Job Mismatches in Pakistan: Is there Some Wage Penalty to Graduates?

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In this study, an attempt has been made to estimate the incidence of job mismatch and its impacts on graduate's earnings in Pakistan. The study has divided the job mismatch into three categories; qualification-job mismatch, skill mismatch and field of study and job mismatch. The primary dataset has been used in which the formal sector employed graduates have been studied. This study has measured the qualification-job mismatch by three approaches and found that about one-third of the graduates are facing qualification-job mismatch. Similarly, more than one-fourth of the graduates are mismatched in skill, about half of them are over-skilled and the half are under-skilled. The analysis also shows that 11.3 percent of the graduates have irrelevant and 13.8 percent have slightly relevant jobs to their studied field of disciplines. Our analysis shows that over-qualified graduates face wage penalty under different approaches. After controlling skill heterogeneity, there is less penalty to *apparently* over-qualified and more penalty to *genuinely* over-qualified. The over-skilled graduates face wage penalties and the under-skilled get wage premiums as compared to the matched workers. A good field of study and job matches also improve the wages of graduates.

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Keywords: Education and Inequality, Higher Education, Human Capital, Labour Market, Wages

1. INTRODUCTION

The role of human capital has long been acknowledged by researchers and policy makers not only for sustained economic growth but also for social cohesion. Being so important, the policy-makers all around the globe have stressed allocating more resources to raise education level, which in turn, affects worker's earning and national productivity. In 1960s and 70s, many developed countries including U.S and U.K started to invest heavily in higher education, and Freeman (1976) was the first who raised his concern while analysing the accuracy of the match between graduates' attained education and education demanded by the labour market. The initial studies perceived it as a temporary phenomenon [Freeman (1976)]; however, it was not empirically supported as the incidence of 'over-education', mainly focused on literature, ranges from 10 percent to 40 percent, an average of 25 percent in developed countries [Groot and Maassen (2000); Leuven and Oosterbeek (2011)]. These

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estimates raised serious questions over the validity of conventional views of the labour market; consequently a good debate has started with the emergence of some new theories i.e. the job competition theory and the job assignment theory in which the institutional rigidities, allocation problems and skill heterogeneities were dealt.

Both the economists and sociologists have consigned the job mismatch phenomenon as a serious efficiency concern with its pertinent socio-economic costs at individual, firm and national level. At individual level, it would decrease the individual's marginal product as the existing studies show that over-qualified workers earn less than the matched workers, though the estimated wage differentials differ across the countries.[1] The lower returns to education may also incur some non-transitory costs i.e. lower level of job satisfaction, frustration and higher turnover rate. At the firm level, job mismatch is associated with lower productivity and lower level of job involvement; and in case of high turnover rates, firms may have to incur extra costs on screening, recruiting and training [Tsang (1987); Sloane, *et al.* (1999)]. At the macro level, the national welfare would be lowered by under-utilisation of skills [McGuinnes (2006)]. It is also possible that previously well-matched graduates in the economy will be 'bumped down' in the labour market as over-qualified workers move into lower occupations thus raising the educational requirements within these occupations [Battu, *et al.* (2000)].

The phenomenon can be perceived from some studies, which have highlighted educated unemployment and under-employment [Ghayur (1989); Pakistan (2013)], skill heterogeneity due to educational expansion [Haque, *et al.* (2007)] and decline in rate of return to education [Hausman, *et al.* (2005); Qayyum, *et al.* (2007)]. Recently some studies have emphasised this phenomenon in the context of role of education in career development [Zahid (2014)]. The ongoing demographic transition in Pakistan may also cause the job mismatch phenomenon as the labour force grows faster than the employment rate. As a result, the quality of jobs and access to modest earning opportunities has been emerging as a key issue as reflected by the various labour indicators e.g. educated unemployment, decline in worker's productivity, rising share of informal labour, rising job search periods and high risk of vulnerability especially for youths and females [Pakistan (2008, 2011, 2013)].[2]

Becker's (1964) monogram 'Human Capital' provides the basic foundations to explain earning distribution in developed countries and Mincer's model (1974) on earning provides a cornerstone empirical framework to predict the human capital theory. Both Becker (1964) and Mincer (1974) asserted that education and training are the most important components of human capital accumulation, which in turn, directly and indirectly affect the individuals' life time earnings. Following Becker's Human Capital Theory (1964), a number of studies in Pakistan have measured the return to education by assuming that labour market is competitive and workers are paid according to their marginal product.[3] But no study has anticipated the impact of job mismatch on earnings. In view of the importance of job mismatch and existing

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[1] For U.K, 12 percent by Dolton and Vignoles (2000), 18 percent by Dolton and Silles (2003), 23.2 percent by Chevalier and Lindley (2006). For U.S, 13 percent by Verdugo and Verdugo (1989), 11 percent by Cohn and Khan (1995). For Holland, 26 percent by Groot (1996), 8 percent in Kiker, *et al.* (1997) for Portugal and 27 percent in Budría and Edigo (2007) for Spain.

[2] 61.2 percent were considered vulnerable, meaning "at risk of lacking decent work" in 2012-13 [Pakistan (2013)].

[3] Shabbir (1993), Nasir (2002, 2005), Akbari, *et al*. (2000), Nazli (2004), Aslam (2005), Chaudhary, *et al.* (2010), Afzal (2011) and many others.

literature gap in Pakistan, the study aims to measure the potential impact of various types of job mismatchs on graduates' earning in Pakistan. Since terms 'education and job mismatch' are linked with educated workers, therefore the analysis in this study is carried out on employed graduates working in the formal sector who hold at least fourteen years formal education, named as the 'graduate workers'.

The rest of the study is organised as follows. Section 2 presents the theoretical framework of job mismatch discussing both: the types of job mismatch and theoretic aspects of job mismatch. Discussion on data sources and methodology is given in Section 3. The penultimate section has discussed the results over the incidence of job mismatch and its impact on graduate's earning. Conclusions and policy considerations are given in the final section.

2. JOB MISMATCH AND WORKER'S EARNING: A THEORETICAL FRAMEWORK

Job mismatch has three dimensions; qualification-job mismatch, skill mismatch and field of study and job mismatch [Farooq (2011)]. qualification-job mismatch compares the acquired qualification (in years) with the required qualification (in years) of a worker in his/her current job, while the skill mismatch compares overall acquired competences with the required competences. The field of study and job mismatch evaluates that how much studied field of discipline is relevant to the nature of job. An extensive literature exists on the first type of job mismatch; whereas, only few subjective studies recently have been made on skill mismatch and field of study and job mismatch. All these studies have been carried out primarily in the developed economies. The existing studies are mixed over the use of titles for three types of job mismatches as some studies have used the term 'qualification mismatch' by Green and McIntosh (2002), and 'education mismatch' by Verdugo and Verdugo, (1989), Battu, *et al.* (2000), Lourdes, *et al.* (2005) etc. for the first type of job mismatch (qualification mismatch). Similarly, different titles have been used for the second type of job mismatch (skill mismatch) i.e. competence mismatch by Lourdes, *et al.* (2005) and skill mismatch by Green and McIntosh (2002), Jim and Egbert (2005) and Lourdes and Luis (2013).The rest of this study will follow the titles as given in Figure 1; qualification-job mismatch, skill mismatch and field of study and job mismatch. The sub-classification of graduates under each type of job mismatch is also given in Figure 1.

Fig. 1. Conceptual Framework for the Three Types of Job Mismatch
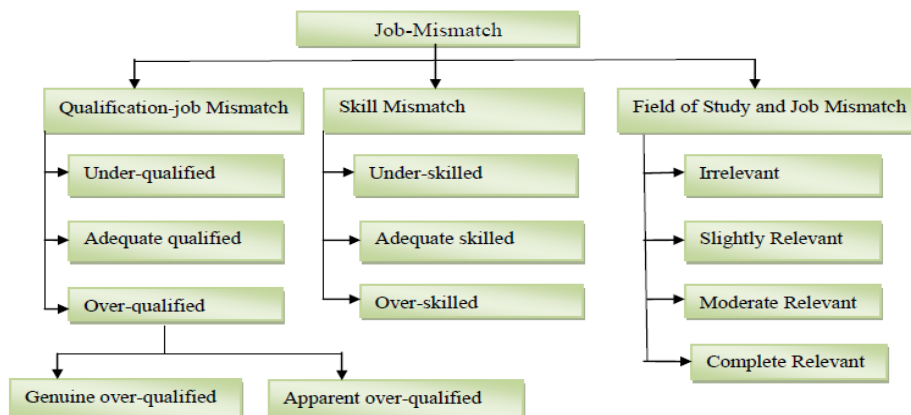
Though there is no unified accepted theory on job mismatch and earnings; however, the following three theories have explained the job mismatch phenomenon with earnings. According to *Human Capital Theory (HCT),* labour market is competitive where every worker is paid the value of his/her marginal product [Schultz (1962); Becker (1964)]. Wages and productivity are fixed in relation to prospective jobs; therefore, over-qualified workers have same productivity and thus receive the same wages as compared to the matched workers. In a pure human capital framework, the concept of job mismatch may be meaningless. The job mismatch phenomenon may not necessarily reject the HCT in case of short run existence; however, if it appears to be a long run phenomenon, then no one can save the HCT [McGuiness (2006)]. The opponents of HCT argue that it fails to explain the underutilisation of skills, institutional rigidities and non-competitive labour market. Tsang (1987) suggested that the relationship between education and productivity is more multifaceted than the direct and positive relationship as suggested by HCT. Some studies have pointed out that return to education may not increase with the level of education [World Bank in "Knowledge for Development" (1999); Psacharopoulos and Patrinos (2002)].

In contrast to HCT, the *Job Competition Theory* highlights the institutional rigidities where earnings are associated with job characteristics [Thurow (1975)]. The allocation on job is based on available supplies of both workers and jobs, workers may possess more education and skills than their jobs necessitate. If there is an over-supply of educated job seekers, some educated workers will look for jobs at lower level with wage penalties. In the extreme case, education simply serves to obtain the job, and there is a zero return to human capital beyond that required to do the job. Therefore, Mincer model (1974) and the Thurow's model (1975)are two extreme cases, the first being purely supply side driven and the second being purely demand side driven.

A third strand between the former two extreme cases is found in the *Job Assignment Theory,* which asserts that there is an allocation problem in assigning the heterogeneous workers to jobs which differ in their complexity [Sattinger (1993)]. Hartog (2000) viewed that the labour market is consisting of a bundle of capabilities and suggested that up to 40 percent of the income variance can be attributed to capability variables. In practice, the frequency distributions are unlikely to match and education mismatch may be a persistent problem if the job structure is relatively unresponsive to changes in relative supplies of educated labour. Earnings are then a function of both individual and job characteristics where over-qualified workers earn some rate of return on over-education but less than the return to required education.

Duncan and Hoffman (1981) found that over-qualified workers receive a lower return on surplus schooling. In Europe, similar findings have been reported by Dolton and Vignoles (2000), Groot and Maasen (2000), Battu, *et al.* (1999) and many others. A dominant paradigm of literature concludes that over-qualified workers face wage penalties, while under-qualified workers enjoy wage premiums while comparing them with the matched workers with the same level of formal education. Initially, these finding were reported by Verdugo and Verdugo (1989), Gill and Solberg (1992). Later these results were endorsed by Cohn and Khan (1995), Dolton and Vignoles (2000), Bauer (2002) and Frenette (2004). The second finding is that the job mismatch explains the wage differentials among workers who hold the same type of jobs. Thus, the workers

earn a positive rate of return on years of over-education, which is lower than the required education (in years). Similarly, under-qualified workers have a negative rate of return. These results were initially estimated by Duncan and Hoffman (1981) and later confirmed by Alba (1993), Sloane, *et al.* (1999), Groot and Maasen (2000), Ng (2001), Groeneveld and Hartog (2004).Overall, the literature supports the assignment theory that the over-qualified workers are working below their potential but gaining some benefit from surplus schooling [Alba (1993); Groot (1996); Sloane, *et al*. (1999); Hartog (2000); Dolton and Silles (2003); Lourdes, *et al.* (2005); Chevalier and Lindley (2006); Martin, *et al.* (2008)].

3. DATA SOURCE AND METHODOLOGY

3.1. Data Description

Due to non-availability of key information in national secondary data sources including e.g. required education for a specific job, attained and required level of skills, relevance of field of study to current job and job satisfaction, the present study has used the primary dataset by targeting the employed graduates working in the formal sector who have fourteen and above years of education (Graduates, Master, MS/MPhil, PhD), named as 'graduate workers'. A primary survey, the Survey of Employed Graduates (SEG) has been conducted in 2010 in two major cities of Pakistan, Islamabad and Rawalpindi to study the job mismatch phenomenon in depth. At broad level, the targeted universe in the SEG dataset has been divided into the three major groups; graduates in federal government, graduates in autonomous/semi-autonomous bodies under federal government and graduates in the private sector. The Thirteenth Census Report of Federal Government Civil Servants (2003-04)[4] and Annual Statistical Bulletin of Federal Government and Semi-government (2007-08)[5] were used to estimate the graduate employees in the federal government and semi-government. For private sector, the relevant information was gathered from a few private departments i.e. banks, hotels, telecom companies, international donor offices, media (newspaper and broadcasting). For the remaining private sector like hospitals, educational institutions, NGOs, manufacturing and Industry etc., the internet and the other sources were used to get the total numbers of units located in Islamabad/Rawalpindi and then through rapid sample survey, the information was obtained to estimate the employed graduates.

To avoid the sampling bias and errors, the proportional stratified random sampling technique was adopted where the published BPS grades for the government and semi-government sectors have been considered as 'strata' while the 3-digit occupational codes were used as 'strata' for the private sector. For further detail on population universe and sampling, see Farooq (2011). A sample of 514 graduates across the three major groups was collected according to their relative employment share. All the questionnaires have been conducted by face-to-face interviews.

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[4]Government of Pakistan (2003-04) "Thirteenth Census of Federal Government Civil Servants". Pakistan Public Administration Research Centre, Management Services Wing, Establishment Division, Islamabad.

[5]Government of Pakistan (2007-08) "Annual Statistical Bulletin of Federal Government". Pakistan Public Administration Research Centre, Management Services Wing, Establishment Division, Islamabad.

3.1. The Measurement of Three Types of Job Mismatch

Regarding qualification-job mismatch, the empirical work so far has relied on the three methods to measure required qualification. First, the Job Analysts (JA) Method (*Objective Approach*), in which the professional job analysts grade the jobs and recommend the minimum educational requirements for a certain job [Battu, *et al.* (2000)]. Second method refers to Self Assessment (*Subjective approach*), where workers are asked directly to give information on the minimum educational requirements for their current job or whether they are mismatched or not [Alba (1993)]. The third method 'Realised match (RM)' measures the degree of qualification-job mismatch by two variables; years of schooling and occupation. The distribution of education is calculated for each occupation; employees who depart from the mean by some *ad-hoc* value (generally one) standard deviation are classified as mismatched workers [Verdugo and Verdugo (1989) and Ng (2001)].

This study has measured qualification-job mismatch by all the three methods, which are job analyst (JA), worker self assessment (WSA), and realised match (RM) on the basis of SEG 2010 dataset. The attained education (number of completed years) has been used as a measure of qualification; while the required qualification (education) has also been measured in years. For the JA method, the required level of qualification in years has been measured by questioning the sampled graduates "*In your opinion, what level of formal education (years) and experience (years) is demanded by your employer/organisation to get the job like yours?*" For the WSA approach, graduates were asked *"In your opinion, how much formal education (years) and experience (years) is required to perform your current job well?"* By comparing the attained qualification and required qualification, the graduates have been classified into three categories; over-qualified, under-qualified and matched graduates.

For the third RM measure, the required qualification has been measured on the basis of two variables; completed years of schooling and occupations. The mean years of schooling at two-digit occupational classification has been used as a measure of required qualification by assuming that the graduates working in similar occupation require the same level of qualification. The qualification-job mismatch has been estimated by comparing the attained and required qualification with (+/−) one standard deviation of the mean.[6] Graduates with attained qualification greater and less than one standard deviation were defined as over-qualified and under-qualified graduates, respectively. The middle range; within +/− of one standard deviation comprised of the matched workers.

Following Chevalier (2003), a measure of qualification-job mismatch and occupation-satisfaction has also been adopted to capture the idiosyncratic characteristics by segregating the over-qualified graduates into two categories; those over-qualified who are satisfied over their mismatch are defined as *apparently* over-qualified, whereas those who are dissatisfied are *genuinely* over-qualified.[7]

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[6]+/− One standard deviation was used as the actual mean deviation of the difference of the attained education and the required education was 0.989, close to one.

[7]Job satisfaction has been measured at five point Likert scale range from very dissatisfied to very satisfied. For *apparently* over-qualified workers, range 1 (very dissatisfied) and range 2 (dissatisfied) were used while for *genuinely* over-qualified workers range 3 to 5 have been used.

Skill is a broad signal of human capital because it assimilates the other constituents of human capital (skills, experience) and also the formal qualification/education. The attained skills possessed by the workers, may be lower or higher than the required skills in their prospective jobs, known as mismatch in skill. Majority of the studies have used formal education as the proxy of skill;[8] however, the later studies have criticised it as it is difficult to quantify the extent of this skill [Jim and Egbert (2005); Lourdes, *et al.* (2005)]. The two measurement approaches of skill mismatch have emerged from the literature; majority of the studies have used the *subjective approach*, based on worker's perception [Green and McIntosh (2002); Lourdes, *et al.* (2005)], while some studies have used the *specific approach* by measuring the various specific attained skills possessed by the workers and the required skills in their current jobs [Jim and Egbert (2005); and Chevalier and Lindley (2006)].

The ongoing study has followed the specific approach to measure skill mismatch where initially, the level of nine specific attained and required skills have been estimated in SEG survey on five-point scale, ranging from 1 'not at all' to 5 'a lot'. These nine skills are; supervisory skills, English writing skills, English speaking skills, numeracy skills, teamwork skills, management skills, computer skills, research skills and time management skills. Through Principal Component Analysis (PCA) method, the weights has been estimated on attained skills and required skills on the basis of mean required level of nine skills by assuming that the workers in same occupations at two-digit occupational coding require the similar types of skills in their jobs. The skill mismatch has been estimated by comparing the attained skill index and required skill index with (+/–) 0.08 standard deviation (SD) of the mean (0.075 SD for SEG weights).[9] The graduates with attained skills more or less than required skills by 0.08 standard deviation were defined as over-skilled and under-skilled, respectively. The middle range comprises the skill matched graduates. For detail methodology along with questions on attained and required skills, see Farooq (2011).

The field of study and job mismatch analyses the level of match between the individual's field of study and his/her features of the job. The existing three studies have adopted both subjective and education-occupation combination to measure the field of study and job mismatch [Jim and Robert (2004); Robst (2007) and Martin, *et al.*(2008)]. The ongoing study has estimated the field of study and job mismatch by subjective approach with the question: *'how much is your current job relevant to your areas of education?'* The four possible options were; irrelevant field of study, slightly relevant, moderately relevant and completely relevant field of study.

3.3. Impact of Job Mismatch on Earnings: Methodology

The specification to estimate the impact of job mismatch on earnings revolves around the standard Mincer earning equation [Mincer (1974)], which itself was originated to measure Becker's human capital theory (1964). The standard Mincer earnings equation is generally written as:

$$Ln\ y_i = \delta_0 + \delta_1\ \text{Year\_School}_i + \delta' X_{ki} + \mu_i \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (1)$$

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[8]As Battu, *et al.* (1999), Frenette (2004), Groot (1996) and Ng (2001) did.
[9]Standard deviation has been calculated after comparing the both attained and required skill index.

Where, Lny_i is natural log of monthly wages, year of schooling measure the impact of attained qualification on earning while X_i represents the vector of all independent control variables related to personal characteristics and human capital characteristics. In contrast to the HCT, one can measure the Job Competition Theory [Thurow (1975)] by replacing the required qualification with attained qualification in Equation 1.The job assignment theory provides the framework to analyse the impact of job mismatch on earning by adding over-qualification and under-qualification. Two types of model specifications have been applied so far in the literature to measure the impact of qualification-job mismatch on earnings as given in the following two equations:

$$Ln\ y_i = \alpha_0 + \alpha_1 Q^r_i + \alpha_2 Q^o_i + \alpha_3 Q^u_i + \alpha' X_i + \varepsilon_i \qquad \dots \qquad \dots \qquad \dots \qquad (2)$$

$$Ln\ y_i = \beta_0 + \beta_1\ Year\_school_i + \beta_2 D^{oq}_i + \beta_3 D^{uq}_i + \beta' X_i + \varepsilon_i \qquad \dots \qquad \dots \qquad (3)$$

In Equation 2, the years of required qualification (Q^r), years of over-qualification (Q^o) and years of under-qualification (Q^u) have been used as explanatory variables to analyse the impact on earnings. In Equation 3, the former methodology has been modified by taking dummy variables of over-qualification (D^{oq}) and under-qualification (D^{uq}). The core difference between the two approaches is when one measures the qualification-job mismatch in terms of years, then the coefficients of over-qualification and under-qualification should be compared with those workers who are matched but on the same jobs; whereas, in dummy specification, the over-qualified and under-qualified graduates have been compared with those who have same qualification but on matched jobs. As this study has targeted the graduate employees, therefore, being limited variation in years of over-qualification and years of under-qualification variables, the second approach has been adopted. Another advantage of using the second approach is that it has the capability to split over-qualification (D^{oq}_i) variable into *genuinely* over-qualified(D^{ogq}) and *apparently* over-qualified (D^{oaq}) category to capture the heterogeneity among the skills of graduates, thus resulting in the following equation;

$$Ln\ y_i = \beta_0 + \beta_1\ Year\_school_i + \beta_2 D^{ogq}_i + \beta_3 D^{oaq}_i + \beta_4 D^{uq}_i + \beta' X_{ki} + \mu_i \qquad \dots \qquad (4)$$

In the light of Mincerian earning equation, the following equation has been used to measure the impact of skill mismatch on graduates' earnings where os_i and us_i are dummy variables for over-skill and under-skill for graduate i;

$$Lnyi = \beta_0 + \beta_1\ Year\_school_i + \beta_2 os_i + \beta_3 us_i + \beta' X_i + \varepsilon_i \qquad \dots \qquad \dots \qquad \dots \qquad (5)$$

The following equation has been used to measure the impact of field of study and job mismatch on graduates' earnings where sr_i, mr_i and cr_i represent the three dummies for weakly relevant, moderately relevant and completely relevant field of study to the current job:

$$Lnyi = \beta_0 + \beta_1\ Year\_school_i + \beta_2 sr_i + \beta_3 mr_i + \beta_4 cr_i + \beta' X_i + \varepsilon_i \qquad \dots \qquad \dots \qquad (6)$$

4. RESULTS

4.1. Incidences of Job Mismatch

The estimates in Table 1 show that the incidence of qualification-job mismatch varies by the three measures, which are worker's self assessment (WSA), job analysis (JA) and

realised match (RM) method. Both the WSA and JA show that the level of over-qualification and under-qualification are close to each other as compared to the RM measure. The close estimates of over-qualification by WSA and JA approach suggest that graduates have not overstated or understated the qualification requirements. These estimates are consistent with the earlier findings that RM method reports a lower incidence of over-qualification as compared to the WSA and JA methods [Meta-analysis of Groot and Maassen (2000) and McGuinnes (2006)].High statistical relation was found between WSA and JA while poor relationship was found with RM of both JA and WSA.[10]

Table 1

The Level of Qualification-Job Mismatch by Various Measures (%)

Measures	Matched	Under-qualified	Over-qualified
WSA Method	65.4	9.9	24.7
JA Method	69.5	4.5	26.1
RM Method	63.4	21.6	15.0

To get a realistic picture, the assumption of 'homogeneity in skills of workers who hold the same qualification level', has been relaxed by segregating the over-qualified workers into '*apparently over-qualified*' and '*genuinely over-qualified*' on the basis of occupation-satisfaction approach. Table 2 shows that under WSA and JA approaches, about 57 to 63 percent of the over-qualified respondents in non-graduate jobs are not too dissatisfied with their mismatch, therefore, they are defined as *apparently* over-qualified graduates and the rest (37 percent to 43 percent)who are dissatisfied, are defined as *genuinely* over-qualified graduates. The issue of heterogeneity is now clear as the *genuinely* and *apparently* over-qualified graduates are not similar in skill possession. These results are consistent with the earlier studies, which have captured the issue of heterogeneity [Chevalier (2003); Chevalier and Lindley (2006)].

Table 2

The Level of Genuine and Apparent Over-qualification (%)

Education-Job Mismatch	WSA Approach	JA Approach	RM Approach
Matched	65.4	69.5	63.4
Under-qualified	9.9	4.5	21.6
Genuinely Over-qualified	10.7	9.7	4.7
Apparently Over-qualified	14.0	16.3	10.3

The results over skill mismatch have been reported in Table 3, which shows that more than one-fourth of the graduates are mismatched in skill either in terms of being over-skilled or in terms of being under-skilled. The phenomenon of 'matched graduates' is considerably higher among males (73 percent—74 percent) than among females (67 percent). A lesser proportion of female graduates are under-skilled, while, there are more over-skilled female graduates. It reflects the scenario of relatively more under-utilisation of females' skills in their jobs in Pakistan.

[10]Parametric t-test and spearman rank correlation tests were applied.

Table 3

The Distribution of Respondents by the Level of Skill Mismatch (%)

	Matched Graduates	Under-skilled	Over-skilled
Female	66.7	11.1	22.2
Male	72.8	13.9	13.4
Both Sexes	71.8	13.4	14.8

The results for the field of study and job mismatch have been reported in Table 4, which shows that 11 percent of the graduates consider that their current jobs are totally irrelevant to their studied field of discipline, while another 14 percent reported their jobs are slightly relevant, followed by the moderately relevant with 38 percent and completely relevant with 37 percent. An important information is that the female graduates are facing more field of study and job mismatch than the male graduates as one-third of the female graduates are mismatched falling in either irrelevant or weakly relevant category; however, less than one-fourth of the male graduates are falling in these first two categories (Table 3). See Farooq (2011) whether the formal education is good proxy of skill or not?

Table 4

% Distribution of the Respondents by Field of Study and Job Mismatch

Level of Mismatch	Female	Male	Total
Irrelevant	14.8	10.6	11.3
Slightly Relevant	18.5	12.9	13.8
Moderately Relevant	33.3	39.3	38.3
Completely Relevant	33.3	37.2	36.6

4.2. Impact of Job Mismatch on Graduates' Earnings

In the light of Equations 3 and 4, Table 5 reports the estimated results of qualification-job mismatch where model 1 and model 2 estimate the impact of qualification-job mismatch on graduates' earning by WSA and JA approach. In model 3 and model 4, the over-qualified graduates have further been split into *genuinely* over-qualified and *apparently* over-qualified. The exponential criteria has been adopted to calculate the percentage impact of indicator variables. The residuals of all the 4 models have been reported in Appendix Figures 1 to Figure 4, which are normally distributed, sugesting that the t-stat values are reliable. The coefficients of over-qualification in model 1 and model 2 show that over-qualified graduates face 30 percent to 37 percent of wage penalty under different approaches (WSA and JA). The results are in line with existing studies of qualification-job mismatch, which support the job assignment model [Sattinger (1993)] that both individual and job characteristics determine the level of earnings. These results are also in the line with previous studies that both WSA and JA yield consistent results, with the overestimation by WSA approach [McGoldrick and Robst (1996); Battu, *et al.* (2000); Groot and Maasen (2000)]. After controlling the heterogeneity in model 3 and model 4 by splitting the over-qualified graduates into

'genuine' and 'apparent' category, the penalty for over-qualification is still statistically significant with less penalty to apparently over-qualified (20 percent to 26 percent) and more to the genuinely over-qualified graduates (49 percent to 53 percent) under WSA and JA approaches. The coefficient of under-qualification is not significant in all the models. These results are consistent with the earlier studies that the *genuinely* over-qualified face more wage penalties as compared to *apparently* over-qualified [Chevalier (2003); Chevalier and Lindley (2006)].

Regarding the other control variables, all the models show that the male graduates are likely to earn 10 percent to 12 percent more than the female graduates, consistent with earlier studies conducted in Pakistan [Sabot (1992); Nazli (2004); Nasir (2002, 2005) and many others)]. The significant coefficients for education and experience show the importance of human capital accumulation as the graduates with more education and experience have a positive rate of return on it. Regarding the quality of institution from where the graduates have obtained their highest degree, the graduates who got their education from distance learning institutes earn about 32 percent less than those who got their education from the university. The foreign degree/diploma holders graduates earn about 20 to 23 percent more than the locally educated. These differences reflect the heterogeneity of education, which in turn is generating the wage differences among the graduates.

Regarding the labour market characteristics, a wage differential exists between government and private organisations where graduates in the government sector earn less than the private sector. Tenure with the current job also has a strong influence on graduates' earnings, as the graduates who have been in the current job between two to four years earn about 20 percent to 22 percent more and the graduates with more than four years in the current job earn 30 percent to 32 percent more than those who have tenure up to one year (Table 5).

Table 5

The Impact of three Types of Job Mismatch on Graduates' Earnings—SEG, 2010

	Model 1 WSA-I		Model 2 JA-I		Model 3 WSA-II		Model 4 JA-II	
Regressor	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.
Over-qualification	−0.367*	0.060	−0.295*	0.061	–	–	–	–
Under-qualification	−0.051	0.079	−0.051	0.111	−0.044	0.078	−0.044	0.110
Over-qualification genuine	–	–	–	–	−0.532*	0.081	−0.487*	0.085
Over-qualification apparent	–	–	–	–	−0.265*	0.068	−0.203*	0.067
Education	0.136*	0.024	0.138*	0.025	0.139*	0.024	0.142*	0.025
Experience	0.025*	0.009	0.027*	0.01	0.024*	0.009	0.025*	0.009
Experience square	−0.017*	0.008	−0.016*	0.009	−0.017*	0.008	−0.016*	0.009
Sex (male=1)	0.113**	0.063	0.118**	0.063	0.114**	0.062	0.121**	0.063
Marital status (married=1)	0.118*	0.06	0.117**	0.061	0.118*	0.06	0.120*	0.061
Foreign diploma (yes=1)	0.226*	0.087	0.209*	0.088	0.207*	0.086	0.203*	0.087
Type of institution (university as ref.)								
College	−0.050	0.068	−0.07	0.069	−0.055	0.067	−0.067	0.068
Distance learning	−0.282*	0.084	−0.279*	0.086	−0.292*	0.084	−0.287*	0.085
Organisation of job (govt.=1)	−0.049**	0.03	−0.050**	0.03	−0.045**	0.027	−0.048**	0.030
Tenure (up to 1 year as ref.)								
1 to 2 year	0.019	0.082	−0.01	0.083	0.007	0.081	−0.017	0.082
2 to 4 year	0.212*	0.077	0.195*	0.078	0.205*	0.076	0.181*	0.078
More than 4 year	0.322*	0.090	0.305*	0.091	0.306*	0.089	0.291*	0.091
Constant	7.430*	0.408	7.395*	0.415	7.409*	0.404	7.366*	0.411
F-Stat	17.99		17.17		18.06		17.30	
R-square	0.5759		0.5644		0.5840		0.5735	
N				514				

* Denotes significant at 5 percent, ** denotes significant at 10 percent.

Following Equations 5 and 6, the results are given in Table 6 where model 5 measures the impact of skill mismatch on earnings, while model 6measures the impact of field of study and job mismatch. The residuals of both models have been reported in Appendix Figure 5 to Figure 6. The results about the impact of skill mismatch on graduates' earnings in model 5 show that over-skilled graduates face 20 percent wage penalties and under-skilled get 16 percent wage premium as compared to those who have the same level of education and on matched jobs. Regarding the under-skilled, the findings of this study are different from the studies of Lourdes, *et al.* (2005) in which the under-skilled workers face wage penalties; however, the estimates of this study are in the right direction that under-skilled graduates get wage premium when compared with the matched workers. These results are consistent with the earlier studies, which indicate that skill mismatch leads to wage differential among the workers [Green and McIntosh (2002); Lourdes, *et al.* (2005); Di-Pietro and Urwin (2006)].

In the last model, the estimates show that the moderate field of study and job matched and complete field of study and job matched graduates earn significantly more by 23 percent and 20 percent respectively compared to those who have irrelevant field of study in their current jobs. These results are in line with existing studies showing that a good match between the field of study and the current job improves the level of earnings [Robst (2007); Martin, *et al.* (2008); Domadenik, *et al.* (2013)].

Regarding gender, the estimates support the initial results as mentioned in Table 5 that male graduates, on average, earn 11 percent more than the female graduates. Similarly, education and experience have a significant impact on graduates' earnings with 10 percent and 3 percent per year, respectively. The graduates with foreign diploma earn more than the locally educated graduates (Table 6).

Table 6

The Impact of three Types of Job Mismatch on Graduates' Earnings—SEG, 2010

Regressor	Model 5 Skill Mismatch		Model 6 Field of study Mismatch	
	Coeff.	St. Err.	Coeff.	St. Err.
Over-skill	–0.195*	0.066	–	–
Under-skill	0.155*	0.069	–	–
Weak relevance/irrelevant	–	–	0.115	0.09
Moderate relevance/irrelevant	–	–	0.228*	0.083
Complete relevance/irrelevant	–	–	0.203*	0.09
Education	0.102*	0.023	0.102*	0.024
Experience	0.026*	0.01	0.029*	0.01
Experience square	–0.017*	0.008	–0.016*	0.009
Sex (male=1)	0.102**	0.063	0.099**	0.062
Marital status (married=1)	0.103**	0.062	0.118**	0.062
Foreign diploma (yes=1)	0.194*	0.089	0.218*	0.09
Type of institution (university as ref.)				
College	–0.073	0.069	–0.043	0.07
Distance learning	–0.276*	0.086	–0.260*	0.088
Organisation of job (govt.=1)	–0.056**	0.03	–0.053**	0.031
Tenure (up to 1 year as ref.)				
1 to 2 year	–0.018	0.084	0.000	0.084
2 to 4 year	0.197*	0.079	0.216*	0.079
More than 4 year	0.292*	0.092	0.298*	0.093
Constant	7.866*	0.393	7.735*	0.409
F-Stat	16.67		15.75	
R-square	0.5572		0.55	
N		514		

* Denotes significant at 5 percent, ** Denotes significant at 10 percent.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The main focus of this study is to estimate the three types of job mismatches and analysing the pecuniary consequences of job mismatch. The present study has found that the choice of measurement method has a significant effect on the incidences of qualification-job mismatch. Overall 31–37 percent of the graduates are facing the qualification-job mismatch either falling in over-qualification or under-qualification category. Similarly, more than one-fourth of the graduates are mismatched in skill either in terms of being over-skilled or in terms of being under-skilled. The phenomenon of 'matched graduates' is considerably higher among males than among females. An important information is that the female graduates are facing more field of study and job mismatch than the male graduates as one-third of the female graduates are mismatched falling in either irrelevant or weakly relevant category; however, less than one-fourth of the male graduates are falling in these two categories.

This study has examined the impact of all the three types of job mismatches on graduates' earnings and found that the over-qualified graduates face 30 to 37 percent wage penalty under different approaches. After controlling skill heterogeneity, the penalty for over-education is still significant with fewer penalties to *apparently* over-qualified and more penalties to *genuinely* over-qualified. The over-skilled graduates face wage penalties and the under-skilled get wage premium as compared to the matched workers. A good field of study and job match also improve the wages of graduates. Overall these results do not support the Human Capital Theory. However, this study cannot necessarily reject the Human Capital Theory on the basis of cross-sectional dataset as the mismatch phenomenon might be temporary. The results of this study support the Job Assignment Theory [Sattinger (1993)] as both the individual and job characteristics are determining the levels of job mismatch and wages.

Our findings lead to the following policy implications and recommendations primarily in two areas; reforms in human resource development and labour market institutions:

- The incidences of various types of job mismatches especially the skill mismatch suggest the need for better quality of education and skills by ensuring the equality of skills and rightly demanded skills across the institutes and regions. The phenomenon of field of study and job mismatch suggests the close coordination among the various demand and supply side stakeholders of the labour market for better understanding of issues in order to formulate the right policies.
- The rapid enrolment at higher education level with limited labour demand suggests to implement entrepreneurial reforms both in educational institutes and in the labour market to absorb this educated influx. Females should receive a special focus in such policies, which would not only raise their participation but also provide them the entrepreneurial opportunities.
- Some tracer type studies or panel studies are required for a better understanding of employment patterns and skills demanded by the various sectors and occupations. It would not only guide the planners and enrolled youths about the

labour market opportunities and type of skills needed, but also would help to project future educational needs.

- There is a need to improve the Labour Force Survey (LFS) questionnaire for skill assessment and job mismatches. A module about the history of employment may also be made part of the LFS. Additional research is of course needed to estimate the timing and depth of job mismatch, productivity losses and direct and indirect hiring and firing costs to firms due to job mismatch.
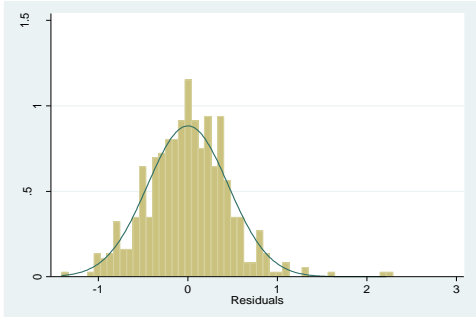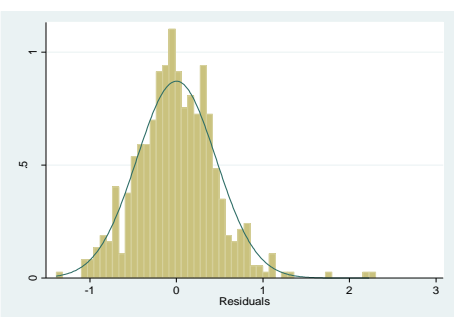
Appendix Fig. 1: Residuals of Model 1
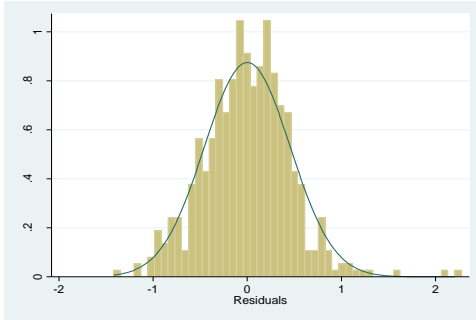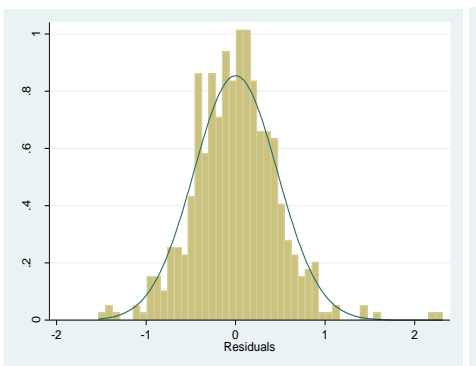
Appendix Fig. 2: Residuals of Model 2
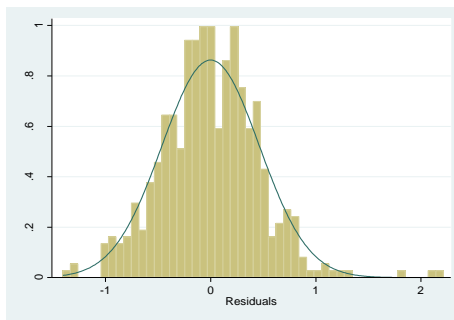
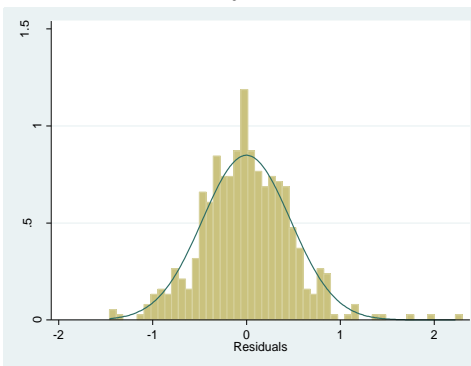**Appendix Fig. 3 Residuals of Model 3**

Appendix Fig. 4 Residuals of Model 4

Appendix Fig. 5: Residuals, Skill Mismatch

App. Fig. 6: Residuals, Field of Study Mismatch

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