

التعليم والنمو الاقتصادي في المملكة العربية السعودية:
دراسة قياسية باستخدام المعادلات الآنية

**Economic Growth and Education in Saudi Arabia:
An application of Simultaneous Equations Method**

التعليم والنمو الاقتصادي في المملكة العربية السعودية: دراسة قياسية باستخدام المعادلات الآنية

Economic Growth and Education in Saudi Arabia: An application of Simultaneous Equations Method

Abstract

The objectives of this study are to assess the mutual relationship between education and the growth of real non-oil gross domestic product in Saudi Arabia, and to specify the determinants of government expenditure on education for the country. By utilizing the simultaneous equations method of estimation and applying three-stage least square (3SLS) procedure, the results indicate that there is no direct mutual positive relationship between education and economic growth in Saudi Arabia unless government expenditure on education is introduced into the model. When government expenditure on education was excluded, the relationship was only towards one direction; from real non-oil gross domestic product to general education enrollment. The results also show that population is a determinant for general education enrollment, and that government revenue, general education enrollment and educational expenditure for the previous year are the main determinants for government expenditure on education in Saudi Arabia.

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(1)

1961 Schultz

1962 Denison

(2)

361-360 1995

310 1991 -

(1)

(2)

()
() NOGDP

() (1) :
() NOGDP

(2)

(G_E)

:

Sitrumilin 1924

(3)

()

(4)

()

: (3)

.611-574 1997

(4)

: .38-36 1995

Schultz, Denison, and the contribution of "EDS" to national income growth. Mary J. Bowman, University of Chicago, p. 450.

(Cob-Douglas Production Function)

43% Denison .1960-1910

(1957-1929)

.538-537 1990 (2)

(5)

()

(R. M. Solow 1957)

:

- - ()

()

()

1949-1909

12.5%

87.5 %

(1959) Odd Aukhrast

Cob - Douglas

2%

1%

()

0.7%

1%

1.8%

GNP

(1962) E. F. Denison

(Cob - Douglas)

. 1960-1910

. GNP

23%

21%

)

1957-1921

F. Harbison

(6) (1985

1987

1977

75

(1964) CH. A. Myers

.499 1419 - 3 8
 . 170-169 1977
 . 174-167 1987
 .35-29 1985

(5)

(6)

(7) . 0.84 0.67

(1977) Razin, Economic Growth and Education

(y) (l) (11)

.(n) (e)

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.()

. (8) NI ()

(1999) Javad M . Sadeghi

98 GNP

(9)

(1982)

(1980) W B

)

83 (

(7)

(8) Razin, Assaf, Economic Growth and Education : New Evidence, Economic Development and Cultural Change ,VOL.25, NO. 2, Jun. 1977, pp 317-324 .

: Netherlands

(9) Javad M . Sadeghi , The Relationship of Education to Economic Growth ;Across-Country Analysis ,Working Paper 9617 , Economic Reseach Forum, for the Arab Countries .Iran & Turkey , pp 1-22.

. 1977-1960

1959-1950

UNESCO

. ⁽¹⁰⁾ (1995 1990 1998)

(1982)

. 1980 -1970

9% - 6%

Denison Schultz

(1980)

. ⁽¹¹⁾

(1977)

. ⁽¹²⁾ (1984)

(1982)

(1979)

()

(1995)

25%

(1999)

.45-37 1982 .24-21 1990 .88-74 1998

⁽¹⁰⁾

⁽¹¹⁾

.174-173 .14-13 1996 (1) .45-42 1998

⁽¹²⁾

.18-15 1996

:

:

8040 NOGDP
 . 6.34% 1998 43011 1970

.(5.1%) GDP 13.9%

()

(1) NOGDP

⁽¹⁴⁾ .(1998 - 1970)

(1)

NOGDP	GDP				
8040	19907	833	8492	666	1970
28318	532820	6322	54509	21294	1980
38894	562430	16262	132827	25460	1990
40649	628770	29732	211721	26541	1995
43011	664880	35021	296927 *	45595	1998

. 1997 *

(14)

.() 1410

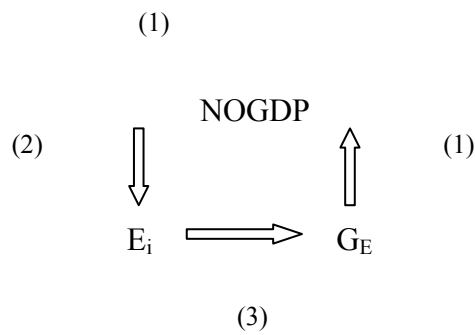
Simultaneous Equations Model

.

:

.

:



(Behavioral) Structural equations)

;(13) (Exogenous Variables Endogenous Variables

$$NOGDP = f(L/P, G_E, NOGDP(-1))$$

$Q_i = f(L, G_E, G_{NE})$: (15)
 $E_i = f(G_E, P, Q_i, O_H)$
 $G_E = f(P, G_R, E_i, O_H)$

(E_i) (Q_i) : Endogenous Variables :
 (P) (G_{NE}) (L) : Exogenous Variables (G_E)
 () () (G_R) (O_H)

$$E_i = f(P, \text{NOGDP}, E_i(-1))$$

$$G_E = f(G_R, E_i, G_E(-1))$$

:

$$\text{NOGDP} = \alpha_1 + \beta_1 L/P + \beta_2 G_E + \beta_3 \text{NOGDP}(-1) + U_1 \quad \dots\dots\dots(1)$$

$$E_i = \alpha_2 + \beta_4 P + \beta_5 \text{NOGDP} + \beta_6 E_i(-1) + U_2 \quad \dots\dots\dots(2)$$

$$G_E = \alpha_3 + \beta_7 G_R + \beta_8 E_i + \beta_9 G_E(-1) + U_3 \quad \dots\dots\dots(3)$$

:

: Endogenous Variables

	.		
()		= NOGDP
			= E _i
.)		= G _E

: Exogenous Variables

	.		
.)		= L/P
			= NOGDP (-1)
			= P
			= E _i (-1)
			= G _R
			= G _E (-1)
()		= U ₁ , U ₂ , U ₃
			= β _i = β ₁ , β ₂ , ..., β ₉
			= α _i = α ₁ , α ₂ , ..., α ₃

(E_i)

(NOGDP)

(AL/P)

(E_i)

(A)

$$\begin{aligned}
 & \cdot (\quad) \text{ NOGDP} \\
 & \quad (\text{ NOGDP}) \\
 & \quad \quad (E_i) \\
 & \quad (2) \quad (1) \quad \cdot (16) \\
 & \quad \quad \quad (1) \\
 & \quad (G_E \quad) \quad (\text{ NOGDP}) \\
 & (2) \quad \cdot (\quad) \\
 & \quad (P) \quad (E_i) \\
 & \quad \quad (3) \\
 & (G_E \quad) \\
 G_E \quad (E_i) \quad (G_R) \\
 \quad \quad \quad \cdot (-1) \\
 \quad \quad \quad (2) \\
 \quad \quad \quad (2)
 \end{aligned}$$

G_E	E_i	NOGDP	Endogenous	:
				: Variables
	+		NOGDP	-1
+			E_i	-2
		+	G_E	-3

		Exogenous	:
			: Variables
	+	L / P	-4
			-5
	+	NOGDP (-1)	
	+	P	-6
	+	E _i (-1)	-7
+		G _R	-8
+		G _E (-1)	-9

- The Rank Condition

-

- The Order Condition

OLS

)

ILS

.(

IV

:

. 3SLS

2SLS

3SLS

()

()

:

Logarithmic Form

-1

Growth

Linear Form

. (3)

Rates

-2

Standard Error

.

-3

5%

(t)

LM

-4

-5

1998-1970

:

NOGDP

GDP

WB

IMF

⁽¹⁷⁾. (2000)

1414-

1415

.7 (14)

⁽¹⁷⁾

.1412

.() 1410

. 1999 1420-1390

	:	:
(18)	()
	:	
()	
:	-	-
	()
	.	
	. 3SLS	
/		
.		
	-	-
Standard Error		
	(3)	.
LM		(t)
		.($\overline{R^2}$)

(3)

Logarithmic Form

* . 3SLS

ln G_E	ln E_i	ln NOGDP	
-4.350 (-3.586) ¹	2.772 (4.070) ¹	0.836 (2.521) ¹	C
		0.180 (2.556) ¹	ln L/P
		0.098 (9.519) ¹	ln G_E
		0.727 (37.172) ¹	ln NOGDP (-1)
	0.334 (3.237) ¹		ln P
	0.042 (1.789) ²		ln NOGDP **
	0.723 (9.729) ¹		ln E_I (-1)
0.429 (7.251) ¹			ln G_R
0.329 (3.369) ¹			ln E_I
0.451 (7.069) ¹			ln G_E (-1)
2.043	2.237	1.318	D-W
0.427 (0.520)	0.24 (0.623)	1.60 (0.206)	LM (1)
0.95	0.99	0.99	$\overline{R^2}$

. 3SLS

2SLS

*

(One - tail test)

. 1%

(t)

1

5%

(t ≥ 1.71)

(t)

2

NOGDP/P ()

NOGDP

**

NOGDP

(One - tail test) 5%

()

(3)

(9)

($\overline{R^2}$)

(0.99)

(0.95)

Q – stat

⁽¹⁹⁾ Breusch – Godfery LM

Q- stat

Q-stat

Q-stat

LM

AR(1)

⁽²⁰⁾

(H₀)

2SLS

(F)

(0.05)

(t)

(4)

(Koyck)

⁽²¹⁾

Serial

Time Series

⁽¹⁹⁾

Correlation

D –W

⁽²⁰⁾

Eviews3, User's Guide, 2nd, Edition, Copyright 1994-1998, pp. 303-308 and pp. 343-346.

⁽²¹⁾

.258-251

1996 / 1417

–

(SEM (4))

*			
0.6593	0.180	L/P	
			NOGDP
0.3589	0.098	NOGDP	G _E
2.663	0.727		NOGDP(-1)
			NOGDP
	0.727		
	0.273		
	3.66		
1.206	0.334	E _i	P
0.1516	0.042		
		E _i	NOGDP ()
2.610	0.723	E _i	E _i (-1)
	0.723		
	0.277		
	3.61		
0.7814	0.429	G _E	G _R
0.5993	0.329	G _E	E _i
0.8215	0.451	G _E	G _E (-1)
	0.451		
	0.549		
	1.82		

: (Koyck)

$$\sum_{j=0}^{\infty} \beta_j = \beta_0 \left(\frac{1}{1-\lambda} \right)$$

$$\beta_j = \beta_0 \lambda^j, \quad j = 0, 1, 2, \dots$$

$$0 < \lambda < 1$$

(t)

		<u>() GDP</u>	-
			-1
	(1%)		
(0.36%)		(0.1%)	
	()		
			-2
(0.18%)			(1%)
		(0.66%)	
		(22)	
			-3
		(1%)	
(2.66%)		(0.73%)	
			(23)
			-
			-1
(0.33%)		(1%)	
(L)		(L)	(22)
	()		
(L/P)		(L)	
	()		
			(23)

()

(24)

(1.21%)

-2

(1%)

(0.042%)

()

()

(0.15%)

(1%)

-3

(1%)

(0.72%)

(2.61%)

—

-1

()

()

(0.99)

()

(24)

(0.78%)

(1%)

(0.43%)

(25)

-2

(0.33%)

(1%)

(0.60%)

-3

(1%)

(0.82%)

(0.45%)

:

()

(2)

(1)

)

Razin (1977)

(21)⁽²⁶⁾

(1984)

(1982)

(1979)

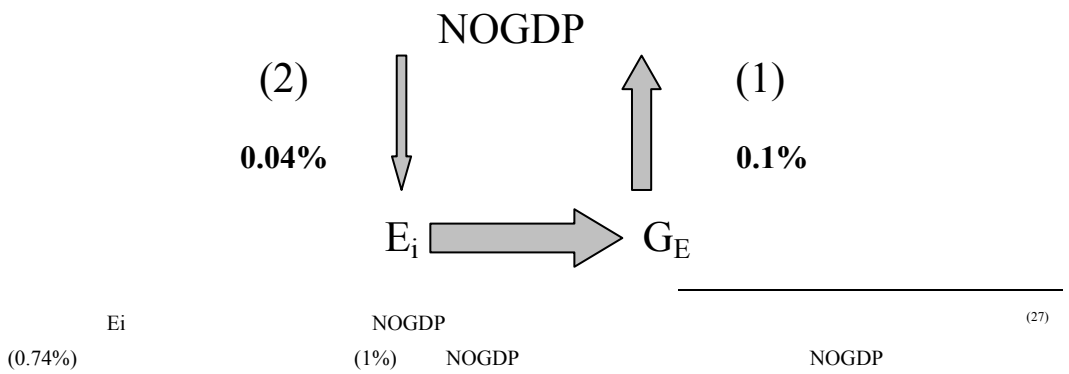
(1991)

(25)

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) ()
 .() ()
 (1)
 (2)
 (3)
 (27) ()
 (1%)
 (0.1%)
 (0.04%) (1%)
 (0.33%)
 0.60 0.15 0.36
 ()

: (28)
 (2)



1987-1982

1981-1970

(1998-1988

Dummy Variables
 Differential Shift)

beta Coefficient (28)

(1%)

0.33%

(3)

:

(1%)

-1

.

(0.1%)

()

(29)

(1%)

-2

(0.04%)

(1%)

-3

(0.33%)

.()

()

):

(NOGDP

)

(t)

(30)

()

-

-

:

()

-1

()

()

()

(EH)

(GEO)

(E)

(EO)

(EH)

(30)

(t)

(0.99)

-2

(31)

-3

المراجع

أولاً : المراجع العربية

■ أخضر

- - 1995 .
- . 1990
- 1982 .1996
- 35 3 1416 - 1995 .
- :
- . 1998
- .2000 /1421
- :
- .1999 /1420
- 22-18
- 1412 .1991
- /1411 21
- .1991
- . 1987
- (1) :
- 1996 13 - 14 .
- 8 3 1419 /1998 .
- 2 (2) 1990 -
- . 1995

.1999 14 ■
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. 1977 ■
. 1985 ■
- ■
. () 1410 ■
.1414-1412 1415 ■
. () 1410 ■
. 1999 1420-1390 ■
- ■
/ 1417 : ----- ■
. 1996 ■
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& ■
. 1966 ■
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تميز نموذج المعادلات الآنية (نموذج الدراسة الآني) وفقاً لشرطي الدرجة والرتبة

Order & Rank Condition

:

The Order Condition (\quad) -1

)

(

) = E (1994)

= M (

E > M-1 . E = M-1 .

E > M-1 .

(

:

(5)

Variables ▶	NOGDP	E _I	G _E	L/P	NOGDP (-1)	P	E _I (-1)	G _R	G _E (-1)
Equation 1	1	0	1	1	1	0	0	0	0
Equation 2	1	1	0	0	0	1	1	0	0
Equation 3	0	1	1	0	0	0	0	1	1

()

Rank Condition () -2

[17] ()

: ()
: Order Condition () -

$$E > M - 1 = 5 > 3 - 1 \quad ; \quad M = 3 \quad E = 5$$

()

-2

$$E > M - 1 = 5 > 3 - 1 \quad ; \quad M = 3 \quad E = 5$$

()

-3

$$E > M - 1 = 5 > 3 - 1 \quad ; \quad M = 3 \quad E = 5$$

()

Rank Condition () -

-1

1	0	1	1	1	0	0	0	0
1	1	0	0	0	1	1	0	0
0	1	1	0	0	0	0	1	1

:

1	1	1	0	0
1	0	0	1	1

: Det.

$$\begin{vmatrix} 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 \end{vmatrix}$$

(Δ) det

$$\Delta_1 = \begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix} = 0 - 1 = -1 \quad \Delta_2 = \begin{vmatrix} 1 & 1 \\ 0 & 0 \end{vmatrix} = 0 - 0 = 0 \quad \Delta_5 = \begin{vmatrix} 0 & 1 \\ 1 & 1 \end{vmatrix} = 0 - 1 = -1$$

$$\Delta_3 = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = 1 - 0 = 1 \quad \Delta_4 = \begin{vmatrix} 0 & 0 \\ 1 & 1 \end{vmatrix} = 0 - 0 = 0$$

$$\Delta_1 = (1)(0) - (1)(1) = (0) - (1) = -1 \quad :$$

:

:

M = 3

E = 5

()

E > M - 1 = 5 > 3 - 1