EDUCATION AND INCLUSIVE GROWTH IN SAUDI ARABIA

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Abstract

*Education is one of the most important factors of inclusive growth in every country. In this paper
we investigate the causality relationship between education expenditure and inclusive growth in
Saudi Arabia for 1981-2013 time period. We used a Structural Vector Auto Regressive (SVAR)
model to analyze the relationship between education expenditure and inclusive growth. As a
measure of inclusive growth we used the growth rate of Inequality-adjusted Human
Development Index (IHDI) and for education we used by the ratio of Human Resource
Development Expenditure to GDP. The estimated results suggest that education expenditure
has a positive impact on inclusive growth supporting in this way the view that investing in
education is determinant to inclusive growth.*

*Keywords: Education expenditure, Inclusive growth, Inequality-adjusted Human Development
Index (IHDI), SVAR, Causality test*

INTRODUCTION

Inclusive growth refers to both the pace and distribution of economic growth. Growth is usually considered inclusive if its benefits are widely shared across the population. Education expenditure is considered as one of the policies that can reduce inequality and increase inclusiveness. Attainment of the highest standard of education, is fundamental to more inclusive growth. Equitable education increases the prosperity of individuals, families and societies. It gives people the knowledge and skills necessary for occupational integration and boosts productivity, innovation and entrepreneurship.

While, Saudi Arabia is the Arab region's largest economy and has seen positive GDP growth, reaching a record 6.8% GDP growth rate in 2011 and seeing record oil export revenues in recent years. Lack of structural change and non-inclusive growth are frequently features of natural-resource intensive economies like Saudi Arabia. Diversification of the economy beyond oil has been a topic of attention for decades, but oil exports still make up 90% of public revenues today.

Improving standards of living for less developed parts of the Kingdom remains a challenge. A priority is thus to ensure that growth can be of greater benefit to all, including the less developed regions of the country (UNCCSF, 2012). It is the diversification and inclusiveness of such growth that will determine the sustainability of the Kingdom's aspired emergence as a major economy In order to be sustainable and effective, growth needs to be inclusive (Berg and Ostry, 2011 and Kraay, 2004)).

Generally, it is agreed that greater spending on education, as long as it is efficiently administered, is a key to a more inclusive growth.

Saudi Arabia has achieved substantial progress in improving access to all levels of education. the ratio of education expenditures in government expenditure has increased from 8.8% in 1981to 25,11 % in 2015. Increased oil revenues encouraged government to develop the education sector.

This paper distinguishes itself from the existing literature in that it examines the effects of education on inclusive growth in Saudi Arabia filling the literature gap. We begin by this paper by a review of the literature on the different definitions and the different measures of inclusive growth. Then, we explore the impact of education on inclusive growth in Saudi Arabia. Finally, Using annual data from 1981-2013, we propose a measure of inclusive growth in Saudi Arabia and we examine empirically the effects of education on inclusive growth in Saudi Arabia by using Structural Vector Auto Regression model (SVAR).

WHAT IS INCLUSIVE GROWTH?

There are different approaches to Inclusive Growth. Ramos &Ranieri (2013) compare various definitions of inclusive growth and demonstrate that there is no standard one, though there is a certain consensus. According to Rauniyar&Kanbur (2010), "Inclusive growth is that which is accompanied by lower income inequality, so that the increment of income accrues disproportionately to those with lower incomes." They noted that, if inclusiveness is understood as being captured by poverty, then inclusive growth is indistinguishable from pro-poor growth— defined as growth associated with poverty reduction.

Ali &Son (2007), proposed that "growth is defined as inclusive if it increases social opportunity function that depends on two factors: (i) average opportunities available to the population, and (ii) how opportunities are shared or distributed among the population". In turn, Ianchovichina & Lundstrom (2009) presented an analytical framework for assessing inclusive growth, paying attention to both the pace and the pattern of growth. Covering several dimensions, such as the employability of the poor, the cost of capital, geography and infrastructure, the framework centres attention on the constraints to inclusive growth, thus focusing on what is lacking to enable full inclusiveness rather than on measuring what degree of inclusiveness a country has attained.

The Commission on Growth and Development (2008) notes that inclusiveness – a concept that includes equity, equality of opportunity, and protection in market and employment transitions – is an essential ingredient of any successful growth strategy.

The World Bank refers to Inclusive Growth to denote both the pace and pattern of economic growth, which are interlinked and assessed together. In the World Bank approach, a rapid pace of economic growth is necessary for reducing absolute poverty. But, for this growth to be sustainable in the long run, it should be broad-based across sectors, and inclusive of most of a country's working-age population-(World Bank, 2009). The World Bank's approach adopts a long-term perspective and is concerned with sustained growth, where inclusiveness refers to equality of opportunity in terms of access to markets, resources and unbiased regulatory environment for businesses and individuals.

For the Asian Development Bank (ADB) Inclusive Growth is a concept that goes beyond broad-based growth. It is a type of "growth that not only creates new economic opportunities, but also one that ensures equal access to the opportunities created for all segments of society, particularly for the poor" (Ali & Son, 2007).

In the UNDP perspective, Inclusive Growth is seen as both an outcome and a process. On the one hand, it ensures that everyone can participate in the growth process, both in terms of decision-making as well as in terms of participating in growth itself. On the other hand,

Inclusive Growth is one whose benefits are shared equitably. Inclusive growth thus implies participation and benefit-sharing.

The OECD approach defines inclusive growth as "economic growth that creates opportunity for all segments of the population and distributes the dividends of increased prosperity, both in monetary and non-monetary terms, fairly across society".

In line with Kakwani & Pernia (2000), according to the International Policy Centre for Inclusive Growth (IPC-IG), inclusive growth "implies participation and benefit-sharing". Participation relates to both process—active involvement in ensuring that the process of growth is inclusive—and outcome—expansion of the number of people productively contributing to the economy, which may be conceived of as manifested by employment ratios.

Further illustrating the on-going effort to devise means to assess inclusive growth with a view to guiding development policies, in line with the incorporation of inclusive growth as a guiding principle in its long-term strategy, the African Development Bank (AfDB, 2013)) defines inclusive growth as "economic growth that results in a wider access to sustainable socio-economic opportunities for a broader number of people, regions or countries, while protecting the vulnerable, all being done in an environment of fairness, equal justice, and political plurality" (AfDB, 2013).

MEASURING INCLUSIVE GROWTH

Inclusive growth is a multidimensional and complex concept. There is no consensus in the literature and in policy discussions on how it should be defined and measured.

A shortage of robust data and the current lack of a universally accepted definition of inclusive growth will make successful measurement of inclusive growth programs and policies challenging. However, there is some agreement in the literature on the methods required to measure and analyze inclusive growth policies, The empirical literature propose different measures and indicators of inclusive growth.

First, the UNDP's annual ranking of countries based on their estimated Human Development Indicators (HDI) can be taken as a readymade measure of inclusive growth. Introduced in 1990, the HDI provides an alternative to conventional measures of national development, such as the level of income and the rate of economic growth. HDIs offer a broader definition of well-being and provide a composite measure based on three basic dimensions of human development: income, life expectancy and education. These are given equal weightings and the resulting combined score is used for ranking countries according to their performance annually(UNDP,2015). Since 2010, UNDP has also offered an inequality-adjusted score (IHDI) to capture the effect of inequality on these scores and hence on country rankings. These two

measures would in fact be the same if there were no inequality and in that sense the 'IHDI is the actual level of human development (taking into account inequality), while the HDI can be viewed as an index of the potential human development that could be achieved if there is no inequality' (UNDP, 2012). Second, Ali & Son (2007), Anand,.Mishra & Peiris(2013) and Taskin (2014), proposed a measure of inclusive growth based on utilitarian social welfare function drawn from choice literature, where inclusive growth depends on two factors: income growth and income distribution. A measure of inclusiveness is based on the concept of a concentration curve (*See Kakwani N. (1980), Ali and Son (2007) for details of concentration curves, and Anand et al. (2013) for social mobility curves*).

The African Development Bank propose also an inclusive growth index. The index reportedly includes job creation, access to basic infrastructure and social services, access to business opportunities, voice and accountability, regional integration, social protection, access to productive knowledge, and agricultural productivity (AfDB, 2013)).

The overall inclusive scores for each country (IGi) is computed as a geometric mean for that country of the standardised values for different indicators according to the following formula:

IGi = ($S_{1i} S_{2i} S_{3i.......} S_{ji}$)$^{1/n}$ (1)

Where:

(j = 1,… n: indicator j included in the dataset)

(i = 1,… m : country i included in the dataset)

Sji is a standardised score for the rankings obtained in respect of indicator j for country i.

Standardised scores are obtained using the following formula.

Sji = 100(m_j - r_j) / (m_j - 1)i (2)

Where: r_j is a country's rank in respect of indicator j in (descending order) and m_j is the total number of countries for which data for indicator S_j is available. This takes into account the variable number of countries for which data is available for specific indicators. In general, due to data limitations, the number of the countries declines for variables such as inequality and the structure of employment (percentage of the wage and salaried in total employment) – a factor that is arguably biased against less developed countries

More recently, Ramos, Ranieri & Lammens(2013) suggested measuring the inclusiveness of growth. Following the definition of inclusive growth as a process that enhances benefit-sharing and participation, it includes three indicators in the analysis: income poverty, inequality (as proxy for the benefit-sharing dimension) and the employment-to-population ratio (as proxy for participation). The index gives prominence to poverty and inequality, which have

consistently been the core indicators of pro-poor and inclusive growth, combining them with the indicator of employment to account for the participation dimension.

Finally, McKinley (2010) proposed an inclusive growth index based on the Asian Development Bank's Long-Term Strategic Framework 2008–2020. The index includes indicators of growth, productive employment, economic infrastructure, income poverty and equity, gender equity, human capabilities and social protection. This composite index is based on a scoring methodology and a weighting scheme that implicitly involves value judgments.

EDUCATION AND INCLUSIVE GROWTH IN KSA

The role of education has been acknowledged widely by economists and policy makers. Economists believe that investment on education or human capital increases output and labor productivity. However, it is important to look at the role of education not only on the rate of economic growth but also on elements that make growth more inclusive. Since inclusive growth involves reduction of poverty and inequality and broad based participation through productive employment, it would be important to ask whether in addition to raising economic growth, education and skill training help reduce poverty and inequality and improve the employability of potential job-seekers (Rizwanul, 2014)).

There is scientific evidence that educated people are healthier, live longer, are more active during aging, the consumption patterns clearly show a significant role in community building, identity, education, and personal control in the field (Tandi, 2013).

Investment in human capital is universally recognized as a key pillar of achieving inclusive growth. Investments in education have been statistically linked to better economic development outcomes. As labour is their main asset, a good level of education enables poor men and women both to participate in and benefit from economic growth (Ravallion, 2004).

Quality education is the key to inclusive growth and empowerment of a large section of the population (Dauda & Mesagan (2016)). At the country-level, improving educational access is cited as a key determinant of Brazil's inequality success story (ECALC, 2011)). Hull (2009) estimated the impact of investment on education on the growth of the economy in Lesotho he found that education and technical training have a strong influence on workers' chances of wage employment and the level of earning.

In Honduras, a male urban worker with a post-secondary degree earns approximately 100% more than a male urban worker with high school education and 170% more than a male urban worker with primary school education. In Pakistan, education is an important determinant of mobility. Ireland's and Moldova's economic transformations towards a comparative advantage in niche, high-skilled goods and services have been attributed to investment in education.

Maddison (2007) found that that in rural economies, educational improvements have been shown to increase returns to small-scale farmers because they can more readily absorb new techniques and innovate, as well as adapt more effectively to climate change risks.

The growth of education sector in the development process of any economy cannot be over-emphasized because only well educated people produce optimally and contribute to national output. However, a key aspect of achieving this is the efficiency with which inputs, mostly in the form of public spending, are transformed into desired social outcomes (Ebejer & Mandl, 2009)).

Saudi Arabia has achieved substantial progress in improving access to all levels of education. Many of the Kingdom's key human development indicators have improved since the establishment of the State. Attainment of the highest standard of education has led to the increase in public expenditure allocation to education sector over the years with the aim that this would in turn generate returns that will further enhance the growth and development of the country. However, significant disparities exist between regions and between rural and urban areas, even as the capacity of local governments to deliver services and provide the necessary infrastructure is limited. A low level of preschool education, skills mismatches with the labour market, as well as persistent issues of dropouts, repetition and illiteracy, also must be addressed (United Nations Common Country Strategic Framework (UNCCSF, 2012)). Education and technical training have a strong influence on workers' chances of wage employment and the level of earning.

Although several empirical studies (Ageli, 2013) have examined the relationship between education spending and economic growth in Saudi Arabia, none of these studies has explored the relationship between education and inclusive growth.

METHODOLOGY

Inclusive growth measure

To measure inclusive growth for the Saudi Arabia, we use the same methodology proposed by Huang & Quibria (2013).The inclusive growth IG is defined as the growth rate of the Inequality-adjusted Human Development Index IHDI as follows:

$$IG_t = 100 * (IHDI_{t+1} - IHDI_t) / IHDI_t$$

Following UNDPs technical note 2 (2011), we calculate the Inequality-adjusted Human Development Index IHDI by adjusting HDI for inequality in the distribution of each dimension across the population. The IHDI is a geometric mean of three dimension indices adjusted for inequality.

The IHDI draws on the Atkinson (1970) family of inequality measures A_x.

$A_x = 1 - g/\mu$ where g is the geometric mean and μ is the arithmetic mean of the distribution. This can be written as:

$$Ax = 1 - \frac{\sqrt[n]{X1 \ldots Xn}}{\bar{X}}$$

Where $\{X1, \ldots, Xn\}$ denotes the underlying distribution in the dimensions of interest. A_x is obtained for each variable (life expectancy, mean years of schooling and GNI per capita).. Sensitivity analysis of the IHDI is given in Kovacevic(2010).

Then, the inequality-adjusted dimension indices are obtained from the HDI dimension indices, I_x, by multiplying them by $(1 - A_x)$, $I_x^* = (1 - A_x) \cdot I_x$.

Step 3. Combining the dimension indices to calculate the Inequality-Adjusted Human Development Index

The IHDI is the geometric mean of the three dimension indices adjusted for inequality:

$IHDI^* = (I^*_{Health} \cdot I^*_{Education} \cdot I^*_{Income})^{1/3}$

$= [(1 - A_{Health}) \cdot 1 - A_{Education}) \cdot (1 - A_{Income})]^{1/3} \cdot HDI.$

The loss in the Human Development Index due to inequality is:

$Loss = 1 - [(1 - A_{Health}) \cdot (1 - A_{Education}) \cdot (1 - A_{Income})]^{1/3}.$

Annual data for life expectancy at birth, mean years of schooling and GNI per capita(US $) are provided for the period 1981-2013 by the World Development Indicators(WDI) data base. Data on HDI are taken from UNDP Human Development Reports.

Econometric Approach

Standard VAR models are useful when we want to analyse inter-dependencies and dynamic relationships between variables with no underlying economic structures, so VAR models evolved in the sense of incorporating a priori information on the behavior of the variables under analysis.

While VAR models explain the behaviour of endogenous variables by their own past values, SVAR models allow for the presence of contemporaneous interdependencies between endogenous variables (Breitung, Bruggemann& Luetkepohl, 2004).

The SVAR models are preferred in case of there as a need to involve theoretical interpretation to the model outcomes. Such technique allows to order the model's variables according to their relative importance and endogenous/exogenous structure.

The Data

The main objective is to empirically examine the relationship between education expenditure and inclusive growth in Saudi Arabia. To this end we use Structural Vector Autoregression (SVAR) analysis on an annual dataset between 1981 and 2013 . The period is chosen due to data availabilty. We use 5 variables: growth rate of the Inequality-adjusted Human Development Index as a measure of inclusive growth (INCGROWTH) calculated by the authors. All the other variables are obtained from the Saudi Arabian Monetary Agency (SAMA) annual reports. Expenditure on Education (EDU) is measured by the ratio of Human Resource Development Expenditure to GDP. The growth rate of Non oil GDP (NGDP) and the growth rate of real GDP (RGDP).

Table 1. Descriptive statistics

	EDU	INCGROWTH	NOGDP	RGDP
Mean	6.812777	1.098690	6.372121	5.841212
Median	6.938059	1.114433	5.050000	6.040000
Maximum	8.541331	2.053594	18.07000	27.09000
Minimum	4.210682	0.360144	-8.05000	-17.45000
Std. Dev.	0.883008	0.308588	6.099072	12.89822
Observations	32	33	33	33

ANALYSIS AND EMPIRICAL RESULTS

Stationarity and Cointegration

As a first step, we test the stationarity of the variables by conducting the Augmented Dickey-Fuller (ADF) unit root test. The results are presented in table(2) and offer a strong evidence that all variables are stationary. For each variable, the null hypothesis of the unit root test is rejected. Thus, it is appropriate to employ SVAR model.

Table 2. Augmented Dickey Fuller Test

Variable	Level	
	Stat	**P value**
EDU	-4.1715*	0.0029
INCGROWTH	-2.8432***	0.0636
NOGDP	-2.7869***	0.0714
RGDP	-4.0563*	0.0036

(*), (**), and (***) are statistically significant at 1, 5, and 10 percent

The next step is to test for the presence of a relation between our variables of interest. Table(3) reports the results for cointegration tests. To demonstrate the causality link between education expenditure and the other variables, Granger pairwise causality test is implemented. Granger causality test evaluates whether past information on one variable helps in prediction of other variables outcomes (Nwogwugwu, Ijomah & Uzoechina, 2016).

It is important to mention that SVAR optimal lag length is applied. To determine the lag length, we use LR, FPE, AIC, SC, and HQ criterion (Table 3). According to this criterion a lag of 1 period is advised. According to the lag criterion, the causality test is run with one lag.

Table 3. VAR Lag Length

VAR Lag Order Selection Criteria
Endogenous variables: EDU INCGROWTH NOGDP RGDP
Exogenous variables: C

Sample: 1981 2013
Included observations: 28

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-223.4933	NA	134.0396	16.24952	16.43984*	16.30770
1	-198.1218	41.68171*	69.69335*	15.58013*	16.53171	15.87104*
2	-186.2463	16.11682	101.2622	15.87473	17.58757	16.39837

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4, shows the null hypothesis of Education expenditures shock, does not Granger cause Inclusive growth and Non-Oil GDP is rejected at the 5 percent level. Hence, Education expenditures shock Granger cause Inclusive growth. Thus, Education expenditures shock Granger cause real GDP.

Since the above results are acceptable, one can proceed to the core tools of the SVAR models represented by variance decompositions and impulse response functions.

Table 4. Pairwise Granger Causality Test

Pairwise Granger Causality Tests

Sample: 1981 2013
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
INCGROWTH does not Granger Cause EDU	30	0.22163	0.6416
EDU does not Granger Cause INCGROWTH		4.62584	0.0406
NOGDP does not Granger Cause EDU	30	0.00050	0.9823
EDU does not Granger Cause NOGDP		0.86911	0.3595
RGDP does not Granger Cause EDU	30	2.45514	0.1288
EDU does not Granger Cause RGDP		3.36692	0.0776
NOGDP does not Granger Cause INCGROWTH	32	1.02274	0.3202
INCGROWTH does not Granger Cause NOGDP		2.76475	0.1071
RGDP does not Granger Cause INCGROWTH	32	12.0010	0.0017
INCGROWTH does not Granger Cause RGDP		0.58065	0.4522
RGDP does not Granger Cause NOGDP	32	3.51342	0.0710
NOGDP does not Granger Cause RGDP		0.00418	0.9489

**Impulse response functions and Variance decomposition**

This paper applies a well-known methodology that usually utilized to determine the relative importance of each shock in the model in explaining the variations of each and every endogenous variable in the model. To do so, we need to extract the impulse response functions (IRFs) and Variance decompositions (VDs). The first one provides a visual presentation of the response of the underling variable to a specific shock. The second tool, VDs, shows how relatively important is an underlying shock in explaining the variables' fluctuations.

Impulse response of Inclusive growth

Technically speaking, graph (1) shows the response of inclusive growth to the shocks of education; inclusive growth; non-oil real GDP, and real GDP, respectively. With regards to the education shock, it seems that this shock has an initial positive impact on inclusive growth especially in the first year. The shock starts to decrease slowly and hit the long-term equilibrium in the second year. After that, the effects drop to the negative area, before in converges to the zero line, indicating a temporary effect of the education shock. The other shock seem to have temporary nature too, with inclusive own shock as the most significant one.

Graph 1. Impulse response of Inclusive growth

Response to Cholesky One S.D. Innovations

Response of INCGROWTH to EDU

Response of INCGROWTH to INCGROWTH

Response of INCGROWTH to NOGDP

Response of INCGROWTH to RGDP
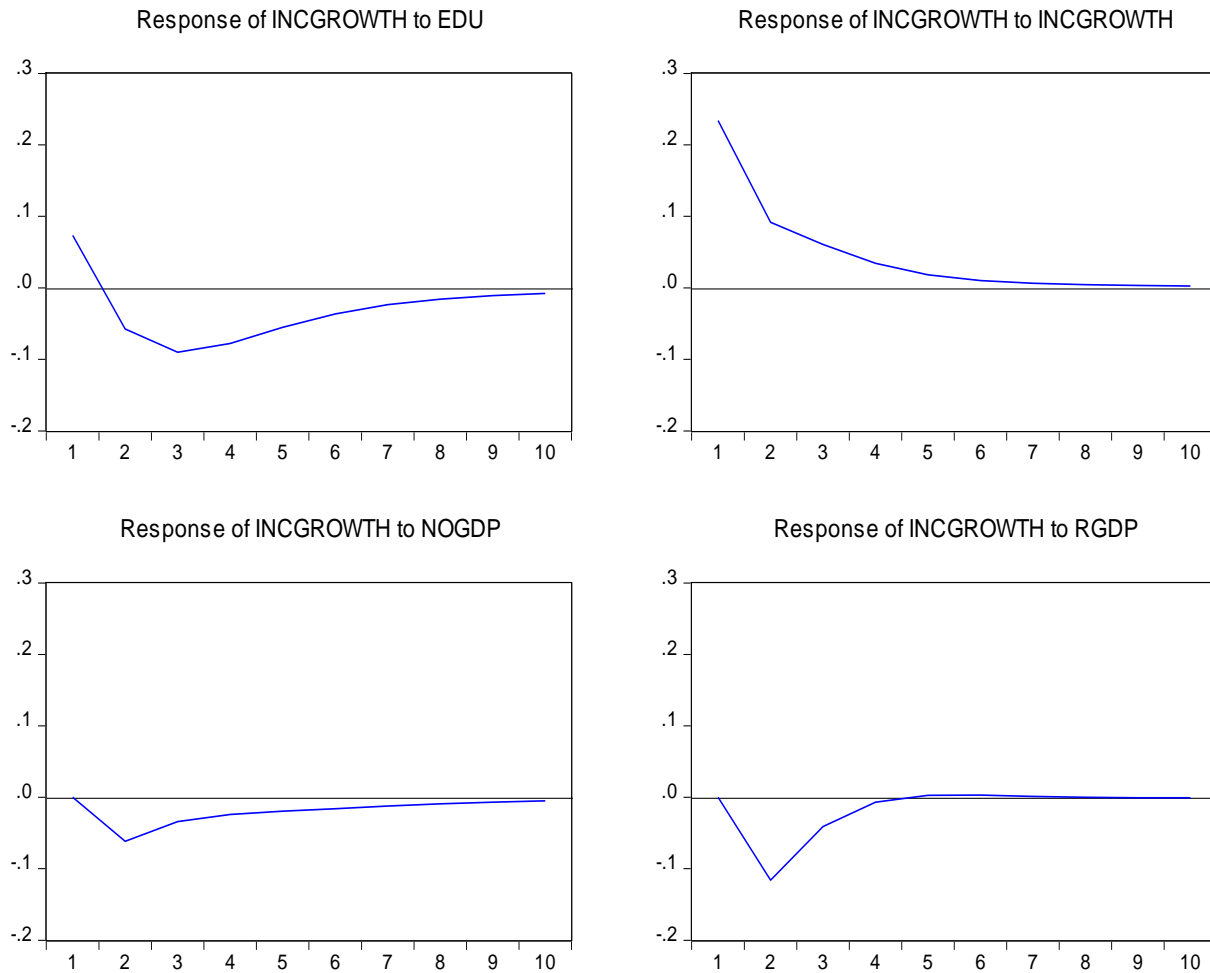
Variance decomposition of Inclusive growth

The variance decomposition as seen in table (5) shows the response of the inclusive growth to the four shocks. With 10%, the education shocks play a relatively significant role in explaining the variation of the inclusive growth in the first year. The inclusive growth own shock is the most important shock in the first year with almost 91%. The other two shocks seem to play insignificant role in the first year. As time expands, the education shocks increase slowly and steadily to reach almost 29% in the last year. Meanwhile, the inclusive growth shocks remain the most important factor in explaining the model fluctuations, they decrease slowly and reach 58% in the last year. The non-oil GDP and real GDP shocks seem to still very modest factors in explaining the inclusive growth variations.

Table 5. Variance decomposition of Inclusive growth

Period	S.E.	EDU	INCGROWTH	NOGDP	RGDP
1	0.665107	8.940306	91.05969	0.000000	0.000000
2	0.770252	9.743832	70.90388	4.255307	15.09699
3	0.787571	16.17658	64.48531	4.761954	14.57615
4	0.789754	20.45571	61.00649	4.944001	13.59380
5	0.790086	22.43261	59.29749	5.113820	13.15608
6	0.790210	23.23722	58.53150	5.257025	12.97425
7	0.790276	23.56213	58.19158	5.353969	12.89231
8	0.790316	23.70237	58.03402	5.410176	12.85343
9	0.790340	23.76884	57.95688	5.439888	12.83438
10	0.790354	23.80282	57.91757	5.454906	12.82471

Cholesky Ordering: EDU INCGROWTH NOGDP RGDP

The estimation results show that shocks to education have a positive and significant effect on inclusive growth in Saudi Arabia. However, the contribution of education in inclusive growth increase slowly and steadily.

CONCLUSION

The main objective of this paper was to explore the relationship between education expenditure and inclusive growth in Saudi Arabia, which is measured as the growth rate of the Inequality-Adjusted Human Development Index. We use the structural VAR approach with the associated impulse response and variance decomposition analysis. The use of SVAR lies in that it is less dependent on existing economic theory and is less susceptible to endogeneity among the variables of interest (Seak-Kyun, 2014).

The estimated results suggest that education expenditure has a positive impact on inclusive growth supporting in this way the view that investing in education is determinant to inclusive growth. So more efficient spending on education can better serve the goal of inclusive growth in Saudi Arabia. The SVAR shows that education has a considerable role in explaining the variation of inclusive role which supports the fact that education maintains a sustainable impact on inclusive growth. The policy implications are straightforward indicating that higher government expenditures on education will always stimulate inclusive growth.

Further studies as an extension of current study could include other policy variables such as quality of education and education outcomes. In addition, the study can be expanded by conducting a similar approach for a group of countries with similar structure such as Gulf Cooperation Council (GCC).

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