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Human resource, financial market development and economic growth in Saudi Arabia: a role of human capital

Abstract. Human Capital (HC) is considered as a key factor in determining and accelerating the economic growth in this modern age due to productivity gains. The present study explores the impact of human resources and financial market development (FMD) on the economic growth of Saudi Arabia by using data of 1970-2017 and by applying the autoregressive distributed lag (ARDL) cointegration methodology. Our findings suggest that the interaction between HC and human resources or between capital and FMD contributes positively to the economic growth in Saudi Arabia. Further, elasticity of FMD is found greatest in comparison of other growth factors. The elasticity implies that human capital is not enough to largely support the financial market. Its improvement, however, will promote the economic growth at higher pace as an increase of 1% in FMD interacting with human capital will increase economic growth by 0.688%. The findings of our research corroborate the importance and complementarity of HC and growth factors in enhancing the economic growth and we recommend the policy makers to focus on improving human capital in the kingdom through effective educational policies.

Keywords: Human Resource; Human Capital; Economic Growth; Financial Market Development

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**Людський ресурс, розвиток фінансового ринку та економічне зростання
в Саудівській Аравії: роль людського капіталу**

Анотація. У сучасну епоху людський капітал розглядається як ключовий фактор, що визначає та прискорює економічне зростання за рахунок підвищення продуктивності. На основі даних за період 1970–2017 рр., а також шляхом застосування авторегресійної моделі з розподілим лагом, автори статті дослідили вплив людських ресурсів і розвитку фінансового ринку на економічне зростання Саудівської Аравії. Результати проведеного дослідження показують, що взаємодія людського капіталу та людських ресурсів, а також капіталу й фінансового ринку, позитивно впливає на економічне зростання Саудівської Аравії. Також було визначено, що еластичність зростання фінансового ринку найбільшою мірою проявляється під час зіставлення її з іншими факторами росту. За результатами дослідження було зроблено висновок про те, що людський капітал та інші фактори є важливими та взаємодоповнювальними щодо забезпечення й підвищення економічного зростання країни. Рекомендовано подальше поліпшення якості людського капіталу шляхом упровадження ефективної політики освіти.

Ключові слова: людські ресурси; людський капітал; економічне зростання; розвиток фінансового ринку.

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**Человеческий ресурс, развитие финансового рынка и экономический рост
в Саудовской Аравии: роль человеческого капитала**

Аннотация. В современную эпоху человеческий капитал рассматривается как ключевой фактор, определяющий и ускоряющий экономический рост за счет повышения производительности. На основании данных периода 1970–2017 гг., а также при помощи использования авторегрессионной модели с распределенным лагом, авторы статьи исследовали влияние людских ресурсов и развития финансового рынка на экономический рост Саудовской Аравии. Результаты проведенного исследования показывают, что взаимодействие человеческого капитала и людских ресурсов, а также капитала и финансового рынка, положительно влияет на экономический рост Саудовской Аравии. Также было определено, что эластичность роста финансового рынка в наибольшей степени проявляется при сравнении её с другими факторами роста. На основании результатов исследования был сделан вывод о том, что человеческий капитал и другие факторы являются исключительно важными и взаимодополняющими в отношении обеспечения и повышения экономического роста страны. Рекомендовано дальнейшее улучшение качества человеческого капитала путем внедрения эффективной политики образования.

Ключевые слова: людские ресурсы; человеческий капитал; экономический рост; развитие финансового рынка.

1. Introduction

Human resources are compulsory for economic growth in any economy with regard to the employed labour force. Yet, the quantity of human resources cannot be enough to support economic growth in this modern age. Therefore, there is growing awareness of the importance of human capital in terms of educated labour force, which can be claimed to be great potential in improving economic growth. HC can be differentiated from human resources by the ability of conceptual thinking, value judgments, quick decision making and management aspects of any organization or economy. Romer (1986) advocates the importance of HC in economic growth in terms of the endogenous growth theory, where he considers HC to be an endogenous productivity factor aimed at enhancing economic growth. The previous growth theories considered technology to be both a productivity factor and an exogenous factor. This is viewed as obsolete in modern scientific literature, as technologies can be transferred to any corner of world with a proper stock of HC, due to which economic growth may be enhanced. With regard to empirical literature, Barro (1991) was the first to test the impact of HC on economic growth by proposing school enrolment rates as a proxy for HC. When conducting a cross-country analysis, he discovered a positive impact of HC on economic growth and stressed the need for further studies on this issue.

A high level of HC in a country is considered to be a growth-enhancing element which requires educated and skilled labour force as a factor input. Similarly to physical capital, HC can also be raised by financing or by investing in education. Today, labour alone is not enough to become a decisive factor in accelerating economic growth, as previously thought. Modern growth theories suggest that diminishing returns in physical capital occur due to a lack of HC, whereas investing in HC may accelerate productivity, unlike low productivity of uneducated labour. Further, human capital also attracts foreign investments and technologies which may bridge the saving-investment and technological gaps in any country and foster economic growth. The financial market of Saudi Arabia is growing at a faster rate which may also require human capital to perform well and may support the economic growth.

There is a strong research base which empirically tests the contribution of HC to the growth process. HC can be defined as an asset in an organisation/economy and a continuous variable increasing productive capacity of human resources through educational attainment, work experience through on-job and off-job trainings and any other activity or investment which can promote the skill levels of human resources. Therefore, the definition of human capital encompasses knowledge, skills and experience of human resources. Also it should be noted that human resources require investments to be converted into HC, similarly to investments in physical capital. It is very difficult to measure skills and experience at the macro level. Therefore education is usually used as a proxy for HC. In this regard, HC has been measured through different indicators, including school enrolment rates, average years of schooling, educational attainment rates, literacy rates, government expenditures on education and university enrolments, etc. The Federal Reserve Bank of St. Louis has recently developed a new definition of the Human Capital Index (HCI) per person and constructed

time series data for each country. The definition includes both years of schooling and yields to educational attainment. The authors of this article consider this definition to find the impact of human resources and FMD through their interaction with HC on the economic growth of Saudi Arabia.

Saudi Arabia depends mainly on the oil sector in terms of the country's economy, which is aimed at the diversifying the Saudi Vision-2030 and spending significant budgetary funds on the development of HC, particularly through its spending on education. To uplift the higher education sector, the country is spending a significant amount of budgetary funds on universities and vocational centres to raise the skill level of labour force, which may significantly contribute to the country's economic growth. Therefore, the education sector is an emerging sector in Saudi Arabia, followed by the oil, financial and telecommunication sectors. A rising trend of the HCI in Saudi Arabia is shown in Figure 1. In this context, it should be noted that the development of King Abdullah City is aimed at progress made by the world-class educational institutes to support the knowledge economy of Saudi Arabia. Although, these efforts have been found very fruitful in terms of developing the HC, the literacy rate of Saudi Arabia is yet far from standards of other high-income countries. Therefore, there is huge hidden potential in the Saudi labour market, which may support the country's economic growth, if properly and timely applied in developing the human capital. In this regard, formal education is considered very useful in enhancing cognitive abilities of the labour force, which, in turn, may enhance the productivity of the labour sector and the financial sector, and consequently may accelerate the economic growth of the country.

Knowing the importance of education and HC in economic growth, we are highly motivated to quantify a contribution of human resources and FMD in the growth process of Saudi Arabia through their interaction with HCI. There has not been a single research on this hypothesis. Therefore, the purpose of this study is to bridge the Saudi HC literature gap and to motivate policy makers to understand the importance of HC in framing the rational educational policies.

2. Brief Literature Review

There are a number of studies on the relationship between HC and income growth. Mincer (1981) argues that human capital can be developed through formal education and some informal channels such as work experience. He further claims that the contribution of HC is larger than that of physical capital as human capital is not only quantified by formal education, but it is also involved in innovation activities. Therefore, a great collective contribution of human capital can be claimed in the income growth of any economy. Barro (2001) emphasises the importance of qualitative aspects of HC along with quantitative aspects in long-run economic growth. He claims that the quality of education can have more long-lasting effects on economic growth than the of quantity of education.

Empirically, Bassanini and Scarpetta (2002) apply the panel cointegration on HC and income growth of OECD countries. In the short run, they find that HC has a negative yet insignificant impact on economic growth. However, in the long run, such an impact can be considered to be positive. It has been evident that education or HC could have positive contribution in

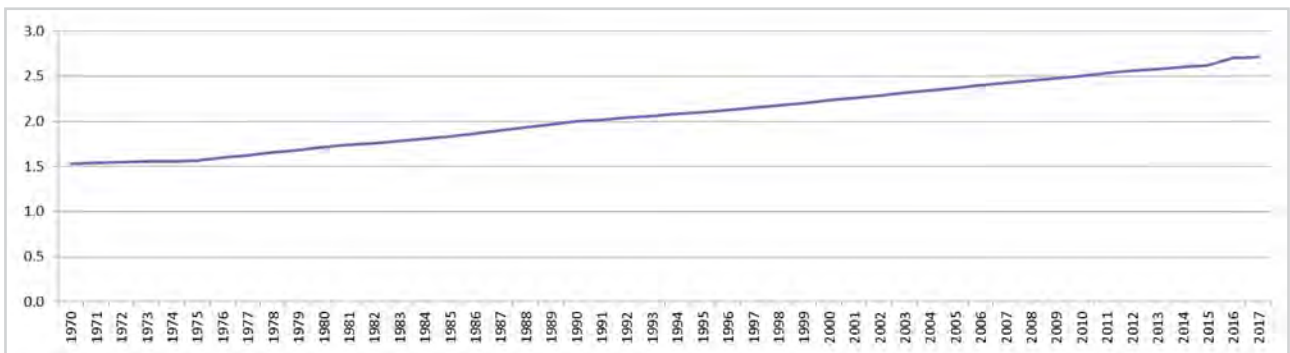


Fig. 1: Human Capital Index Per person over 1970-2017
Source: Compiled by the authors

terms of economic growth, but their adjustment requires a long time. Bianco (2009) stresses a positive role of HC in providing a stable economic growth which results from R&D activities and technological progress. Hanushek (2013) investigates the role of schooling with regard to economic growth, particularly the quality of schooling through enhancing cognitive skills in labour. He asserts that developing countries are far from the developed world in the quality of schooling. Therefore, HC in developing countries is not sufficient to support economic growth. He suggests to support the economic growth and to improve macro-economic performance by enhancing the quality of education.

Reza and Widodo (2013) investigate the growth of human capital in Indonesia by using data for the period between 1996 and 2009, and find that human capital has positively contributed to the country's productivity and its economic growth. They claim that a one-percent increase in human capital can enhance the productivity growth by 1.56 percent. Pelinescu (2015) investigates the role of HC in economic growth. He argues that a sustainable development cannot be accomplished if human skills and education are neglected. In his analysis, he finds that continuous investment in HC support income growth in most countries.

Using a panel of 132 countries in the period between 1996 and 2011, Ali et al. (2018) investigate the role of human capital, institutional quality and economic opportunities in terms of economic growth. They argue that economic opportunities may play a constructive role in human capital to support the growth phenomena. Conclusively, they report a positive impact of human capital on the economic growth in the sample group. Based on the group comprising nine East and South Asian countries, Siddiqui and Rehman (2017) investigate impacts of human capital on economic growth with regard to different levels of schooling. They report a positive role of primary and secondary education, and a positive role of tertiary and vocational education on the economic growth in the East Asia and South Asia, respectively.

Sigitas Vaitkevičius, Rūta Čiutienė, Evelina Meilienė, and Asta Savanevičienė (2015) created the index of human capital development covering 26 primary variables for 26 EU countries. The authors propose to compose the Human Capital Development (HCD) out of three parts, namely: Social progress of human capital, Innovation development rate of Human capital and Potential of Human capital development: «The Social progress of human capital as variable describes the achieved state of evolvement of the human capital in the country; the Innovation development rate of Human capital used to describe creativeness of the human capital in the country and the Potential of human capital development describes the prerequisites of human capital evolution».

The mentioned researchers highlight the importance of HC in terms of economic growth and conduct empirical studies to support their theories. Yet, there are no relevant studies for Saudi Arabia and we are trying to fill this gap.

3. Methodology and Data Sources

3.1. Data Sources

This research uses data covering the period between 1970 and 2017 for Saudi Gross Domestic Product (SGDP) to define Saudi income growth, gross capital formation (a proxy for physical capital), employed labour force (a proxy for human resources or labour), private credit by the banking sector as percentage of GDP (a proxy for FMD) and the Human Capital Index (HCI) per person (a proxy for human capital). All series, except the HCI, are collected from a WDI CD-ROM provided by the World Bank and the HCI per person is obtained from the Federal Reserve Bank of St. Louis database. All series are used in the form of a logarithm to catch the elasticity parameters.

3.2. Model and Estimation Strategy

There can be an unlimited number of elements of economic growth discussed in theoretical and empirical studies. Here, we are focusing only on the basic factors such as labour, physical capital and FMD in terms of the HCI expressed in the form of a growth equation. Most of economic models are non-linear. Therefore, we are considering our model to be log-linear. It has the following form:

$$\log SGDP_t = \alpha + \beta \log(K * HCI)_t + \delta \log(L * HCI)_t + \gamma \log(FMD * HCI)_t + \varepsilon_t \quad (1)$$

Here, SGDP stands for Saudi Gross Domestic Product, *K* is for capital, *L* is for human resources, *FMD* is for financial market development and *HCI* is for the Human Capital Index. Macroeconomic series usually shows the non-stationary behaviour and require to be tested for a unit root problem before being used in a long-run analysis. For this purpose, we will use a standard DF-GLS test suggested by Elliot et al. (1996). The regression analysis could be done after testing the unit root. For this purpose, we use the Auto-Regressive Distributive Lag (ARDL) technique initiated by Pesaran et al. (2001), which also reflects possible endogeneity in the model. This technique gives robust results even in presence of the mixed order of integration. The structure of the ARDL model for equation (1) can be expressed as follows:

$$\Delta \log SGDP_t = \phi_0 + \phi_1 \log SGDP_{t-1} + \phi_2 \log(K * HCI)_{t-1} + \phi_3 \log(L * HCI)_{t-1} + \phi_4 \log(FMD * HCI)_{t-1} + \sum_{i=1}^k \phi_{1i} \Delta \log SGDP_{t-i} + \sum_{i=0}^k \phi_{2i} \Delta \log(K * HCI)_{t-i} + \sum_{i=0}^k \phi_{3i} \Delta \log(L * HCI)_{t-i} + \sum_{i=0}^k \phi_{4i} \Delta \log(FMD * HCI)_{t-i} + \psi_t \quad (2)$$

Equation (2) can be tested for the possible presence of cointegration by applying a bound test. Further, the long-run elasticity parameters could also be estimated by the normalising procedure suggested by Pesaran et al. (2001). Further, Error Correction (EC) can be introduced in the equation (2) by replacing the lagged level variables. The coefficient of EC can be used to evidence a short-run relationship and coefficients of differenced variable can be utilized to describe short-run impacts.

4. Empirical Findings and Discussions

Table 1 represents the GD-GLS unit root test. All the variables show the non-stationary behaviour at the level and the stationary behaviour after their first differencing. Keeping these results, the level of integration is one, and we can proceed to a cointegration analysis.

After the unit root analysis, we tested the presence of cointegration (Table 2). The results of the bound test show that the model discussed in equation (2) has a cointegration, and we can proceed to a regression analysis.

Table 3 presents the long- and short-run results. All the diagnostic tests show that our model is beyond any econometric problem and is qualified to interpret the long- and short-run elasticities. In the long run, the capital regarding the HCI shows a positive impact on economic growth. Yet, its elasticity is low. A one-percent increase in the capital brings an increase of 0.576% in per capita in terms of Saudi GDP. Labour, a proxy of human resources, also has a positive impact on Saudi GDP. Its elasticity is also low and is less than that of capital. It means that human capital supports the productivity labour to a lesser extent than physical capital. Lastly, FMD also has a positive impact on income growth. Its coefficient reflects the elasticity of economic growth with respect to FMD and the magnitude of elasticity. 0.688 confirms that FMD has the greatest impact on the

Tab. 1: DF-GLS Test

Variables	Level		Differenced	
	C	C & T	C	C & T
LogSGDP _t	1.3541 (2)	-1.5412 (1)	-1.8459 (1)**	-3.8451 (0)***
Log(K*HCI) _t	0.4984 (1)	-1.5414 (1)	-7.9541 (0)***	-8.5412 (0)***
Log(L*HCI) _t	-0.1954 (1)	-1.6641 (1)	-2.8051 (0)***	-3.5412 (0)*
Log(FMD*HCI) _t	-1.0402 (1)	-2.4245 (1)	-1.7031 (0)*	-2.1542 (0)*

Note: C is intercept and T is time trend. ***, ** and * are showing stationarity at 1%, 5% and 10%, respectively. Lag lengths are in ().

Source: Calculated by the authors

Tab. 2: Results of the ARDL Bound Test

Equation No.	ARDL Optimal Lag Structure	F-Statistic
2	1,0,0,0	33.7198
Significance	Lower Bound	Upper Bound
5%	3.078	4.022
1%	4.270	5.412

Source: Calculated by the authors

Tab. 3: Long and Short Run Results: logSGDP_t

Predictors	Parameters	S.E.	t-stat	p-value
Long Run				
Log(K*HCI) _t	0.5753	0.0608	9.4672	0.0000
Log(L*HCI) _t	0.5626	0.3212	1.7517	0.0871
Log(FMD*HCI) _t	0.6877	0.1919	3.5834	0.0009
Intercept	-4.9096	1.4516	-3.3821	0.0016
Short Run				
ΔLog(K*HCI) _t	0.3243	0.0631	5.1385	0.000
ΔLog(L*HCI) _t	0.3171	0.1581	2.0053	0.0514
ΔLog(FMD*HCI) _t	0.3876	0.0812	4.7753	0.0000
EC _{t-1}	-0.5636	0.0696	-8.1014	0.0000
Heteroscedasticity		0.4038		0.8047
Serial Correlation		1.4943		0.1976
Normality		1.1403		0.9323
Functional Form		2.1031		0.1354

Source: Calculated by the authors

economic growth, if compared to labour and capital. The financial market of Saudi Arabia is growing fast due to the need to keep the pace with the modern age, as well as due to the kingdom's policies for economic diversification. Furthermore, the financial market can perform optimally only with the help of highly trained human resources due to FMD. Still, the elasticity remains less than one and has important policy implications. Being less than one, the elasticity implies that human capital is not enough to largely support the financial market. Its improvement may, in turn, promote the economic growth at higher pace as an increase of 1% in FMD interacting with human capital will increase economic growth by 0.688%. To reach this effect, the government needs to improve HC by investing in the education sector. Consequently, if HC is proper and available in any country, then its effect can be more than 1%, showing the presence of increasing returns to the labour scale, capital and FMD in the long run. However, with the elasticity being less than one, the estimated effects do not show increasing returns to the scale in Saudi Arabia. All this requires further attention to get full advantage of HC in determining the economic growth. Such a finding also directs us towards a fact that there is abundant potential available in Saudi HC to contribute to the country's economic growth, which is only possible by framing appropriate educational policies.

In the short run, the coefficient of EC_{t-1} is negative and shows the convergence from the short run to the long run equilibrium relationship. Further, the speed of convergence is 0.564% per year. Therefore, our model requires less than two years to smoothen its cyclical fluctuations. The short elasticities are significant in case of all the hypothesized factors of growth. Therefore, we can claim that human resources, physical capital and the financial market, with regard to the HCI, have a positive impact on the economic growth, even in the short run. It can be noticed that FMD has the most significant impact on economic growth, if compared with human resources and physical capital. Therefore, financial markets have proven to be important due to their contribution to the economic growth of Saudi Arabia. Concluding on both long- and short-run results, it should be noted that human capital is complementary to relationship human resources, physical capital and financial markets in determining the economic growth.

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