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# HUMAN CAPITAL–GROWTH NEXUS: THE ROLE OF SKILL MISMATCH

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**Abstract**. *Economics is a branch of social science that touches upon many aspects of our lives and has important effects on the well-being of all people. Within economics, human well-being is significantly contingent on the process of growth. Production takes place via a combination of human and physical capital; therefore, human capital is expected to be a main contributor to economic growth. However, many studies have failed to uncover a significant association between human capital and growth, and others have found only marginal contributions therein. Several economists have tried to explain this paradox. This study brings forth skill mismatch as another potential explanation of the weak relationship between education and growth, and shows that skill mismatch can nullify the potential advantage of increased human capital. Most countries have failed to take skill mismatch seriously; therefore, there is no systematic data on the indicators that relate to it. This paper emphasizes the need for reliable and sufficient data on the indicators of skill mismatch, so that planning for the better utilization of human capital can take place.*

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## 1. Introduction

An increasing amount of literature is aimed at analyzing the relationship between education and economic development. Most of the theoretical literature assumes that there should be a very strong relationship between these two variables. However, on contrary, the empirical evidence of the relationship between these two variables does not support the existence of such a strong relationship. Several explanations of this paradox have been presented in the scholarly literature.

An important explanation in this regard can be traced to the analysis of Toprak (2006), a Turkish politician and political philosopher who compared the economic development of Japan to that of Turkey over the last six decades. The two countries were allies in World War II, and were in similar positions by the end of war with respect to their economic and social conditions. Both countries realized that education was a method of development, and decided to promote education accordingly. Turkey emphasized education on literature, art, music, and so forth, whereas Japan emphasized education on mathematics, technology, and engineering. The lack of a strong relationship between growth and education (or human capital in the broader sense)[1] could be a result of the incorrect choice of field of study, which is a particular kind of skill mismatch.

Every country needs a particular combination and level of skilled graduates in different subjects/professions, and this combination of skills depends on the country's physical and institutional infrastructure. The speed of economic development in an economy can be optimized if the supply of skilled graduates in different subjects matches with the respective demand of skills. Any mismatch between the supply and demand of skills results in inefficient – or even the complete lack of – utilization of resources, and the level of growth achievable for the same level of human capital (hereinafter HC) decreases.

Let us imagine a country where there is a need to construct roads and bridges to link various parts of the country so that producers can transport their goods to market. If the country's universities are producing enough engineers to meet demand, this will have a positive impact on the economy, not only because of the addition of the services of these engineers but also due to the increase in goods that would be traded via the infrastructure that they construct. On the other hand, if the country is producing literature graduates instead of engineers, the value added to the economy would be only in terms of the services of these graduates. This will cause a reduction in the achievable level of growth with same level of HC. Further, suppose that the number of literature graduates is so large that many of them are unable to secure a job in the market. The education of these unemployed graduates is still counted in the HC, but this HC does not contribute

1 This paper uses the terms "education" and "human capital" interchangeably

to economic growth. Many of these unemployed graduates would take jobs in positions which are not a good match for their abilities, and this would again cause a reduction in the achievable level of growth with same amount of HC.

This example shows that the balance between the supply and demand of type and level of skills is an important determinant of growth. The larger the mismatch, the smaller the achievable level of growth. Therefore, this study argues that a potential explanation of the paradox of the growth–education relationship could be the mismatch between supply and demand of skills.

Despite very strong theoretical linkage between HC and economic growth, empirical results on the relationship between these two variables appear to be insignificant either theoretically or economically (having very small coefficients). The objective of this study is to present the case that skill mismatch offers a plausible explanation for this dilemma, and could be a potential reason for the discrepancy between theory and empirical results. This paper also aims to argue that incorporating a measure of skill mismatch into the typical production function would probably better explain economic growth. However, the data on skill mismatch is not available at regular frequencies for most countries; therefore, this paper also argues that systematic data on the indicators of skill mismatch should be collected to find a better explanation for economic growth.

The contribution of this study is to show that skill mismatch can be a potential explanation for the weak relationship between education and growth, and to extend the production function to include a measure of skill mismatch. Most countries have failed to take skill mismatch seriously; therefore, there is no systematic data on the indicators related to skill mismatch that might allow for regressions. This paper also makes the case for the collection of data on the indicators of skill mismatch to potentially motivate states to do so.

This article is organized as follows: after a brief introduction, the next section presents a comprehensive review of the relevant literature. Section three discusses methodology, including what skill mismatch is, the impact of skill mismatch on growth and development, and why the production function needs further modification. Section four presents results and discussions on measuring skill mismatch and skill mismatch in Pakistan. Section five concludes the study.

## 2. Literature Review

### *2.1 HC and Growth Nexus: Glimpses from the Literature*

There is a large discrepancy between the theoretical and empirical literature regarding the relationship between HC and economic growth. This discrepancy and its potential explanations are summarized in this section.

### *2.2 HC in Production Theory*

Consider the standard Cobb–Douglas Production function:

$$Y(t) = A(t)K(t)^{\alpha}L(t)^{\beta} \quad (1)$$

Here, represents the output, with referring to time. This function takes two inputs – i.e., physical capital and labor. Labor in the abovementioned production function refers to quantity of labor. However, it could be argued that, instead of only quantity, a "product of quantity and quality" of labor can give a better explanation of growth. Therefore, replacing labor with HC should give a better explanation of output. The production function will thus take the following form:

$$Y(t) = A(t)K(t)^{\alpha}H(t)^{\beta} \quad (2)$$

Thus, the presence of HC in the production function makes good sense, and one would expect a significant contribution of HC towards aggregate production and growth. Thus, HC has been a part of aggregate production functions and growth regressions. Many versions of the production function that contain HC as a part of them have been proposed so far.

Contrary to the theoretical literature, growth regression estimates do not support such a strong relationship between production (GDP) and HC. There are a large number of studies that have found negative or non-existent relationships between growth and HC. Instead of citing all of these studies here, we report how other authors have summarized the literature on the relationship between HC and growth. Recent empirical investigations into the contribution of HC accumulation to economic growth have often produced discouraging results. Educational variables frequently turn out to be insignificant or to have the "wrong" sign in growth regressions, particularly when these are estimated using first-difference or panel specifications. The accumulation of such negative results in recent literature has fueled growing skepticism of the role of schooling in the growth process, and has even led some researchers to seriously consider possible reasons as to why the contribution of educational investment to the growth of productivity may actually be negative (Fuente and Doménech 2000).

Pritchett (2001) reported that cross-national data shows no association between the increases in HC attributable to the rising educational attainment of the labor force and the rate of growth of output per worker. There has been much dispute as to whether economies that are open or those with more HC grow faster (Soderbom and Teal 2001).

The literature on the determinants of economic development treats research on the relationship between HC and economic growth as one of the "big unknowns" (Leeuwen 2007), whilst investment and the welfare of the population are known to be drivers of economic growth (Mykytiuk et al. 2020). Despite the conventional view that HC is one of the main determinants of growth, the evidence for the effect of HC on growth is weak and controversial (Sunde and Vischer 2011). Despite enormous interest in the relationship between education and growth, the evidence is fragile at best (Aghion et al. 2009).

There is almost universal acceptance of microeconomic findings that suggest there are strong economic returns from education at the level of individuals. It is perhaps surprising, then, that the macro-evidence delivers such divergent results. While early cross-national studies showed a positive, statistically significant, and often strong impact to be exerted by school enrollment rates on economic growth, a second wave of studies, often focusing on stocks of HC rather than flows, reported empirical results that suggested that the impact of HC on growth was zero at best – potentially even negative (Fedderke 2005).

The abovementioned commentaries of various authors show that results on the relationship between these two variables are not very optimistic. However, there is no shortage of studies finding positive and significant coefficients of HC in growth regressions. Barro (1991), Benhabib and Spiegel (1994), Sala-i-Martin and Barro (1995), Sala-i-Martin (1997), and many others find schooling and/or some other proxy of HC to be significantly and positively correlated with reductions in the growth rate of per capita GDP across countries. However, in these regressions, the marginal contribution of HC appears to be very small compared to what one would expect. For example, consider Barro's famous study (1991), where he presents positive and significant coefficients of HC in growth regressions. In the logarithmic form of the production function, the coefficients represent elasticity. Thus, the elasticity of growth that Barro found with respect to education was 0.0044, whereas the elasticity of growth with respect to physical capital was 0.10. This implies that a 1% increase in physical capital could lead to a 0.1% change in growth. On the other hand, a 1% change in HC would bring only a 0.0044% change in growth. Thus, despite being statistically significant, the coefficient of HC was not promising. Therefore, even after accounting for HC accumulation, a growing body of research suggests that something other than capital, labor, or HC accounts for the bulk of the observed differences between countries in the level and growth rate of real gross domestic product (Limam and Miller 2004).

On the other hand, many authors have doubts as to the significance of HC coefficients in growth regressions, and they assume that this is because of methodological mistakes. For example, some claim that this effect is overstated due to methodological problems such as correlation with omitted variables and the imposition of restrictions that are rejected by the data (Sianesi and Reenen 2003). Therefore, this quick review reveals that the skepticism regarding the relationship between HC and growth is widely acknowledged and is based on empirical evidence that is not easily ignored.

### *2.3 Explaining the HC–Growth Paradox*

Because of the disagreement between the theoretical and empirical literature, many researchers have started to explore the factors behind such a pessimistic relationship between economic growth and HC. Therefore, various scholars have offered various explanations, some of the most notable of which are discussed below.

Some researchers have questioned the proxies of HC being used in the regression. A large list of proxies is used that includes educational attainment, investment (Aghion et al. 2009), level of education, and quality of education (Barro 2001), and many authors have expressed concerns regarding the use of these kinds of proxies. Despite this, surprisingly, changing these proxies might not change the nature of the results.

Some authors have reservations regarding the specifications of models being used. For example, Sunde and Vischer (2015) asked for the use of both difference and lag of HC simultaneously in growth-accounting regressions.

Pissarides and Véganzonès-Varoudakis (2011) argued that it is very important to take into account the structure of the labor market, which may possibly explain the

dilemma reported in the growth–HC relationship. Aghion et al. (2009) also point out the importance of the structure of the labor market. Some authors (e.g., Fuente and Doménech 2000) suggest that it is the quality of data that has caused this paradox.

Arcand and d'Hombres (2007) considered the following reasons to explain the paradox:

i. additional sources of unobserved heterogeneity stemming from country-specific rates of labor-augmenting technological change;
ii. measurement error in the HC series being used;
iii. lack of variability in the HC series once the usual covariance transformations are implemented.

Wider research suggested the lack of variability in the HC series to be reasonable in the context of the Solow model.

Pritchett (2001) suggests that the following three reasons could explain the paradox:

i. the institutional/governance environment could have been sufficiently perverse that the accumulation of educational capital *lowered* economic growth;
ii. marginal returns to education fell rapidly as the supply expanded while demand for educated labor was stagnant;
iii. educational quality could have been so low that "years of schooling" created no HC.

However, there is no consensus that has yet emerged as to the most probable reason for this paradox.

### *2.4 Alternative Explanations of the HC–Growth Paradox*

It is evident that a number of authors – e.g., Pissarides and Véganzonès-Varoudakis (2011) and Aghion et al. (2009) – point out the importance of the structure of the labor market while studying the relationship between HC and growth. As we shall demonstrate in this paper, one very important characteristic of the structure of the Labor market is the skill mismatch.

If we think back to the example of Toprak cited in the introduction, Japan and Turkey shared many socioeconomic characteristics at the end of WWII. The two countries tried to remedy their situations with education, with one focusing on science and technology and the other focusing on literature and the arts. After five decades, the two had substantial differences in their socioeconomic status. This implies that merely the presence of education/HC alone does not determine the speed of development. Perhaps the more important factor, which shapes the fate of nations, is the type of education obtained by graduates.

For Toprak (2006), the reason behind the differential development in Turkey and Japan is a particular kind of skill mismatch. A skill mismatch can have various forms, each having a different mechanism affecting the speed of development. A mismatch can occur when the skills that people possess do not match the skills that the market demands. Another kind of mismatch can occur when the supply of a particular kind of skill in a market exceeds the demand for that kind of skill. A skill mismatch can also occur when the level of skills possessed by a worker is not equal to the level of skills that the market demands. Every type of skill has a particular set of implications for the growth of the economy.

The mismatch of skills can have a large number of undesirable consequences, both for individuals and for society as a whole. For individuals, the mismatch of skills can result in lower job satisfaction, unemployment, and problems associated with unemployment including distress, hypertension, poverty, and crime. For society, skill mismatch can result in inefficient – or the complete lack of – utilization of resources, and in unemployment and the macroeconomic consequences thereof.

## 3. What is Skill Mismatch and What is the Impact of Skill Mismatch on Growth and Development?

The word "skill" has different meaning for different individuals. Within a profession, the word skill is used to denote the ability to perform a particular task. For example, for linguists, skill means the ability to listen, read, write, or understand; for engineers, it might mean the ability to fix problems in a machine. The problem with this kind of definition is that it is not very easy to judge these kinds of skills. Instead, a more general definition of skill is adapted by Infometrics and Department of Labour (2006), who use the word "skill" to denote "basic eligibility to work for a certain position in a profession." This definition of skill allows a single individual to compare the supply and demand of skills for different professions. Therefore, the phrase "skill mismatch" can also have different meanings. A skill mismatch can occur if the skills an employer demands are different from the skills a candidate has, if the number of available skilled graduates is more (or less) than the number of skilled persons demanded in the market, or if the level of skills required by an employer differs from the level of skills an employee possesses. Various kinds of skill mismatch are precisely defined in CEDEFOP (2012), which is reproduced in the manner below.

**Table 1.** *Categories of skill mismatch*

| Type | Definition |
|---|---|
| Over-education | To have completed more years of education than the current job requires. |
| Under-education | To have completed fewer years of education than the current job requires. |
| Over-qualification | To hold a higher qualification than the current job requires. |
| Under-qualification | To hold a lower qualification than the current job requires. |
| Over-skilling | To be unable to fully use one's skills and abilities in the current job. |
| Under-skilling | To lack the skills and abilities necessary to perform the current job to acceptable standards. |
| Skill-shortage | Demand for a particular type of skill exceeds the supply of available people with that skill. |
| Skill-surplus | The supply of people with a particular skill exceeds the demand for it. |
| Skill-gap | The level of the employed person's skills is less than that required to perform the job adequately or the type of skill does not match the requirements of the job. |

| Type | Definition |
|---|---|
| Economic-skills obsolescence | Skills previously used in a job are no longer required or are less important. |
| Vertical-mismatch | The level of education or skills is less or more than the required level of education or skills. |
| Horizontal-mismatch | The level of education or skills matches the job requirements, but the type of education or skills is inappropriate for the current job. |

Source: *CEDEFOP briefing note on skill mismatch in Europe, available online at www.cedefop.europa.eu/files/5521_en.pdf*

Each type of skill mismatch has a particular but not disjointed set of implications for individuals and for growth, and each type of skill mismatch affects growth and development through a particular mechanism. This section discusses some selected types of skill mismatch and how they affect the economy. Instead of following the order given in the CEDEFOP report, we discuss these types according to their importance. Therefore, this discussion proceeds in the following order: (a) skill surplus; (b) skill shortage; (c) horizontal mismatch; (d) skill obsolesce; and (e) over education.

### *3.2 Skill Surplus*

Skill surplus is defined as a situation when supply of people with respect to a particular skill exceeds demand. For example, a skill surplus would exist if 1,000 engineers per year were required in an economy, but universities were producing 4,000 engineers per year.

Consider, for example, a field of study where the number of graduates with skills in this field exceeds the market demand by a large number. This could have three results for a graduate:

a. The graduate does not find a job. In this case, the investment in their education would not be productive until they find a job, and the graduate would not be able to contribute to the growth of the economy. This is the worst-case scenario for both the graduate and the economy. Educating someone is an extremely costly investment, and a lot of time and physical resources are involved in producing a graduate. The cost of production of a graduate is in the millions, whether paid by individuals or by governments. With a huge surplus of graduates in one field, society's investment in them is non-productive, and the resources invested in the graduate by society will go astray or will remain idle until the person finds employment. On the other hand, the absence of reasonable employment and social security will create stress, hypertension, and can potentially lead to crime – which can affect development in other ways.
b. The graduate succeeds in finding a job in some other subject/profession with little relevance to their qualification. This would lead to lower productivity because the graduate would not have the skills required for the particular job. They would

be unable to exploit their actual skills because they would be working in an irrelevant field. The field in which the graduate could achieve maximum productivity would no longer be available, therefore they could not exhibit reasonable productivity. The implications of this will be elaborated on in the discussion of horizontal mismatch.

c. The graduate finds a job for which the actual required qualification is lower than the qualification of the graduate. This case will be elaborated on in the discussion of over-education.

### *3.3 Skill Shortage*

This is defined as a situation where "demand for a particular type of skill exceeds the supply of available people with that skill." It is possible that there is a huge demand for graduates of a particular subject/profession, but the number of graduates available is smaller than the demand. For example, suppose there is a demand for 10 engineers in the market, but there are only four candidates. The consequences of this shortage can be summarized as follows:

a. Some of the vacancies for engineers would remain vacant, and the economic activity that the filling of these vacancies would enable would not happen.
b. Employers would be unable to initiate the projects that they want. The unskilled labor and the skills that were necessary from other professions would not be hired. This would again lead to inefficiency and lower productivity.
c. The shortage in strategic skills may lead to a sovereignty crisis.

Thus, the shortage of skills would put downward pressure on the overall level of employment in the economy. Crucially, the shortage of skills in necessary services like medicine would put the life of citizens at risks, and the shortage of skills in defense and security would create a threat for the sovereignty of the economy.

### *3.4 Over-education*

Over-education is defined as the difference between the skills required for an employee's current job and the skills possessed by the employee who has actually completed more years of education than are necessary. This means that an employee has a higher level of qualification than is needed for their current job.

In an ideal situation, the average productivity of a worker increases with their level of qualification – hence the positive relationship between salary and qualification. However, suppose that an employee with a master's degree is employed in a role that demands only a bachelor's degree. The salary that this employee would receive would be lower than the salary admissible to them if they were working on a job that demanded a master's degree. Since salaries are directly counted in GDP, a smaller salary will result in a reduction in the achievable level of GDP. If there were thousands of employees in such a situation, then the overall reduction in GDP would become a sizeable number.

Secondly, if a highly qualified employee occupies a low-level job, they will not have the opportunity to exploit their high-level skills, which would cause another reduction in the achievable level of GDP. Highly-qualified people have high levels of problem-solving ability, but they will not have the opportunity to exploit their ability if they are working in a job that does not require that level of ability. If we consider a software engineer hired in a data entry operator job, whilst the engineer could undoubtedly add more value to the economy than a data entry operator, this would only be possible if the software engineer were to be hired for programming. If they were hired as data entry operator, it is quite possible that their keystroke rate would be smaller than that of an ordinary data entry operator. Therefore, hiring a highly qualified graduate in a job that demands a lower level of skill is problematic for the individual, as they will not be satisfied with their job, and for society, as the resources available in the society are not being optimally utilized. Therefore, over-education can also result in productivity loss and a reduction in the level of growth.

### *3.5 Horizontal Skill Mismatch*

Horizontal skill mismatch is defined in the CEDEFOP report as a situation where "the level of education or skills matches job requirements, but type of education or skill is inappropriate for the current job." Horizontal skill mismatch occurs when the level of skills required by the economy is the same as the level of skills that the candidate possesses, but the subjects/professions that are required by the economy don't match the profession of the potential candidate. Again, the example of Japan and Turkey is an elegant illustration of this kind of mismatch. It is quite obvious that if engineers are needed by the economy, doctors and poets cannot substitute. Therefore, it is extremely important to have the horizontal match of skills.

We can again consider a country where there is a need for roads and bridges to link various regions so that producers can transport their goods to market. If the country's universities were producing enough engineers to meet demand, this would have a positive impact on the economy – not only because of the addition of the services of those engineers, but also due to the goods that would be traded due to their efforts. On the other hand, if the country was producing graduates in literature instead of engineers, the value added to the economy would only be in the form of the services of those graduates. There would be no new bridges or roads; therefore, the effect of this HC would not transmit to other sectors of economy. This would cause a reduction in the achievable level of growth, and many graduates would fail to find jobs because they would not have the ability to serve the purposes of employers. This would result in unemployment and its associated problems.

### *3.6 The Need for Further Modification of Production Functions*

The production function that was reshaped into a growth model by Solow (1956) changed shape continuously, until it became the augmented growth model proposed by Mankiw et al. (1992) in the following functional form:

$$Y(t) = K(t)^{\alpha}H(t)^{\beta}(A(t)L(t))^{1-\alpha-\beta} \quad (3)$$

Where represents output, represents capital stock, represents HC stock, represents technology, and represents labor stock.

Let be the indicator of skill mismatch which takes the value zero when there is no mismatch, and takes a positive value when there is a mismatch. is taken such that:

$$S(t) = \begin{cases} 0 & no\ skill\ mismatch \\ < 0 & skill\ demand\ is\ higher\ than\ the\ skill\ supply \\ > 0 & skill\ demand\ is\ lower\ than\ the\ skill\ supply \end{cases} \quad (4)$$

We have shown that productivity/speed of growth is reduced in both cases – i.e., in case of surplus or in case of shortage. Therefore, HC must be discounted for the skill mismatch. Let us define functional HC as HC discounted for the amount of skill mismatch. Functional HC should have the following properties:

a. the amount of functional HC cannot exceed the amount of HC – i.e.,
b. functional HC becomes smaller with an increase in the amount of skill mismatch, and becomes zero when skill mismatch is infinite – i.e.,
c. functional HC is equal to HC when there is no skill mismatch – i.e.,

Therefore, the function suggested for measuring functional HC is as follows:

$$Hf(t) = \frac{1}{1+|S(t)|}H(t), \quad (5)$$

where $\frac{1}{1+|S(t)|}$ may be treated as a discounting factor.

Therefore, the growth function will take following form:

$$Y(t) = K(t)^{\alpha}Hf(t)^{\beta}(A(t)L(t))^{1-\alpha-\beta} \quad (2)$$

Replacing *Hf*(*t*) with its value will yield following formula:

$$Y(t) = K(t)^{\alpha}\left(\frac{1}{1+|S(t)|}H(t)\right)^{\beta}\left(A(t)L(t)\right)^{1-\alpha-\beta} \quad (7)$$

## 4. Measuring Skill Mismatch, and Skill Mismatch in Pakistan

Skill imbalances have emerged as an important concern of policy makers in advanced nations such as Canada, Australia, New Zealand, and the United Kingdom. However, in most of the countries of the world, little attention has been paid to this issue. Most nations around the globe have not yet recognized the need to measure skill mismatch, and skill-related data is not generally available. This data is used for designing immigration policy and for advisory career counseling. However, most of the available data on skill mismatch is presented in the form of survey reports collected at irregular intervals. Therefore, at present it is not possible to carry out a reasonable empirical study to quantify the impact of skill mismatch on economic development and growth.

The "indicators of skill mismatch comprise vacancy hiring and turnover rates, relative wage movements and employment and unemployment changes, etc." However, there is a serious need for a wide range of skill mismatch indicators collected from every

country in the world, so that each nation can optimize its growth by assuring greater harmony between supply and demand for skills.

Janjua and Rehman (2016) have collected some indicators of skill mismatch in Pakistan using a representative sample of various employment units. Some facts from this report are presented here to elaborate on how important the problem of skill mismatch is.

**Table 2**. *Estimates of vacancy fill rate*

| Subjects | Private | Public | Overall | Subjects | Private | Public | Overall |
|---|---|---|---|---|---|---|---|
| Area Studies | 53.9 | | 53.9 | Statistics | 9.8 | 14.5 | 12.3 |
| Business | 48.6 | 35.4 | 44.9 | Computer Sciences | 9.7 | 41.2 | 33.9 |
| Journalism | 36.6 | 40.8 | 38.1 | Life Sciences | 9.6 | 30.3 | 24.1 |
| Chemistry | 22.6 | 20.7 | 21.3 | Anthropology | 9 | 59 | 9.8 |
| Gender Studies | 22.3 | | 22.3 | Political Science | 8 | 58.9 | 52.3 |
| Philosophy | 16.5 | | 16.5 | Sociology | 7.4 | 100 | 8.9 |
| Physics | 16.2 | 95.1 | 68.3 | Health Science | 7 | 15 | 12.2 |
| Performing Arts | 14.5 | | 14.5 | Agriculture | 6.5 | 19.3 | 17.2 |
| History | 13.5 | 234.4 | 126.9 | Systems Science | 6 | | 6 |
| Engineering | 13.5 | 76.5 | 58.1 | Education | 4.8 | 295 | 183.4 |
| Mathematics | 13 | 43 | 29.9 | Linguistics | 3.5 | 67 | 13.9 |
| Literature | 11.5 | 3.7 | 10 | | | | |

Source: *Janjua and Rehman (2016)*

Table 2 presents vacancy fill rates (hereinafter – VFRs) separately for the public and private sectors. Public sector jobs in Pakistan offer more facilities, job security, and prestige than their private sector equivalents. Therefore, securing a job in the public sector is more competitive. As a result, the VFR for the public and private sectors reflect competition for an ordinary job and for a prestigious one.

It is evident from Table 2 that in the subject of area studies, a candidate would have to compete with 53 other candidates to secure their job, if they were willing to work in a private sector organization. Business administration is an area in which the private sector carries higher prestige, therefore this subject does not follow the common trend and competition is higher in private sector organizations than in public. Here, a candidate would have to compete with 49 other people to secure a private job, and 35 people to secure a job in the public sector. This also implies that the chance of employability per attempt is less than 1/35 for a candidate, whether they apply to a public or a private sector organization. This means that a candidate would have to wait for a long time before they got a job, as a result of which both the candidate and the economy as a whole would suffer. The candidate would suffer because they would have to face the problem of unem-

ployment, and the economy would suffer because the resources invested in the education of the candidate would remain idle until they began their job. This also implies that the proportion of candidates who remain unemployed after having attained the qualifications necessary for a job is very high, and unless they get a job they will contribute nothing to the economy.

The differences between VFRs in public and private sector organizations also suggest important information. Education, for example, has one of lowest VFRs in private sector organizations, and one of highest VFRs in public organizations. The low VFR in private sector organizations reflects the fact that it is not very difficult for a candidate to secure a job in an ordinary private school, and perhaps reflects the fact that private schools are the largest private sector employers in Rawalpindi and Islamabad, where the survey was carried out. However, as mentioned earlier, in the private sector there is no job security, and other facilities associated with the public sector are absent. In order to attain a prestigious job in a public sector organization, a candidate would have to compete with approximately 295 other candidates.

**Table 3.** *The lag between attaining a qualification and getting a job*

| Major Areas | Time Lag (years) |
|---|---|
| Formal Sciences | 1.17 |
| Humanities | 0.70 |
| Management Sciences | 1.72 |
| Natural Sciences | 1.23 |
| Professions & Applied Sciences | 1.51 |
| Social Sciences | 1.86 |

Source: *Janjua and Rehman (2016)*

Table 3 summarizes the results of time lag – the lag between completing education and securing a first job for employees in Rawalpindi and Islamabad. For most subjects, a candidate would have to wait for over 1.25 years before attaining their first job, and this lag period is one of no or very little economic activity. The contribution of the respondent to GDP and productivity would have been close to zero during this period, though they were highly educated and were highly qualified for the job that they were currently engaged in at the time of the survey. The average levels of income and economic activity in Rawalpindi and Islamabad are among the highest in the country. If the same survey was carried out in a low-income city of Pakistan, one would expect a longer lag period. One can suggest that the relationship between GDP and HC would be weaker if the lag between securing qualification for a job and beginning employment was longer. This might explain why regressions do not reveal a strong relationship between HC and growth.

## 5. Conclusion

This study has shown that skill mismatch can offer a plausible explanation of the HC–growth paradox. Skill mismatch reduces the achievable level of growth through various mechanisms, and growth is expected to have a strong and inverse relationship with skill mismatch.

This study, however, also notes that most countries have no record of the indicators of skill mismatch. Only very few countries have so far collected data on the various indicators of skill mismatch, but this data is not yet available at a frequency regular enough to enable the impact of skill mismatch on the economy to be quantified and generalized for other countries.

This study argues that skill mismatch can nullify the effects of an increase in HC – increased HC cannot increase growth if there is a proportional increase in skill mismatch. Therefore, this paper argues that there is a dire need to focus on the indicators of skill mismatch so that the effect of HC on growth can be materialized. Future research might focus on skill mismatch, intangible assets, and their appropriate recognition (Petryk et al. 2020), which can also contribute towards the growth of GDP.

**Research Paper/ReVIEW Paper**

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