional bodies along with the participation of employers on boards, that could be promoted to ensure that education programs reflect professional competencies required on the labor market.

Another crucial policy measure to be focused is *developing career guidance* in all types of education organizations to help reveal individual abilities, talents and inclinations and develop natural gifts, so that students orient themselves towards their capabilities and likings, as well as provide knowledge and information about fields of studies, professions, labor market needs and trends as well as effective job search methods and interview strategies for high school graduates and post-secondary students to be able to make more informed career choices and have better employment prospects.

Overall, at the systemic level, the state education policy should be aimed at improving the human capital stock of the population. The state shouldn't only follow but anticipate and prepare for labor market needs, trends and changes. In this regard are quite revealing the dynamism of the labor market environment and its challenges to the education system. As such, these include among others the trends of automation, the emergence of new alternative and flexible forms of employment, as well as new professions, changes in the employer requirements, the systemic problem of labor market forecasting. All this points to the need for the government to enhance its capacity to effectively respond to these challenges. Therefore, improving the quality of institutions and public policies and developing the capacity for labor market anticipation are essential. Kazakhstan needs strengthening further its

system for assessing and forecasting by establishing a regular systematic assessment of supply and demand in the labor markets both for short-term and long-term horizons, broken down by regions, sectors, occupations, and levels of qualification. In this regard, businesses should be actively involved in the assessment of skills needs and the collection of data on graduate outcomes through surveys should be promoted. Importantly, the outputs from the systems for anticipating labor market needs must be linked as an input to the educational system with respect to levels and/or fields of study offered, curricula and program contents changed. In general, based on successful international experiences, the government should expand the use of a variety of relevant policy levers including different funding mechanisms, regulation and information levers, as well as organizational resources to help the education system enhance labor market relevance of knowledge and skills provided by educational institutions and graduate labor market outcomes. In particular, lifelong learning and workplace training offered by employers should be promoted by offering financial incentives and non-financial measures. Private training providers and recruitment agencies should be supported in designing and delivering training courses and events such as partnerships for employment should be organized to give credit to the most innovative approaches to matching skills supply and demand.

Since more comprehensive, more diverse, more detailed information can help mitigate potential asymmetric information in the labor market, *raising public awareness* about labor market trends, demands for professions, skills and job requirements, different job opportunity structures across industries, and the levels of wages across different grades is another area for policy action to be focused. In this respect, the state, educational institutions, employers, individuals and parents are all important stakeholders. In particular, expanding the capacity of employment agencies (public and private organizations, university/school career offices) could be one of most feasible policy levers, as suggested by ILO (2019).

And importantly, the question about whether the country needs some structural reforms to adapt the job/occupation structure to the knowledge-based model of production should be considered. In particular, policies to increase the job generating capabilities of the economy, ensure the growth of job quality and develop the high productivity sectors of the economy should be stressed. Improving

policies, which may have an impact on finding matching jobs, for example, easing labor mobility barriers, should be also considered.

Finally, a policy recommendation is in order with respect to the need to include an additional question in the LFS questionnaire on fields of study of respondents in order to make it feasible to carry out studies on education-job mismatch from the perspective of different fields of study. The respective survey question could be “What is your field of study?” or “Please indicate your field of study”.

## **Chapter 10. Conclusions**

### **10.1 Summary of Findings**

The quantitative and qualitative parts of the current study shed light on the issue of education-job mismatch and provide substantial evidence on the importance of education-job match for both individuals and the economy as a whole. The quantitative inquiry examines the incidence, determining factors and earnings effects of educational mismatches in the labor market of Kazakhstan using the cross-sectional labor force data. Vertical and horizontal mismatches among workers in Kazakhstan are relatively comparable to the incidence of mismatches in other countries (Groot & Van den Brink, 2000; McGuinness et al., 2018; Somers et al., 2019). Our sample data show that the incidence of education-job mismatches varies across socio-demographic, human capital and employment characteristics. Educational mismatch is less often reported by an individual if he is an urbanite, aged 25-45 years, married, has the highest level of educational attainment, has longer tenure in current job, works in organizations with between 51 and 250 employees, is a wage worker, works in a full-time job and in a higher skilled industry.

The examination of the determining factors for educational mismatches shows that the socio-demographic, human capital and employment factors are likely to affect the probability of being educationally mismatched to the job to varying degrees. The findings document interesting results regarding the effects of different levels of education on the probability of education-job mismatches. Relative to the reference group of individuals with primary vocational education, individuals who hold secondary vocational degrees and those who haven't completed their tertiary education are significantly more likely to be overeducated, horizontally or double mismatched to their jobs, holding all other variables constant, except for women who have a decrease in the probability of being horizontally mismatched. Further, the findings indicate that tertiary educated men are more likely to face the risk of being overeducated and double mismatched, while tertiary educated women, on the contrary, have a

lower probability of being vertically mismatched and double matched, relative to their counterparts with primary vocational education, all else equal. But, among all employees, men and women, taken separately, the level of tertiary education including postgraduate degrees has a significant negative effect on the probability of horizontal mismatch. The detailed analysis of potential reasons for such mismatch patterns are provided in Chapter 7 “Analysis of the Findings”. More generally, it can be concluded that the topic of education-job mismatch is new in the context of Kazakhstan and additional quantitative studies are needed to be carried out to determine the reasons for accepting non-matching jobs among workers, in particular across different education levels and gender.

By comparison, the effects of another human capital variable, current job tenure, are found to be much more consistent. The findings suggest that longer tenure is likely to reduce the risk of being vertically, horizontally and double mismatched. It is plausible that human capital obtained via specific on-the-job training allows mismatched workers to compensate for the lack of firm and occupational specific knowledge and skills and subsequently move to higher or horizontally matched job positions.

Importantly, we have also revealed anticipated effects of the industry of employment on the likelihood of being in a non-matching job. The results indicate that consistent with the data on the incidence of educational mismatches across industries, the odds of being educationally mismatched are much higher in lower-skilled industries as compared to higher-skilled industries, where jobs are more skilled and require higher level qualifications. In view of this finding, it can be assumed that education-job mismatches might contribute to relatively low productivity in the lower-skilled sectors which warrants further investigation.

More generally, the quantitative analysis of the determinants of education-job mismatches suggests that human capital and employment characteristics appear to have much more impact on the extent of mismatch than individuals’ socio-demographic characteristics. This implies that choices made by individuals regarding their human capital accumulation and employment decisions matter a lot for their education-job mismatch status.

The qualitative inquiry provides complimentary evidence on additional factors for educational mismatches as revealed from the focus group participants’ opinions. The analysis shows that constrained career choices, labor demand-supply gaps, flaws in the education system, the lack of career guidance, inflated job expectations, unsatisfying employment conditions and unconducive macroeconomic setting might present additional factors that could contribute to explaining education-job mismatches.

Importantly, our study provides evidence of significant negative effects of all three types of education-job mismatch on individual earnings. *Ceteris paribus*, relative to the well-matched case, being only vertically mismatched and only horizontally mismatched have negative effects on income of about 7.4% and 7.9%, respectively. However, when a worker is in a job which is neither in his field of study and nor of his qualification level, all things being equal, the income loss increases up to about 13.6%. The findings also suggest that regardless of an individual's ability, educationally mismatched workers earn less than matched workers and that lower earnings aren't necessarily related to lower ability.

Overall, the estimations suggest that individual human capital characteristics, place of residence, regional and industry effects, and employment characteristics explain some of the differences in earnings between matched and mismatched workers. Regarding other important results, it should be noted that the current study documents the gender gap in earnings and urban-rural earnings gap. Also, as shown by many existing studies, higher educational attainment is found to be associated with higher returns.

From a theoretical point of view, our findings from the earnings equations lend support to the assignment theory as earnings are found to be determined by both worker characteristics from the supply side such as individual human capital endowments, in particular education level, and job characteristics on the demand side including the quality of match between education and job. Vertical and horizontal mismatches appear to impose productivity constraints preventing workers from earning an income equal to their marginal product.

The study has important policy implications. The key policy implication of the findings is to facilitate the matching between education and employment. Our quantitative research documents earnings penalties associated with educational mismatches. This makes studying the issue highly relevant for reducing educational mismatches may be tapped as one of the ways of increasing aggregate productivity in the country, especially across lower-skilled industries. Importantly, both quantitative and qualitative findings suggest that education-job mismatches might be related to the problems with the quality and/or labor market relevance of education, and/or the quantity and/or quality of the jobs or the job matching processes. Therefore, enhancing education quality and relevance, job-creation and the growth of job quality in the economy as well as matching skills, qualifications and available jobs through efficient job placement services and labor market information must be policy priorities.

The major policy recommendations derived from this study include **orienting the education**

*system towards labor market needs* by providing labor market-relevant knowledge and skills. In this respect, important measures to be implemented should include *enhancing the quality of study programs, upgrading the quality of teaching, education facilities and infrastructures, developing further the National System of Qualifications and the quality assurance system across educational organizations, increasing employer engagement and practice-oriented learning, and improving the implementation of students' internships*. Another critical recommendation is to **develop career guidance** at all levels of education. Importantly, **raising public awareness** about labor market trends, demands for professions, skills and competencies, different job opportunity structures across industries, job requirements, the levels of wages across different grades is another area for policy action to be focused. In this respect, the state, educational institutions, employers, individuals and parents are all important stakeholders.

At the systemic level, the role of the state in improving the education-to job matching situation is critical. The government should become more responsive to and anticipatory of new labor market trends and changes. The dynamism of the current labor market environment poses serious challenges to the government. Facing the trends of automation, the emergence of new alternative and flexible forms of employment, and new professions, changes in the employer requirements, and the systemic problem of labor market forecasting, the government needs to enhance its capabilities to effectively cope with these new challenges and their implications. Improving the quality of institutions and public policies, developing labor market forecasting capabilities and creating employment opportunities of good quality are all essential policy measures in this regard.

In general, the findings of the present study enable us to answer all the research questions and confirm all of our hypotheses formulated at its outset. We have determined the incidence of education-job mismatches among Kazakhstani workers across socio-demographic, human capital and employment characteristics and identified a number of factors affecting the incidence of educational mismatches. The quantitative study reveals individual-level and employment factors, while the qualitative study reveals a number of education-related and labor-market related factors that might contribute to educational mismatches. Importantly, we have presented evidence for negative effects of education-job mismatch on individual earnings. We have also revealed from the focus groups and the

relevant literature that there are concerns about the capacity of the country's education system to provide labor market relevant and good quality knowledge and skills and that the labor market-related factors, including labor demand and supply gaps, unfavorable employment and macroeconomic conditions in general represent additional factors that could contribute to explaining education-job mismatches.

### **10.2 Limitations and Implications for Future Research**

Data availability constraints and measurement issues complicate the empirical analysis of educational mismatch in developing countries (Battu & Bender, 2020; Kupets, 2015a) and Kazakhstan is no exception. First, due to the cross-section nature and scope of the data employed in the study we couldn't directly control for unobserved individual heterogeneity or use the instrumental variables approach. Second, as noted before, the education-job mismatch measures used in the analysis reflect only formal education acquired and don't capture informal skills acquired through labor market experience and on-the-job training. In this regard, the only consistent finding is that a longer tenure in current job is likely to decrease the probability of being mismatched to the job.

The above mentioned limitations help identify avenues for future research. We hope future research will overcome these limitations as new forms of data become available. In particular, it would be great to have relevant data to apply panel estimation techniques, construct variables indicating the extent of knowledge and skills utilization on the job, model movement into matching employment and examine the persistence of education-job mismatches. Furthermore, given the possible trade-offs between wages and other aspects of the job such as increased flexibility, promotion opportunities, job autonomy, status, working conditions, and the like, the avenues for further research could also include examining the reasons for education-job mismatch, when relevant data are available. Besides, as noted before, given that the LFS data-set doesn't contain a question on fields of study/specialty completed by the respondent, when the relevant question included in the LFS questionnaire, future research endeavors will hopefully be undertaken to consider education-job mismatch in Kazakhstan in terms of the effects of different fields of study (specialties) as is done in many studies from other countries.

### **10.3 Concluding Remarks**

This thesis has offered an attempt to reveal the incidence of educational mismatches, understand their causes and earnings effects and the role of the education system- and labor market-related factors

in matching of education to employment in Kazakhstan. The study contributes to the educational mismatch literature being the first study on education-job mismatch in Kazakhstan based on using the large nationally representative labor force survey data. Another distinction of this study is its methodological aspect, the use of the mixed-methods design, which enabled to gain a richer, deeper understanding of the issue of educational mismatch. Both quantitative and qualitative findings of the study suggest that education-job mismatch is a salient issue which has important policy implications.

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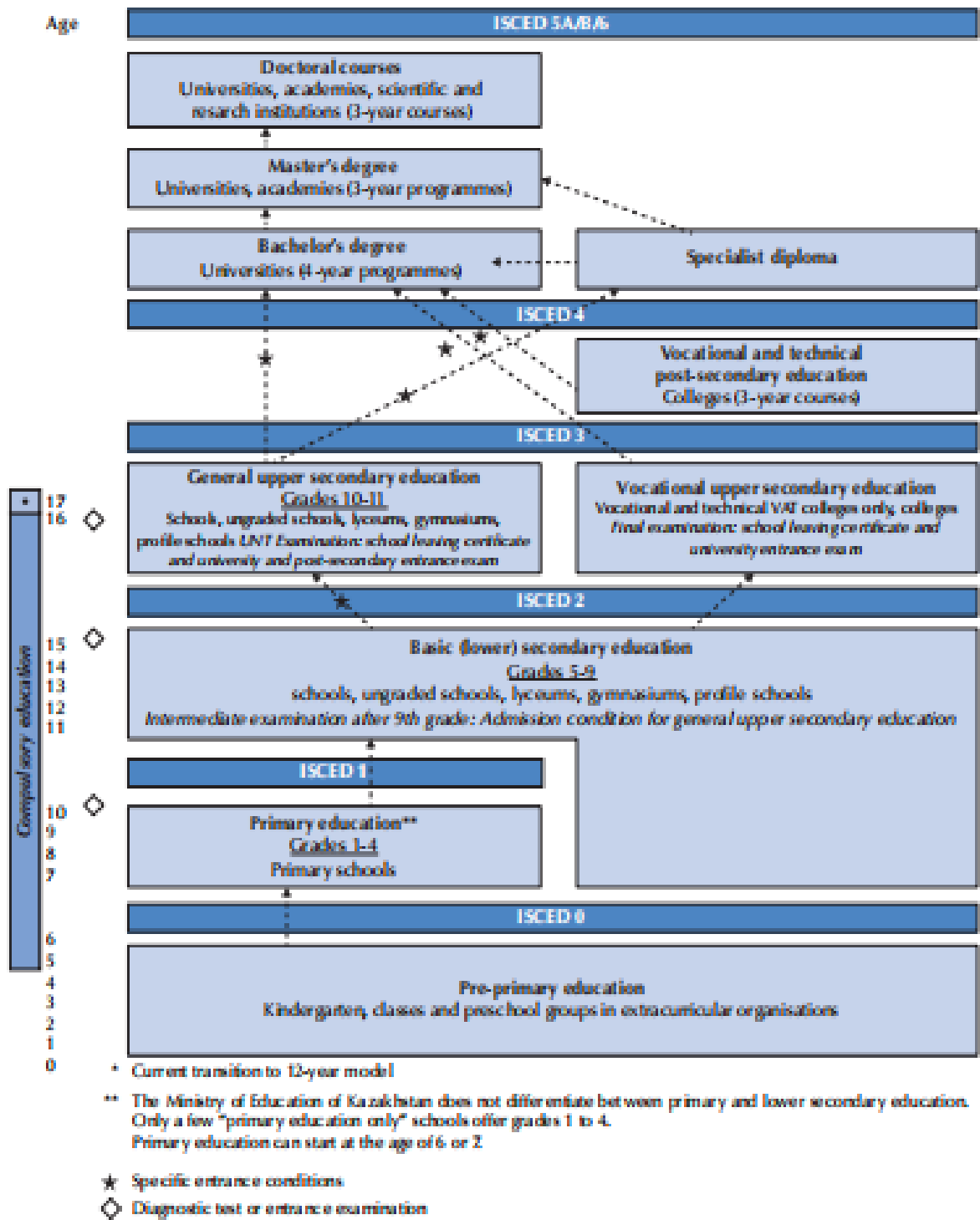
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Appendix A Figure 1. The education system of the Republic of Kazakhstan



Source: OECD (2018)

## Appendix B

### Online focus group participation invitation

Dear ... ,

Good afternoon! I am Balzhan Serikbayeva, a PhD candidate at Nazarbayev University, Nursultan. I am doing the research on the incidence and labor market effects of education-job mismatches in Kazakhstan. I am writing to you as a representative from the field of education/labor market policy and/or practice to kindly ask you to participate in the focus group discussion on the aforementioned topic.

The online focus group discussion will last approximately 1 hour and will involve 7-9 other participants beside you and will be conducted through the Zoom Video Conferencing platform. The discussion will cover questions regarding determinants and implications of education-job mismatch situations, the role of vocational and higher educational institutions and labor market institutions and factors in this context, and the like.

The participation in this study is voluntary and confidential. You can withdraw at any stage without any consequences to you. In case you decide to stop you'll be asked how you would like the data collected up to that point to be handled. If you don't want to comment on some of the questions you don't have to, but you can still be in the study.

If you have any questions about the study or would like additional information you can call or email Balzhan Serikbayeva at 8707 655 42 65 or [balzhan.serikbayeva@nu.edu.kz](mailto:balzhan.serikbayeva@nu.edu.kz).

This study has been reviewed and cleared by the Nazarbayev University Institutional Research Ethics Committee. If you have concerns or questions about your rights as a participant or about the way the study is conducted, you can contact Balzhan Serikbayeva at [balzhan.serikbayeva@nu.edu.kz](mailto:balzhan.serikbayeva@nu.edu.kz).

Kind regards,  
Balzhan Serikbayeva

## Appendix C

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Vertical mismatch	A dummy variable coded as 0 if an individual answers that his/her qualification level corresponds to the job performed, and 1- if a respondent answers that he/she works below their qualification level	1150377	0.22	0.42	0	1
Horizontal mismatch	A dummy variable coded as 0 if an individual answers that he/she works in a job according to the specialty (field of study) acquired, and 1- if an individual doesn't work in a job according to the specialty (field of study) acquired	1150377	0.29	0.45	0	1
Vertical & horizontal mismatch	A categorical variable coded as 1 if individual is both vertically and horizontally mismatched, 0- otherwise	1150377	0.21	0.41	0	1
Income	Log individual monthly earnings	595480	11.01	0.41	10.31	13.12
Female	A dummy gender variable, for which 1= male, 2=female	1150377	1.51	0.50	1	2
Age	A continuous variable which gives age in years	1150377	40.13	11.61	18	65
Rural	Place of residence, 1= urban, 2= rural	1150377	1.57	0.49	1	2

Marital status	A categorical variable, for which 1= the unmarried, 2= the married, 3= the widowed, 4= the divorced	1150377	2.02	0.73	1	4
Education	A categorical variable representing the levels of primary vocational education, secondary vocational education, unfinished tertiary education, and tertiary education including postgraduate education	1150377	6.67	1.07	5	8
Tenure	A categorical variable representing the length of tenure in one's current job. The categories include less than 6 months, 6-12 months, 1-3 years, 3-5 years, and more than 5 years	1150377	4.04	1.17	1	5
Self-employment	A categorical variable, 1= wage worker, 2= self-employed	1150377	1.22	0.41	1	2
Part-time employment	A categorical variable, 1= a full time worker, 2= a part time worker. This variable is constructed using weekly hours. Part-time workers are those who report to work less than 40 hours per week	1150377	1.13	0.34	1	2
Firm size	A categorical variable representing the number of employees in an organization/sole proprietorship where a respondent works. The categories are less than 5 employees, 6-10 employees, 11-20 employees, 21-50 employees, 51-250 employees, 251-	931346	3.94	1.64	1	7

	500 employees, more than 500 employees					
Industry	A categorical variable characterizing an individual's industry of employment. The broad industry categories include, for example, Agriculture, fish & forestry, Mining, Manufacturing, etc.	1150377	8.97	6.11	1	19
Year	A categorical variable indicating the year the survey took place. In our study we use surveys starting from 2014 to 2018	1150377			2014	2018

Table C1. Variable definitions and descriptive statistics

	Vertically		Horizontally		
	Matched	mismatched only	mismatched only	Double mismatch	
Male	70.01	0.81	7.9	21.28	
Female	71.29	0.75	6.28	21.68	
Age<25	67.07	1.02	7.59	24.32	
Age>=25 & age<35	73.88	0.80	6.30	19.01	
Age>=35 & age<45	73.79	0.72	6.83	18.66	
Age>=45 & age<55	70.49	0.73	7.41	21.38	
Age>=55	61.40	0.78	8.12	29.71	
Urban	78.11	0.77	5.64	15.48	
Rural	65.12	0.79	8.14	25.95	
Unmarried	69.64	0.95	7.32	22.09	
Married	71.24	0.73	7.02	21.02	

Widowed	64.97	0.88	7.82	26.33
Divorced	70.82	0.78	6.66	21.75
Primary vocational education	61.39	0.72	14.04	23.85
Secondary vocational education	63.18	0.78	8.55	27.49
Unfinished tertiary education	62.13	1.59	9.43	26.85
Tertiary education	83.82	0.76	3.14	12.28
Tenure				
Less than 6 months	51.50	1.04	8.66	38.79
6-12 months	55.43	1.03	8.33	35.21
1-3 years	65.90	0.94	7.20	25.96
3-5 years	71.59	0.91	7.11	20.39
>5 years	75.87	0.62	6.72	16.80
Wage workers	81.31	0.72	5.35	12.63
Self employed	32.50	1.00	13.27	53.23
Full-time workers	76.25	0.80	6.85	16.11
Part-time workers	33.37	0.67	8.58	57.38
Firm size				
<5 employees	58.83	0.95	11.11	29.12
6-10 employees	71.98	0.97	8.15	18.90
11-20 employees	80.06	0.71	5.89	13.34
21-50 employees	84.39	0.67	4.51	10.43
51-250 employees	86.76	0.57	3.87	8.80

251-500 employees	81.47	0.82	4.45	13.26
>500 employees	83.06	0.73	4.95	11.26

Table C2. Incidence of education-job mismatches across different categories of employees

	Matched	Vertically mismatched only	Horizontally mismatched only	Double mismatch
Agriculture, fish & forestry	32.93	0.84	11.37	54.85
Mining	83.07	0.75	3.95	12.23
Manufacturing	76.58	0.78	7.75	14.90
Energy, gas & air conditioning	84.39	0.75	5.38	9.47
Water supply & sewerage	78.69	0.72	6.14	14.45
Construction	73.13	0.99	8.02	17.85
Trade & car/bike repairs	52.56	1.17	13.50	32.76
Transportation & storage	73.34	0.82	7.67	18.17
Hotel & catering	70.52	1.18	8.84	19.46
Information & communications	88.94	0.66	3.37	7.04
Finance & insurance	91.65	0.60	3.05	4.70
Real assets operations	82.77	0.73	6.45	10.06
Professional, scientific & technical activities	91.74	0.66	2.45	5.14
Administrative & auxiliary support	76.99	0.68	8.13	14.20
Public admin, defense & social welfare	89.45	0.59	3.26	6.70

Education	91.30	0.49	2.37	5.84
Healthcare & social services	90.46	0.65	2.44	6.45
Art, entertainment & recreation	81.94	0.65	6.17	11.24
Other services	73.65	0.93	8.05	17.36

Table C3. Incidence of mismatches across industries

	Baseline	Below median income	Above median income
Vertical mismatch only	-0.074*** (-17.85)	-0.023*** (-9.85)	-0.021*** (-3.94)
Horizontal mismatch only	-0.079*** (-49.80)	-0.012*** (-14.45)	-0.031*** (-14.32)
Double mismatch	-0.14*** (-117.80)	-0.030*** (-47.90)	-0.082*** (-53.63)
<i>Level of education (Ref.=Primary vocational)</i>			
Secondary vocational	0.059*** (46.56)	0.011*** (14.62)	0.040*** (21.19)
Unfinished tertiary	0.10*** (32.50)	0.0037 (1.90)	0.078*** (19.47)
Tertiary	0.22*** (142.67)	0.025*** (29.07)	0.15*** (69.34)
Experience	0.0036*** (24.27)	-0.00091*** (-10.33)	0.0043*** (21.81)
Experience <sup>2</sup>	-0.000055*** (-17.57)	0.000035*** (19.36)	-0.000086*** (-20.80)
<i>Current job tenure (Ref.= &lt;6 months)</i>			
6-12 months	0.031*** (14.16)	0.028*** (20.41)	-0.011** (-3.02)
1-3 years	0.075*** (37.76)	0.046*** (38.08)	0.011** (3.21)

3-5 years	0.11 <sup>***</sup> (54.70)	0.053 <sup>***</sup> (41.81)	0.032 <sup>***</sup> (9.45)
>5 years	0.14 <sup>***</sup> (71.98)	0.052 <sup>***</sup> (42.59)	0.058 <sup>***</sup> (17.51)
Female	-0.11 <sup>***</sup> (-117.73)	-0.015 <sup>***</sup> (-28.72)	-0.078 <sup>***</sup> (-66.37)
<i>Marital status (Ref. = unmarried)</i>			
Married	0.016 <sup>***</sup> (13.18)	-0.0023 <sup>**</sup> (-3.26)	0.017 <sup>***</sup> (10.77)
Widowed	0.028 <sup>***</sup> (12.10)	0.011 <sup>***</sup> (8.27)	0.014 <sup>***</sup> (4.37)
Divorced	0.031 <sup>***</sup> (16.33)	0.0040 <sup>***</sup> (3.81)	0.026 <sup>***</sup> (10.88)
Rural	-0.099 <sup>***</sup> (-97.17)	-0.0052 <sup>***</sup> (-9.02)	-0.067 <sup>***</sup> (-57.00)
Region	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Self-employment	Yes	Yes	Yes
Part-time employment	Yes	Yes	Yes
Year	Yes	Yes	Yes
Constant	10.8 <sup>***</sup> (3365.85)	10.7 <sup>***</sup> (5723.68)	11.2 <sup>***</sup> (2387.58)
<i>N</i>	595361	327326	268035
<i>R</i> <sup>2</sup>	0.41	0.23	0.23

Table C7. Income effects of education-job mismatches for lower and higher income samples

Note: The dependent variable in columns is income; *t* statistics in parentheses; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

	2014	2015	2016	2017	2018
Vertical mismatch only	-0.090 <sup>***</sup> (-15.93)	-0.091 <sup>***</sup> (-11.31)	-0.038 <sup>**</sup> (-2.73)	-0.024 (-1.75)	-0.023 (-1.39)
Horizontal mismatch only	-0.084 <sup>***</sup> (-31.69)	-0.097 <sup>***</sup> (-37.69)	-0.042 <sup>***</sup> (-8.13)	-0.048 <sup>***</sup> (-8.61)	-0.047 <sup>***</sup> (-9.49)

Double mismatch	-0.13***	-0.14***	-0.096***	-0.12***	-0.13***
	(-73.37)	(-77.65)	(-23.85)	(-28.84)	(-33.82)
F test results for joint	F( 3,214142) =	F( 3,219441)	F( 3, 54259)	F( 3, 51731) =	F( 3, 55535)
significance of the coefficients	1845.34	= 2100.62	= 199.81	292.02	= 406.85
on the types of educational	Prob > F =	Prob > F =	Prob > F =	Prob > F =	Prob > F =
mismatch	0.0000	0.0000	0.0000	0.0000	0.0000

Table C8. Income effects of education-job mismatches from the yearly OLS regressions

Note: The dependent variable is income; t statistics in parentheses; \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

<b>Higher skill industries</b>	Information & communications; Finance & insurance; Real assets operations; Professional, scientific & technical activities; Administrative & auxiliary support; Public admin, defense & social welfare; Education; Healthcare & social services; Art, entertainment & recreation
<b>Lower skill industries</b>	Agriculture, fish & forestry; Mining; Manufacturing; Energy, gas & air conditioning; Water supply, sewerage & waste control; Construction; Trade & car/bike repairs; Transportation & storage; Hotel & catering; Other services

Table C4. Industry groups

	Vertical mismatch			Horizontal mismatch			Double mismatch		
	All	Men	Women	All	Men	Women	All	Men	Women
Female	0.968*** (-4.46)			0.931*** (-10.88)			0.969*** (-4.20)		
Rural	0.910*** (-12.61)	0.960*** (-3.87)	0.860*** (-13.98)	0.983** (-2.58)	1.027** (2.87)	0.940*** (-6.21)	0.902*** (-13.40)	0.955*** (-4.27)	0.849*** (-14.75)
<i>Marital status (Ref. = unmarried)</i>									
Married	0.953*** (-5.15)	0.946*** (-4.29)	1.001 (0.04)	0.949*** (-6.09)	0.956*** (-3.83)	0.981 (-1.45)	0.958*** (-4.39)	0.952*** (-3.71)	1.006 (0.41)
Widowed	1.145*** (7.25)	1.066 (1.78)	1.147*** (5.91)	1.144*** (7.90)	1.070* (2.09)	1.133*** (5.83)	1.153*** (7.47)	1.071 (1.85)	1.156*** (6.08)
Divorced	1.070*** (4.84)	1.087*** (3.69)	1.083*** (4.29)	1.049*** (3.75)	1.062** (2.89)	1.054** (3.05)	1.075*** (5.07)	1.101*** (4.19)	1.085*** (4.24)
<i>Level of education (Ref. = Primary vocational)</i>									
Secondary vocational	1.779*** (47.01)	2.135*** (48.51)	1.223*** (10.08)	1.269*** (22.75)	1.600*** (36.00)	0.776*** (-14.15)	1.819*** (47.79)	2.192*** (49.04)	1.243*** (10.70)
Unfinished tertiary	2.133*** (30.93)	2.662*** (29.33)	1.416*** (9.52)	1.431*** (16.18)	1.796*** (19.40)	0.888*** (-3.58)	2.140*** (30.21)	2.654*** (28.46)	1.429*** (9.49)
Tertiary	1.037** (2.58)	1.386*** (17.66)	0.637*** (-20.51)	0.606*** (-41.62)	0.817*** (-12.97)	0.344*** (-54.73)	1.030* (2.05)	1.384*** (17.14)	0.628*** (-20.67)
Experience	1.003* (2.49)	0.998 (-1.42)	1.008*** (4.13)	1.008*** (7.35)	1.003* (2.03)	1.012*** (6.84)	1.004** (2.89)	0.998 (-0.99)	1.008*** (4.35)
Experience^2	1.000*** (5.75)	1.000*** (5.98)	1.000** (2.96)	1.000 (0.75)	1.000* (1.97)	1.000 (0.76)	1.000*** (5.11)	1.000*** (5.41)	1.000* (2.56)
<i>Current job tenure (Ref. = &lt;6 months)</i>									
6-12 months	0.926*** (-4.53)	0.969 (-1.32)	0.886*** (-4.92)	0.929*** (-4.58)	0.990 (-0.47)	0.868*** (-5.93)	0.931*** (-4.13)	0.973 (-1.13)	0.892*** (-4.56)
1-3 years	0.702*** (-23.88)	0.731*** (-15.22)	0.675*** (-18.07)	0.699*** (-25.44)	0.739*** (-15.70)	0.658*** (-19.91)	0.703*** (-23.29)	0.733*** (-14.90)	0.677*** (-17.56)

3-5 years	0.544*** (-39.15)	0.559*** (-27.12)	0.535*** (-27.35)	0.553*** (-40.44)	0.579*** (-27.47)	0.529*** (-29.00)	0.539*** (-38.98)	0.556*** (-26.95)	0.529*** (-27.29)
>5 years	0.368*** (-67.46)	0.384*** (-46.74)	0.359*** (-46.97)	0.389*** (-67.38)	0.415*** (-46.24)	0.369*** (-47.57)	0.365*** (-66.61)	0.383*** (-46.19)	0.356*** (-46.33)
<i>Firm size (Ref. = &lt; 5 employees)</i>									
6-10 employees	0.761*** (-22.57)	0.782*** (-14.16)	0.754*** (-16.49)	0.771*** (-22.89)	0.779*** (-15.40)	0.784*** (-14.95)	0.749*** (-23.50)	0.761*** (-15.47)	0.750*** (-16.50)
11-20 employees	0.650*** (-35.37)	0.680*** (-22.23)	0.630*** (-26.43)	0.668*** (-35.91)	0.696*** (-22.61)	0.654*** (-26.04)	0.652*** (-34.47)	0.677*** (-22.13)	0.636*** (-25.32)
21-50 employees	0.583*** (-45.66)	0.593*** (-31.12)	0.576*** (-32.24)	0.599*** (-47.01)	0.615*** (-31.56)	0.594*** (-32.75)	0.581*** (-44.99)	0.586*** (-31.22)	0.577*** (-31.27)
51-250 employees	0.522*** (-55.94)	0.497*** (-42.60)	0.562*** (-33.97)	0.540*** (-57.47)	0.517*** (-43.89)	0.589*** (-33.54)	0.517*** (-55.66)	0.488*** (-43.00)	0.561*** (-33.22)
251-500 employees	0.640*** (-25.94)	0.598*** (-22.75)	0.715*** (-12.05)	0.634*** (-28.73)	0.592*** (-25.30)	0.725*** (-12.41)	0.626*** (-26.62)	0.579*** (-23.74)	0.711*** (-11.98)
>500 employees	0.502*** (-37.52)	0.437*** (-34.43)	0.652*** (-14.49)	0.513*** (-40.56)	0.462*** (-36.24)	0.639*** (-16.56)	0.488*** (-38.09)	0.420*** (-35.19)	0.643*** (-14.59)
Self-employment	0.877*** (-10.33)	0.794*** (-12.90)	0.958* (-2.32)	1.214*** (16.21)	1.166*** (9.34)	1.257*** (12.82)	0.872*** (-10.61)	0.783*** (-13.46)	0.960* (-2.17)
Part-time employment	1.111*** (7.57)	1.069** (2.99)	1.154*** (7.84)	1.055*** (4.21)	0.979 (-1.05)	1.121*** (6.78)	1.122*** (8.11)	1.070** (2.97)	1.172*** (8.48)
<i>Industry (Ref. = Agriculture, fish &amp; forestry)</i>									
Mining	0.514*** (-38.48)	0.583*** (-25.74)	0.458*** (-24.14)	0.502*** (-43.42)	0.557*** (-30.72)	0.455*** (-25.89)	0.506*** (-38.49)	0.578*** (-25.54)	0.444*** (-24.59)
Manufacturing	0.525*** (-42.12)	0.633*** (-23.06)	0.371*** (-40.50)	0.614*** (-35.80)	0.726*** (-18.34)	0.427*** (-37.87)	0.521*** (-41.76)	0.630*** (-22.80)	0.365*** (-40.30)
Energy, gas & air condition.	0.354*** (-43.67)	0.341*** (-35.63)	0.373*** (-25.20)	0.399*** (-44.68)	0.375*** (-38.00)	0.435*** (-24.02)	0.342*** (-43.74)	0.329*** (-35.61)	0.360*** (-25.40)
Water supply & sewerage	0.531***	0.578***	0.437***	0.569***	0.616***	0.462***	0.528***	0.579***	0.428***

	(-22.67)	(-15.31)	(-18.44)	(-22.60)	(-15.32)	(-19.01)	(-22.42)	(-14.96)	(-18.48)
Construction	0.561***	0.664***	0.400***	0.613***	0.707***	0.443***	0.552***	0.655***	0.393***
	(-37.54)	(-22.28)	(-29.91)	(-35.21)	(-21.10)	(-28.99)	(-37.60)	(-22.54)	(-29.64)
Trade & car/bike repairs	0.952***	1.076***	0.739***	1.143***	1.225***	0.905***	0.948***	1.066***	0.738***
	(-4.03)	(4.08)	(-17.18)	(11.60)	(12.04)	(-5.92)	(-4.30)	(3.48)	(-16.99)
Transport & storage	0.540***	0.621***	0.421***	0.558***	0.614***	0.468***	0.533***	0.612***	0.419***
	(-42.26)	(-26.89)	(-32.02)	(-44.18)	(-30.71)	(-30.92)	(-42.27)	(-27.22)	(-31.57)
Hotel & catering	0.566***	0.739***	0.419***	0.642***	0.825***	0.465***	0.554***	0.749***	0.405***
	(-25.01)	(-7.12)	(-31.35)	(-21.61)	(-5.09)	(-29.75)	(-25.40)	(-6.72)	(-31.93)
Information & communications	0.275***	0.296***	0.227***	0.296***	0.297***	0.259***	0.267***	0.291***	0.216***
	(-43.52)	(-30.40)	(-33.50)	(-46.56)	(-34.27)	(-34.59)	(-42.94)	(-29.85)	(-33.16)
Finance & insurance	0.200***	0.267***	0.143***	0.243***	0.306***	0.178***	0.193***	0.266***	0.134***
	(-47.72)	(-26.61)	(-42.11)	(-49.47)	(-28.23)	(-43.82)	(-46.44)	(-25.69)	(-41.07)
Real assets operations	0.359***	0.441***	0.260***	0.432***	0.494***	0.328***	0.348***	0.427***	0.251***
	(-31.61)	(-17.84)	(-29.37)	(-30.17)	(-17.74)	(-28.50)	(-31.49)	(-17.86)	(-29.19)
Professional, scientific & technical activities	0.203***	0.234***	0.154***	0.220***	0.253***	0.166***	0.190***	0.217***	0.145***
	(-55.02)	(-36.30)	(-44.21)	(-58.97)	(-39.30)	(-47.16)	(-54.40)	(-36.15)	(-43.40)
Administrative & auxiliary support	0.620***	0.746***	0.440***	0.761***	0.922***	0.510***	0.627***	0.757***	0.442***
	(-24.15)	(-11.65)	(-25.18)	(-15.64)	(-3.73)	(-22.88)	(-23.11)	(-10.83)	(-24.53)
Public admin, defense & social welfare	0.233***	0.239***	0.204***	0.264***	0.273***	0.222***	0.225***	0.231***	0.195***
	(-87.10)	(-62.78)	(-63.67)	(-90.68)	(-66.11)	(-66.81)	(-86.64)	(-62.26)	(-63.54)

Education	0.243***	0.386***	0.169***	0.257***	0.402***	0.176***	0.236***	0.383***	0.161***
	(-99.16)	(-44.44)	(-92.89)	(-107.08)	(-48.36)	(-99.32)	(-98.49)	(-43.79)	(-92.72)
Healthcare & social services	0.236***	0.356***	0.164***	0.232***	0.371***	0.156***	0.224***	0.343***	0.154***
	(-79.77)	(-32.68)	(-78.80)	(-89.35)	(-36.01)	(-87.59)	(-79.67)	(-32.73)	(-78.75)
Art, entertainment & recreation	0.407***	0.531***	0.291***	0.468***	0.582***	0.341***	0.403***	0.524***	0.288***
	(-36.52)	(-17.22)	(-36.84)	(-35.51)	(-16.88)	(-36.78)	(-36.10)	(-17.15)	(-36.30)
Other services	0.474***	0.534***	0.370***	0.500***	0.577***	0.375***	0.467***	0.522***	0.366***
	(-34.96)	(-19.56)	(-34.00)	(-35.71)	(-19.39)	(-35.89)	(-34.78)	(-19.73)	(-33.60)
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	930803	459796	471007	930803	459796	471007	930803	459796	471007
Pseudo R <sup>2</sup>	0.1403	0.1217	0.1693	0.1499	0.1222	0.1892	0.1474	0.1273	0.1786
Wald chi2(59)	94134.7	40959.2	56709.6	121066.	50124.3	73159.5	96256.3	41584.9	58123.8
	9	2	7	29	0	1	7	4	7
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table C5: Logit model results for determinants of education-job mismatches (Odds ratios)

Note: The dependent variable is a dummy for vertical, horizontal, and double mismatch, respectively; exponentiated coefficients; t statistics in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

	Vertical mismatch			Horizontal mismatch			Double mismatch		
	All	Men	Women	All	Men	Women	All	Men	Women
Female	0.966*** (-4.69)			0.930*** (-11.06)			0.967*** (-4.43)		
Rural	0.910*** (-12.61)	0.961*** (-3.82)	0.859*** (-14.00)	0.983* (-2.57)	1.027** (2.90)	0.940*** (-6.20)	0.902*** (-13.40)	0.956*** (-4.23)	0.848*** (-14.78)
<i>Marital status (Ref.= unmarried)</i>									
Married	0.951*** (-5.31)	0.944*** (-4.40)	0.998 (-0.13)	0.947*** (-6.33)	0.955*** (-3.95)	0.977 (-1.74)	0.957*** (-4.52)	0.950*** (-3.79)	1.004 (0.25)
Widowed	1.144*** (7.21)	1.064 (1.72)	1.146*** (5.85)	1.143*** (7.83)	1.068* (2.02)	1.130*** (5.69)	1.153*** (7.44)	1.069 (1.80)	1.155*** (6.03)
Divorced	1.066*** (4.58)	1.082*** (3.46)	1.080*** (4.11)	1.045*** (3.46)	1.058** (2.70)	1.049** (2.78)	1.072*** (4.84)	1.096*** (3.98)	1.081*** (4.07)
<i>Level of education (Ref.=Primary vocational)</i>									
Secondary vocational	1.777*** (46.71)	2.129*** (48.08)	1.224*** (10.09)	1.269*** (22.63)	1.595*** (35.60)	0.778*** (-13.95)	1.816*** (47.43)	2.184*** (48.58)	1.243*** (10.67)
Unfinished tertiary	2.107*** (30.24)	2.622*** (28.70)	1.406*** (9.27)	1.419*** (15.71)	1.776*** (18.93)	0.885*** (-3.65)	2.111*** (29.48)	2.612*** (27.82)	1.416*** (9.20)
Tertiary	1.016 (1.06)	1.350*** (15.42)	0.628*** (-20.25)	0.597*** (-40.66)	0.800*** (-13.48)	0.341*** (-52.66)	1.007 (0.45)	1.347*** (14.90)	0.617*** (-20.52)
Experience	0.981*** (-7.88)	0.978*** (-6.86)	0.984*** (-4.63)	0.990*** (-4.66)	0.989*** (-3.65)	0.988*** (-3.80)	0.982*** (-7.50)	0.979*** (-6.43)	0.984*** (-4.49)
Experience^2	1.001*** (11.46)	1.001*** (8.06)	1.001*** (8.63)	1.000*** (8.43)	1.000*** (4.57)	1.001*** (8.50)	1.001*** (10.71)	1.000*** (7.43)	1.001*** (8.16)
<i>Current job tenure (Ref.= &lt;6 months)</i>									
6-12 months	0.927*** (-4.50)	0.969 (-1.33)	0.887*** (-4.86)	0.929*** (-4.55)	0.990 (-0.47)	0.869*** (-5.88)	0.932*** (-4.11)	0.973 (-1.14)	0.893*** (-4.50)
1-3 years	0.702*** (-23.81)	0.732*** (-15.16)	0.675*** (-18.07)	0.699*** (-25.40)	0.740*** (-15.65)	0.658*** (-19.92)	0.704*** (-23.22)	0.734*** (-14.82)	0.677*** (-17.55)
3-5 years	0.544*** (-39.13)	0.560*** (-27.04)	0.534*** (-27.44)	0.552*** (-40.45)	0.579*** (-27.41)	0.527*** (-29.13)	0.539*** (-38.94)	0.557*** (-26.86)	0.527*** (-27.37)

>5 years	0.368*** (-67.47)	0.384*** (-46.71)	0.359*** (-47.03)	0.389*** (-67.42)	0.415*** (-46.22)	0.368*** (-47.66)	0.365*** (-66.62)	0.383*** (-46.15)	0.356*** (-46.39)
<i>Firm size (Ref.= &lt; 5 employees)</i>									
6-10 employees	0.762*** (-22.53)	0.782*** (-14.12)	0.754*** (-16.49)	0.771*** (-22.85)	0.779*** (-15.37)	0.785*** (-14.93)	0.749*** (-23.47)	0.761*** (-15.42)	0.750*** (-16.50)
11-20 employees	0.651*** (-35.33)	0.680*** (-22.19)	0.630*** (-26.42)	0.668*** (-35.88)	0.697*** (-22.58)	0.654*** (-26.03)	0.652*** (-34.43)	0.677*** (-22.09)	0.636*** (-25.31)
21-50 employees	0.583*** (-45.67)	0.593*** (-31.10)	0.575*** (-32.27)	0.599*** (-47.01)	0.615*** (-31.53)	0.594*** (-32.77)	0.580*** (-45.01)	0.587*** (-31.20)	0.576*** (-31.31)
51-250 employees	0.522*** (-55.94)	0.497*** (-42.55)	0.562*** (-34.02)	0.540*** (-57.46)	0.517*** (-43.85)	0.589*** (-33.58)	0.516*** (-55.66)	0.488*** (-42.96)	0.561*** (-33.28)
251-500 employees	0.639*** (-25.98)	0.598*** (-22.75)	0.714*** (-12.13)	0.633*** (-28.76)	0.592*** (-25.30)	0.724*** (-12.49)	0.625*** (-26.65)	0.579*** (-23.75)	0.709*** (-12.06)
>500 employees	0.502*** (-37.53)	0.437*** (-34.41)	0.651*** (-14.55)	0.513*** (-40.56)	0.462*** (-36.22)	0.638*** (-16.59)	0.488*** (-38.10)	0.420*** (-35.17)	0.642*** (-14.65)
Self-employment	0.876*** (-10.40)	0.793*** (-12.94)	0.957* (-2.36)	1.213*** (16.16)	1.166*** (9.32)	1.256*** (12.75)	0.871*** (-10.68)	0.783*** (-13.50)	0.959* (-2.20)
Part-time employment	1.113*** (7.66)	1.069** (2.98)	1.157*** (8.00)	1.056*** (4.29)	0.979 (-1.07)	1.124*** (6.96)	1.124*** (8.20)	1.070** (2.96)	1.175*** (8.64)
<i>Age cohort (Ref.= Cohort age&lt;25)</i>									
Cohort 25=<age<35	1.150*** (8.59)	1.130*** (5.59)	1.181*** (6.81)	1.127*** (8.17)	1.094*** (4.56)	1.186*** (7.61)	1.151*** (8.47)	1.128*** (5.37)	1.189*** (6.89)
Cohort 35=<age<45	1.276*** (9.03)	1.287*** (6.90)	1.274*** (6.01)	1.217*** (8.07)	1.197*** (5.50)	1.261*** (6.28)	1.283*** (9.00)	1.290*** (6.79)	1.287*** (6.09)
Cohort 45=<age<55	1.266*** (6.67)	1.285*** (5.18)	1.235*** (4.02)	1.195*** (5.58)	1.202*** (4.24)	1.181*** (3.46)	1.284*** (6.89)	1.294*** (5.20)	1.262*** (4.31)
Cohort age>=55	1.164***	1.255***	1.071	1.104*	1.196**	1.018	1.187***	1.274***	1.097

	(3.41)	(3.71)	(1.05)	(2.47)	(3.27)	(0.30)	(3.76)	(3.86)	(1.39)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	930803	459796	471007	930803	459796	471007	930803	459796	471007

Table C6. Logit model results for determinants of education-job mismatches with cohort effects included

*Note: The dependent variable is the probability of vertical/horizontal/double mismatch, respectively; exponentiated coefficients; *t* statistics in parentheses; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$*