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The Relationship between Health Expenditures and Economic Growth in Middle East & North Africa (MENA) Countries

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Abstract
The share of the health expenditures of GDP in developed countries is often more than developing countries, therefore as the level of development increases health expenditures increase too. This paper examines the stationary and co integration between the health expenditure and GDP based on the panel co integration analysis, for a sample of 13 MENA countries using data for the period 1995-2005. Panel unit root tests results indicate that both health expenditure and GDP are non- stationary. Even though, the findings indicate that health expenditure and GDP are co integrated. We concluded that the share of health expenditures to GDP decreases with GDP. This implies that health care is not a luxury good in MENA countries.

Key words*: Health Expenditure, Co integration, Unit root, Panel data, Economic Growth, MENA JEL classifications: Q43; Q48*

INTRODUCTION

One of the most important issues in health systems is that what determines the resources a country devotes to medical care. The share of the health expenditures & GDP in developed countries is often more than developing countries, therefore as the level of development increases health expenditures increase too. Since the work by Newhouse (1977) income has been identified as the most important factor explaining differences across countries in the level and share of health care expenditure. He inferred from a linear cross – section regression of health expenditure per capita on GDP (Gross Domestic Product) in OECD reported health care is a luxury good. Early studies on this topic used a single year to obtain cross – country estimates of relationship between health expenditure and GDP these researches detected income elasticity larger than unity, implying that the share of health expenditure in GDP will increase with per capita income. In more recently studies have used panel data that measured across countries and across time. Using panel data increase the sample size and this technique has weak restrictions more new studies tested and estimated the effect of income on health expenditure based on unit root test and co-integration analysis. Some of these studies summarized in table (1).

Table 1: Some of the studies on the effect of the GDP on health expenditure

Authors	Sample	Data	Elasticity of income
Newhouse(1977)	13 OECD countries	Cross-sectional	<1
Parkin et al(1987)	18 OECD countries	Cross-sectional	Dpendent on the type of the file
Gbesmete& Gerdtham(1992)	30 African countries	Cross-sectional	<1
Gerdtham et al(1992)	19 OECD countries	Panel data	>1
Hitris & Posnett(1992)	20 OECD countries	Panel data	>1
Hansen & king(1996)	20 OECD countries	Time series	No long- run relationship
Blomqvist & Carter(1997)	22 OECD countries	Time series	<1
McCOSKEY & Selden(1998)	20 OECD countries	Time series	No long- run relationship
Roberts(2000)	20 OECD countries	Time series	>1
Okunade & Murthy(2002)	USA	Panel data	>1
Bhat and Jain (2004)	OECD countries	Panel data	>1
Clemente et al(2004)	OECD countries	Time series	>1
Wang and Rettenmaier (2006)	OECD countries	Panel data	>1

The finding of these articles indicates that income is the most important factor determining health expenditure of countries. This article revisits the question of unit roots in the MENA (Middle East & North Africa) data and studies the long- run economic relationship between health care expenditure and GDP in MENA countries. We investigate the non- stationary and co-integration properties between health care spending and GDP.

ECONOMETRIC METHODOLOGY

This paper examines the stationary and co integration of health expenditure and GDP based on the panel co integration analysis, for a sample of 13 MENA countries using data for the period 1995-2005.Our analysis used annual data on 13 MENA countries for 1995 to 2005 (t=11) We gathered information on per capita total health care expenditure and per capita income estimated in gdp purchasing power parity. We also collected data for public expenditure on health care and private expenditure on health care and expancy for life in these countries the data were obtained from world development indicator (Word Bank, 2008), published by definitions are as follows:

LHEC: Natural logarithm of health care expenditure total per capita

LGDP: Natural logarithm of GDP per capita

There are very few studies concerning the relationship between health expenditure and GDP for MENA countries. This paper examines the health expenditure – GDP relationship by exploiting heterogeneous panel co-integration framework developed by pedroni(1999) for 13 countries listed in table(2).

Table (2): Health Index in MENA

Country	***Total health expenditure*** *(percent GDP)*	***GDP per capita*** *(current US$)*	***Private health expenditure*** *(percent GDP)*	***Public health expenditure*** *(percent GDP)*	***Life Expancy***
Algeria	3.6	6190	0.99	2.61	71.4
Bahrain	4	19400	1.33	2.68	74.4
Djibouti	6.3	1950	1.94	4.35	52.9
Egypt, Arab Rep.	5.6	4010	3.71	2.18	70.2
Iran, Islamic Rep.	6.6	7010	3.44	3.15	70.7
Jordan	9.8	4370	5.05	4.74	71.6
Kuwait	2.8	18700	0.62	2.17	77.1
Lebanon	11.6	5470	8.42	3.17	72.2
Morocco	5.1	4100	3.35	1.74	70
Oman	3.5	14600	1.1	2.87	74
Syrian Arab Republic	4.7	3520	2.47	2.22	73.6
United Arab Emirates	2.9	23200	0.87	2.02	78.3
Yemen, Rep.	4.6	855	2.4	2.7	59.8
MENA Mean	5.1	5270	4.1	3.4	68.9
Low income	3.8	1113	3.1	2.1	45.8
Mediom income	5.7	4910	4.2	3.1	67.3
High income	10.1	26568	2.2	6.8	78

Table (2) reports figures for annual percentage changes in average per capita GDP and share of health expenditures (total, public& private) in GDP.

Panel unit roots test

Unit root is well-known in the time series literature panel unit root test, such as the Levin ,Lin and chu (LLC 2002), are generalization of the augmented Dickey – Fuller (ADF) individual unit root tests to a common panel unit root test

$$\Delta y_{it} = \alpha_i + \gamma_i t + \beta_i y_{t-1} + \sum_{j=1}^{s} p_{ij} \Delta y_{i,t-j} + \varepsilon_{it}$$

i=1… n n= country

t= 1… t t=time

Where $\Delta y_{it} = y_{it} - y_{i,t-i}$

The null hypothesis $H_0 : \beta_i = 0$

The alternative hypothesis $H_1 : \beta_i < 0$

Im . Pesaran ND Shin (2003 IPS) Propose an alternative testing procedure based on averaging individual unit root, ADF test statistics.
Maddala and wu (1999) and choi(2001) proposed a Fisher – type test which combines the p-values from unit root tests for each cross- section I to test for unit roots in panel data.
Hardri (2000) drives a residual – based Lagrange multiplier test where the null hypothesis is that there is no unit root in any of the series in panel against the alternative of unit root in the panel. This is a generalization of the Kwiatkowski et al (1992) test from time series to panel data see table (3) & (4).

Table (3): Unit root test for LGDP

Test method	*Test statistic (p-value)*	*Null hypothesis*	*Result*
PP - Fisher Chi-square	22.97*(0.62)*	Unit root	No stationary
Im, Pesaran and Shin W-stat	4.47*(1.00)*	Unit root	No stationary
Breitung t-stat	-1.75(*0.04)*	Unit root	stationary
Hadri Z-stat	-6.75*(0.00)*	No unit root	No stationary
ADF - Fisher Chi-square	17.20(*0.90)*	Unit root	No stationary
Levin, Lin & Chu t*	0.68(*0.75)*	Unit root	No stationary

Table (4): Unit root test for LHCE

Test Method	*Test statistic (p-value)*	*Null hypothesis*	*Result*
PP - Fisher Chi-square	19.89 (*0.79)*	Unit root	No stationary
Im, Pesaran and Shin W-stat	1.98 (*0.97)*	Unit root	No stationary
Breitung t-stat	1.14 (*0.12)*	Unit root	No stationary
Hadri Z-stat	6.16 *(0.00)*	No Unit root	No stationary
ADF - Fisher Chi-square	21.03 *(0.74)*	Unit root	No stationary
Levin, Lin & Chu t*	0.30 (*0.38)*	Unit root	No stationary

Unit root and trend stationary results indicate that both health expenditure and GDP are non- stationary. Based on the ADF and PP unit root tests, all of these series are integrated of order one, I (1). Even though, the findings in the next section, indicate that health expenditure and GDP are co integrated.

Panel co-integration tests

To test the null hypothesis of no-co integration we use error correction model (ECM):

$$\Delta y_{it} = \alpha_i + \delta_i z_{i,t-1} + \sum_{j=0}^{l_{\Delta x}} \beta_{ij} \Delta x_{i,t-j} + \sum_{j=1}^{l_{\Delta y}} \gamma_{ij} \Delta y_{i,t-j} + u_{it}$$

Where $H_0 : \delta_i = 0$

Kao (1999) proposed an extension of the Engle and granger (1987) co-integration test from individual time series to panel a test for the null hypothesis of no-co integration can be based on an ADF- type unit root test based on residuals .pedroni (2000,2004) also several tests for the null hypothesis of no-co integration in panel data model. See table (5).

Table (5): Pedroni test result

Test Method	Test statistic (p-value)	Null hypothesis	Result
Group rho-Statistic	3.72 *(0.0004)*	No Co integration	Co integration
Group PP-Statistic	-2.77 (*0.0085)*	No Co integration	Co integration
Group ADF-Statistic	-8.11 (*0.0000)*	No Co integration	Co integration

The first step of our estimation we examination unit root in LHE and LGDP. With a null of non- stationary, the test is residual-based test that explores the performance of statistic. At the second step of our estimation we look for a long-run relationship between LGDP and LHCE using the panel co integration technique developed by pedroni (1995, 1999)
The co integration relationship we estimate is specified as follows:

$LHCE_{IT} = \alpha_i + \delta t + \beta_i LGDP_{it} + \varepsilon_{it}$

Where α_i refers to country effects and δt refers to trend effects. ε_{it} is the estimated residual indicating deviations from the long-run relationship. Also we estimate short-run & long- run income elasticity. See table (6)

$$\Delta y_{it} = \alpha_i + \lambda y_{i,t-1} + \beta_1 X_{i,t-1} + \beta_2 \Delta y_{i,t-1} + \beta_3 \Delta X_{it} + \varepsilon_{it}$$

$$= \alpha_i + \lambda [y_{i,t-1} - (\frac{\beta_1}{\lambda}) X_{i,t-1}] + \beta_2 \Delta y_{i,t-1} + \beta_3 \Delta X_{it} + \varepsilon_{it}$$

Table (6): Short-run & Long- run Coefficient

Adjustment (p-value)	Long - run Elasticity (p-value)	Short – run Elasticity (p-value)
-0.16 *(0.040)*	0.94 *(0.000)*	0.29(*0.006)*

In our model, the coefficient of the LGDP variable can be interpreted as an estimate of the income elasticity of health care expenditures. We know that if the income elasticity of a good is between 0 and 1 (or greater than 1), that good is defined as a necessity (or a luxury). When the co integration model exploring the long-term relationship between LHCE and LGDP is considered, it is seen that the estimated coefficients are statistically significant.

CONCLUDING REMARKS

This article investigated the economic relationship between health care expenditure and GDP in the MENA countries follow over 11 years we have studied the non- stationary and co integration properties of health care expenditure and GDP. This paper examines the stationary and co integration of health expenditure (HCE) And GDP, using some new stationary and co integration tests Our analysis displays that health care expenditure and GDP are non stationary, and that they are linked in long-run. For the panel test, our result clearly rejects the null of no-co integration. We concluded that the fraction of expenditure devoted to health care of total GDP decreases with GDP. Our co integration results show strong evidence in favor of the existence of a long-run equilibrium co integrating relationship between (HCE) and GDP .This implies that health care is not a luxury good in with long –run income elasticity estimated about 0.94.

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