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Healthcare Expenditure and Economic Growth in Developing Countries

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Abstract There has been a growing interest in examining the relationship between income and health expenditures. Although there are differences in the economic structure and health expenditures of the countries in the panel, there is a tendency for an increase in both per capita gross domestic product and health expenditures for all. Therefore, a modified version of the Granger (1969) causality test proposed by Toda and Yamamoto (1995), and Dolado and Lütkepohl (1996) was used in emerging markets in Europe and Middle East African and Asian countries over the period from 1995 to 2013. According to the analysis of the results, a two way causality is found for the Czech Republic and Russian Federation. The evidence from the Egypt, Hungary, Korean Republic, South Africa, and the Philippines supports the health view over the income view, while the evidence from Greece, Poland, the United Arab Emirates, China, Indonesia, and the Korean Republic supports the income view over the health view. The empirical results have indicated that income is an important factor in explaining the difference in healthcare expenditures among countries. Therefore, it appears that increases in income level stimulate healthcare expenditures for some of the emerging market economies.

Keywords Health Expenditure, Causality, Emerging Markets

1. Introduction

The Harrod-Domar model is the first view based on capital accumulation in economic growth theory. This model suggests that economic growth rate is proportional to the rate of capital accumulation at a given level of technology. Then, Solow and Swan developed an exogenous growth model known as the Neo-classical growth model, and to analyze the economic growth they extended the Harrod-Domar model by adding labor as a factor of production. However, the exogenous growth theory has been criticized due to its assumptions failing to account for the process of long-term economic growth; therefore, an endogenous growth theory has been developed by Romer and Lucas. This latter theory suggests that factors of economic growth should be investigated within the system. Therefore, arguments began about how the growth rate can be changed through human capital.

In the 1980s, understanding the impacts of education, health, R&D, technological improvements, new functions of government, accumulation of information, financial improvements, scale economies, income distribution, and many more factors of production required the reconsideration of growth and the factors of growth from a different perspective [1]. Economists began to place greater emphasis on the role of human capital as a determinant of productivity and growth in the early 1990s. Since then, the importance of health and education in economic growth has received much attention (both theoretical and empirical), and a strong consensus has emerged in the last decade that human capital accumulation is an important determinant of economic growth. In addition to education, which constitutes one of the main resources of human capital, the health level of society is another important element. Therefore, it can be argued that there is a close relationship between the health level of society and its economic development[1].

The role of healthcare spending in stimulating economic growth has been suggested in Mushkin's health-led growth hypothesis. According to this hypothesis, health is a type of capital; thus, investment on health can increase income and lead to overall economic growth. In fact, health can affect economic growth through its impact on human and physical capital accumulation [2]. Since healthcare is a core component of human capital investment, rising national healthcare spending would tend to raise labor productivity, quality of life and general welfare. Healthcare spending has also been credited for prolonging life expectancy, and reducing morbidity and infant mortality rates (health outcomes) [3]. Therefore, it can be stated that health is a significant form of human capital and there is a close

1 For a detail discussion of this relationship see S. J. Mushkin (1962), K. Gyimah-Brempong and M. Wilson (2004), H. Li and L. Huang (2009), K. M. Wang (2011), M. Mehrara and M. Musai (2011), A. Amiri and B. Ventelou (2012), Z. M. Elmi and S. Sadeghi (2012).

relationship between the health level of society and its economic development.

However, with the development of a country's economy, its people tend to place greater value on the quality of life and, therefore, have a higher expectation of medical services – particularly in developed countries with higher national income [4]. After World War II, there was an increase in the importance ascribed to the health sector in the national macroeconomic. Increasing health care expenditures (HCE) in a country causes increases in social security, tranquility, safety and welfare, which leads to improved labor efficiency. HCE helps people with acute conditions to recover and return to work quickly. In general, healthier people can work harder and longer, and also think more clearly [5].

Although, healthcare expenditures are ordinarily hypothesized to be a function of real per capita gross domestic product (GDP), there are some reasons to suggest this could be a bilateral relationship, as it can be reasoned that population health is an input to the macroeconomic production function [6]. There are some reasons why a bilateral relationship between healthcare expenditures and real per capita income could exist. First, by definition, health expenditures are a function of resources available (income or wealth). Second, a reverse causation – income as a function of health expenditures – also has a theoretical basis due to the fact that the latter is a determinant of (i) human capital, and (ii) labor supply and productivity. If health expenditure can be regarded as an investment in human capital [7, 8, 9, 10], and given that human capital is an "engine" of growth [11], an increase in health expenditure must ultimately lead to higher income achievements. Similarly, rises in health expenditures make possible higher labor supply and productivity, which eventually must give way to a higher income [12].

Many factors influence the economic growth process. These include internal development policies, political stability, domestic capital formation, development of human capital, banking and financial infrastructure, export policies, foreign direct investment, and foreign aid [13]. It can be stated that capital accumulation is a key determinant of growth, particularly for developing countries; hence, some part of growth is determined through education and health status that reflect society's human capital accumulation. For this reason, the issue of health expenditures and economic growth used as an indicator of human capital is still important for researchers. On the other hand, the basic economic problem specific to emerging market economies is to ensure rapid and stable economic growth. Therefore, sustainability of economic growth is another point of argument for emerging economies in order to become developed and maintain their positions. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own [14]. It is possible to identify three different concepts of sustainable development: the economic, the ecological and the socio-cultural [15]. A socially sustainable system must achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation [16]. So, it can be thought that health care expenditures have implications both for current value of human capital and for the long-run sustainable growth. In this regard, alternative politics are among the frequently argued issues, both by economists and politicians. In this study, the aim is to investigate whether there is a relationship between healthcare expenditures and economic growth, and particularly if there are any individual differences within emerging market economies. Therefore, this paper emphasizes the relationship between economic growth and healthcare expenditures. The remainder of this paper is organized as follows: Section 2 introduces the literature review, Section 3 describes the data, methods and estimation and discussing results and Section 4 presents the conclusion.

2. Literature Review

Human and social capital accumulation is the main factor for the endogenous growth model. In the case of human and social capital accumulation, the significance of innovative strategies (innovation) as well as education and healthcare politics increases day by day. In this context, generating proper education and healthcare policies is essential both for sustainable growth and as a social state principle. Many theoretical and empirical studies indicate that human and social capital investment should be enhanced for sustainable economic growth [17, 18, 19, 20, 21, 22, 23]. In this regard, there is a wide range of literature examining the relationship between healthcare expenditure and economic growth, and this literature can be classified within different contexts in terms of its methodology, data, country group, period and results. For these reasons, studies have examined the relationship between HCE and GDP, the determinants of health expenditure [24, 25, 26, 27] and the unit root properties of health expenditure [28, 29, 30]. In this study, with respect to the subject matter, studies examining the relationship between GDP and HCE will be analyzed. The relationship between growth and health are determined by some authors as follows:

Bhargava et al [31] investigated the effects of health indicators on economic growth rates in the period 1965 to 1990 in developed and developing countries. In this panel data study, it was found that there is a positive but weak relationship between health and economic growth. Bloom et al [32] extended production function models of economic growth, to account for work experience and health, for a panel of countries observed every 10 years from 1960 to 1990.Their result is that health has a positive and statistically significant effect on economic growth. Mayer [33] examined whether there is Granger causality of healthcare expenditures on income for 18 Latin American countries and found a strong causality of income on healthcare. Clemente et al [34] analyzed the behavior of healthcare expenditure for a number of the Organization for Economic Co-operation and

Development (OECD) countries. They adopted the co-integration approach and the results show that there is a long-term relationship between total HCE and GDP. However, the existence of co-integration is only shown when we admit the presence of some changes in the elasticities of the model. Gyimah-Brempong and Wilson [35] investigated the effects of health human capital on the growth rate of per capita income in sub-Saharan African and OECD countries. They used an expanded Solow growth model, panel data and a dynamic panel estimator, and they found that the growth rate of per capita income is strongly and positively influenced by the stock of, and investment in, health human capital after controlling for other variables. The structure of the relationship between health human capital and the growth rate of income in sub-Saharan African countries has been found to be similar to the structure of the relationship in OECD countries. Bloom and Caning [36] compared the estimated effects of health in a macroeconomic production function model of economic growth with the effects that are found using calibration based on wage regressions. They constructed a panel of countries observed every five years from 1960 to 1995. They found that the estimated macroeconomic effects of health are positive and not significantly different from the microeconomic estimates.

Erdil and Yetkiner [37] applied the Granger causality approach to panel data with fixed coefficients in order to determine the relationship between GDP and health expenditures per capita. The findings verify that the dominant type of causality is bidirectional, which cast doubt on the performance ordinary least squares (OLS) estimates in the literature. Moreover, one-way causality patterns are not similar for different income groups. One-way causality generally runs from income to health in lower- and middle-income countries, whereas the reverse holds true for higher-income countries. Li Huang [38] studied the relationship between per capita real GDP growth and the physical capital, human capital and health investment in the production function. Panel data models were used in the estimation based on the provincial data from 1978 to 2005. The empirical evidence showed that both health and education have positive significant effects on economic growth. Çetin and Ecevit [39] examined the effect of health on economic growth using a panel data analysis. This study consisted of annual data from 15 OECD countries for the period from 1990 to 2006. In the analyses, the share of public-health expenditures in total-health expenditures – as well as other explanatory variables – had been employed. The relationship between health expenditures and economic growth was estimated in a pooled regression model by the panel OLS method. As a result, they did not find any statistically significant relationship between health expenditures and economic growth.

Wang [40] studied the international total healthcare expenditure data of 31 countries from 1986 to 2007 to explore the causality between an increase in healthcare expenditure and economic growth. Panel regression analysis and quantile regression analysis were used. The estimation of the panel regression reveals that, health expenditure growth will stimulate economic growth; however, economic growth will reduce health expenditure growth. With regard to the estimation of quantile regression, in countries with low level of growth, health expenditure growth will reduce economic growth. Mehrara et al. [41] examined the stationary and co-integration relationship between health expenditure and GDP based on the panel co-integration analysis for a sample of 13 Middle East and North Africa (MENA) countries, using data for the period 1995 to 2005. The findings indicated that the share of health expenditures to GDP decreases with GDP. This implied that healthcare is not a luxury good in MENA countries. Amiri and Ventelou [42] investigated causality between GDP and healthcare expenditure in OECD countries. They found that bidirectional Granger causality is predominant. Elmi and Sadeghi [43] investigated the causality and co-integration relationships between economic growth and health care expenditures in developing countries during 1990 to 2009. Their findings indicated that income is an important factor across developing countries in the level and growth of healthcare expenditure, in the long-run. Additionally, the health-led growth hypothesis in developing countries is confirmed.

Taban [44] investigated the relationship between health and economic growth in Turkey within the context of causality, by using data over a period from 1980 to 2000. According to the empirical results, two-way causality relationship was seen between life expectancy at birth and economic growth, no causal relationship was found between health expenditures and economic growth. Mehrara and Musai [45] studied the relationship between health expenditure and economic growth in Iran for the period 1970 to 2007, based on the autoregressive distributed lag (ARDL) approach. The study found a co-integrating relationship between real GDP, health expenditure, capital stock, oil revenues and education, although among them health spending accounts for just a small part of the economic growth. They found that healthcare expenditures did not make a significant marginal contribution to the economic growth in Iran. Ak [46] studied the existence of a long-term causality relationship between health expenditures, economic growth and life expectancy at birth for the Turkish economy. As a result of the analysis, it was concluded that there isn't a short-term relationship between the series, although there is a long-term relationship between health expenditures and economic growth. Odubunmi et al [47] examined the relationship between healthcare expenditure and economic growth in Nigeria for the period 1970 to 2009. They used the multivariate co-integration technique proposed by Johansen and found the existence of at least one co-integrating vector describing a long run relationship between economic growth, foreign aid, health expenditure, total saving and population. The co-integrating equation, however, showed some deviations in terms of the signs of the coefficients of health expenditure.

3. Data and Model

3.1. Data

This study aims to test whether there is causality between income and healthcare expenditure as well as whether healthcare expenditure is a driving force for economic growth, particularly for Europe and Middle East African* and Asian countries**. To choose these countries helps especially answer the question: "Can health care expenditures be an alternative way for emerging economies to catch up with developed countries?" The data are annual observations of per capita gross domestic product and per capita health expenditure in constant 2005 purchasing power parity (PPP) from 1995 to 2013. Per capita gross domestic product and health expenditure are taken from the World Bank's database.

3.2. Model

Capital accumulation is a key determinant of growth, particularly for developing countries; hence, some part of growth is determined through health status that reflects society's human capital accumulation. Following the existing literature on the causality between economic growth and health expenditures, the model is described as follow:

$$Economic\ Growth = f\ (\ Health\ Expenditures) \quad (1)$$

For this purpose, we used per capita gross domestic product (*INC*) as an indicator of economic growth and per capita health expenditure (*HEX*) as an indicator of healthcare expenditure. For both variables, we take natural logarithms.

4. Methodology and Empirical Analysis

4.1. Methodology

The causality relationship between the series was tested using the causality analysis developed by Granger [48]. At that time, the concept of stationary levels was not an important issue; therefore, all series were modeled with level values. Through consideration of the stationary levels of macroeconomics variables it has emerged that many macroeconomics variables are non-stationary on level values. Granger and Newbold [49] stated that using non-stationary time series in studies has resulted in spurious regression problems. To solve this problem, an error correction model improved by Engle and Granger [50] has been commonly used in studies. This modified causality test may be used on series which are non-stationary on level but co-integrated to the same order when we take their first differences. However, the causality test, because of the necessity of being co-integrated to the same order, became dependent on co-integration tests. To overcome this problem, the Toda and Yamamoto [51] or Dolado and Lütkepohl [52] approach is used.

The Toda and Yamamoto (1995)*** test involves estimation of a vector autoregressive (VAR) model in levels, a method that minimizes the risks associated with incorrect identification of the order of integration of the respective time series and co-integration among the variables [53]. The implementation of the TY procedure consists of two phases. In the first phase, optimal lag length (*p)* for the VAR model and the maximum degree of integration (d_{max}) for the system series should be determined. Thus, an expanded VAR model with lag length of $(p+d_{max})$ is predicted. In the second phase, to be able to make a deduction for Granger causality, Wald tests are performed with the *p* lagged VAR coefficient matrix.

During the TY phase, the VAR $(p+d_{max})$ model is predicted. Therefore, the bivariate VAR model comprised of per capita gross domestic product (*INC*) and per capita health expenditure (*HEX*) series can be written as:

$$\mathrm{INC_t} = \alpha_0 + \beta_{1i}\sum_{i=1}^{p}\mathrm{INC_{t-i}} + \beta_{2j}\sum_{j=p+1}^{d_{max}}\mathrm{INC_{t-j}} + \gamma_{1i}\sum_{i=1}^{p}\mathrm{HEX_{t-i}} + \gamma_{2j}\sum_{j=p+1}^{d_{max}}\mathrm{HEX_{t-j}} + \varepsilon_{1t} \quad (2)$$

$$\mathrm{HEX_t} = \alpha_1 + \beta_{1i}\sum_{i=1}^{p}\mathrm{HEX_{t-i}} + \beta_{2j}\sum_{j=p+1}^{d_{max}}\mathrm{HEX_{t-j}} + \gamma_{1i}\sum_{i=1}^{p}\mathrm{INC_{t-i}} + \gamma_{2j}\sum_{j=p+1}^{d_{max}}\mathrm{INC_{t-j}} + \varepsilon_{2t} \quad (3)$$

The Wald statistic for the null of non-causality is obtained by imposing zero restriction on *p* lags in the VAR *(p+dmax)* model, which is calculated by ordinary least squares estimation [54]. In the TY process, an important issue to take into consideration is to apply standard Wald tests on the first VAR coefficient matrix. For example, in equation 2, the null hypothesis is formed as $(H_0 = \gamma_{1i} = 0)$ to test the causality between *HEX* and *INC*, and if this hypothesis is rejected after the test is conducted it can be interpreted as "*HEX is Granger cause of INC*".

Another approach to be used in this study is Dolado and Lütkepohl's** [55] approach. The main difference between the TY approach and the DL approach is that the VAR model is estimated as VAR *(p+d)* in TY and VAR *(p+1)* in DL. Then, the Wald test is applied with *p* coefficient matrix as in TY. Wald statistics obtained from these approaches is called "Modified Wald (MWALD)" and has a chi-square asymptotic distribution.

4.2. Estimation and Discussion of the Results

The average values of per capita income and health expenditure indicators for the countries of interest are given in Table 1. There is a general trend of rising health expenditure per capita in all the countries in our panel. Moreover, health expenditure per capita growth rates grow much more rapidly than per capita income growth rates for all countries.

*Europe and Middle East African countries: Czech Republic, Egypt Arab Republic, Greece, Hungary, Poland, Russian Federation, South Africa, Turkey and United Arab Emirates (UAE).

**Asian countries: Chine, India, Indonesia, Korea Republic, Malaysia, Philippines and Thailand.

*** Toda and Yamamoto (1995), hereafter TY

** Dolado and Lütkepohl (1996), hereafter DL

Table 1. Income and Health Expenditure Variables of the Sample Countries

Country	per capita GDP	per capita HEX	per capita GDP growth rate	Per capita HEX growth rate
Europe and Middle East African Countries				
Czech R.	24307	1426	2.22	4.63
Egypt, Arab R.	8697	381	2.79	7.78
Greece	26883	2108	0.76	4.18
Hungary	19926	1250	2.33	6.03
Poland	16988	919	4.19	7.85
Russian F.	17180	792	3.93	10.38
South Africa	10975	779	1.40	4.91
Turkey	14634	602	2.79	10.87
UAE	90128	2068	-3.01	0.92
Asian Countries				
China	6048	261	8.90	14.04
India	3330	125	5.32	7.14
Indonesia	7145	158	2.72	7.72
Korea, R.	24610	1301	3.82	9.32
Malaysia	17684	559	2.75	6.91
Philippines	4834	163	2.64	6.39
Thailand	10774	369	2.40	6.13

The TY and DL causality analysis require investigating unit root properties of the variables. To this end, the unit root tests developed by Dickey and Fuller [56] (henceforth ADF) is applied to each series. The results of ADF tests for *INC* and *HEX* variables are shown in Appendix 1 and 2, respectively. Moreover, the maximum degree of integrations provided by unit root tests is shown in Table 2. This shows the maximum level of integration (d_{max}) is 2 for the Czech R., Greece, Russian F., South Africa, Turkey, UAE and China; *f*or Hungary, Poland, India, Korea R., Malaysia, Philippines and Thailand d_{max} is 1; and d_{max} is 0 for others.

Table 2. Test for Integration

Europe and Middle East African Countries		
Countries	***InINC***	***lnHEX***
Czech R.	I(2)	I(2)
Egypt, Arab R.	I(0)	I(0)
Greece	I(2)	I(1)
Hungary	I(1)	I(1)
Poland	I(0)	I(1)
Russian F.	I(2)	I(1)
South Africa	I(2)	I(0)
Turkey	I(1)	I(2)
UAE	I(2)	I(2)
Asian Countries		
China	I(2)	I(1)
India	I(1)	I(0)
Indonesia	I(0)	I(0)
Korea R.	I(1)	I(1)
Malaysia	I(1)	I(1)
Philippines	I(1)	I(1)
Thailand	I(1)	I(1)

In the second phase of the analysis, lag lengths of the model are determined by using Akaike (1974) and Schwarz (1978) information criteria. Thus, a *p+dmax* lagged expanded VAR model is attained and whether there is any causality or not is determined by applying Wald statistics to lagged values of *p*. Toda-Yamamoto test results for both country groups are presented in Table 3.

When the probability values of MWALD statistics are taken into consideration, according to the empirical findings, no causality relationship among variables is found for Turkey, as one of the European and Middle East African Countries. Two-way causality is shown for the Czech R. and the Russian F.; one-way causality from *HEX* to *INC* is shown for Egypt and Hungary and one-way causality from *INC* to *HEX* is shown for Greece, Poland, South Africa and UAR. No causality is found for Asian countries such as China, India, Malaysia and Thailand; one-way causality from *INC* to *HEX* is shown for Indonesia, whereas one-way causality from *HEX* to *INC* is shown for the Korea R. and the Philippines.

Secondly, the Dolado-Lütkepohl test is conducted to test the causality relationship between variables and these findings are presented in Table 4.In this methodology, 1 is added to the optimal lag length of the VAR model, and causality is determined by applying the Wald test to *p* lagged coefficients of this expanded VAR model.

Table 3. Results for Toda-Yamamoto causality test

Countries	$p+d_{max}$	H_0=*lnHEX* does not cause *lnINC*		H_0=*lnINC* does not cause *lnHEX*		The direction of causality
		χ^2statistic	*p*-value	χ^2statistic	*p*-value	
Europe and Middle East African Countries						
Czech Rep.	3+2	26.473	**0.000**	35.399	**0.000**	Bilateral
Egypt, Arab R.	2+0	17.8999	**0.000**	0.2579	0.879	lnHEX → lnINC
Greece*	2+2	1.0437	0.593	8.7480	**0.013**	lnINC → lnHEX
Hungary	2+1	8.9513	**0.011**	0.0116	0.994	lnHEX → lnINC
Poland	2+1	2.0821	0.353	21.2449	**0.000**	lnINC → lnHEX
Russian F.	3+2	43.7280	**0.000**	64.2211	**0.000**	Bilateral
South Africa	2+2	3.3784	0.185	16.7503	**0.000**	lnINC → lnHEX
Turkey	1+2	0.6168	0.432	0.1092	0.741	No
UAE	2+2	0.1741	0.917	25.2099	**0.000**	lnINC → lnHEX
Asian Countries						
China	3+2	0.6117	0.894	4.8248	0.185	No
India	2+1	0.0551	0.759	0.0402	0.980	No
Indonesia	3+0	1.0645	0.786	24.8764	**0.000**	lnINC → lnHEX
Korea Rep.	1+1	3.4296	**0.064**	0.0263	0.871	lnHEX → lnINC
Malaysia	3+1	0.9104	0.823	3.2401	0.356	No
Philippines	3+1	7.1963	**0.068**	3.8725	0.276	lnHEX → lnINC
Thailand	3+1	0.2541	0.968	2.0776	0.557	No

Note: * Trend is not included in the VAR model. The VAR order (k) was selected using the Akaike or Schwarz Bayesian information criterion.

Table 4. Results for Dolado and Lütkepohl causality test

Countries	$p+d_{max}$	H_0=*lnHEX* does not cause *lnINC*		H_0=*lnINC* does not cause *lnHEX*		The direction of causality
		χ^2statistic	*p*-value	χ^2statistic	*p*-value	
Europe and Middle East African Countries						
Czech Rep.	3+1	15.6075	**0.001**	40.6466	**0.000**	Bilateral
Egypt, Arab R.	2+1	0.3620	0.834	0.4220	0.810	No
Greece*	2+1	1.6236	0.444	5.1477	**0.076**	lnINC → lnHEX
Hungary	2+1	8.9513	**0.011**	0.0116	0.994	lnHEX → lnINC
Poland	2+1	2.0821	0.353	21.2449	**0.000**	lnINC → lnHEX
Russian F.	3+1	16.5063	**0.001**	19.9545	**0.000**	Bilateral
South Africa	2+1	5.8946	**0.053**	3.3704	0.185	lnHEX → lnINC
Turkey	1+1	0.7106	0.399	0.1230	0.726	No
UAE	2+1	2.4558	0.293	101.1849	**0.000**	lnINC → lnHEX
Asian Countries						
China	3+1	1.3552	0.716	22.9323	**0.000**	lnINC → lnHEX
India	1+1	0.7259	0.394	0.0641	0.800	No
Indonesia	3+1	3.1352	0.371	52.6517	**0.000**	lnINC → lnHEX
Korea Rep.	3+1	6.1130	0.106	23.9779	**0.000**	lnINC → lnHEX
Malaysia	1+1	1.0239	0.312	0.2248	0.635	No
Philippines	3+1	7.1963	**0.066**	3.8725	0.276	lnHEX → lnINC
Thailand	1+1	0.6590	0.808	1.6901	0.194	No

Note: The VAR order (k) was selected using the Akaike or Schwarz Bayesian information criterion.

According to the DL test results, in Europe and Middle East African Countries no causality is found between variables for Egypt and Turkey; whereas two-way causality is found for the Czech R. and the Russian F.; one-way causality from *HEX* to *INC* is found for Hungary and South Africa and one-way causality from *INC* to *HEX* is found for Greece, Poland and the UAE. For Asian countries, the DL test results indicate that there is no causality for India, Malaysia and Thailand; there is a one-way causality from *HEX* to *INC* found for the Philippines and from *INC* to *HEX* for China, Indonesia and the Korea R..

When the TY and DL test results are evaluated together, two-way causality is found for the Czech R. and the Russian F. and a one-way causality is found from *HEX* to *INC* for Hungary and the Philippines. The health-led growth hypothesis, first suggested by Mushkin, states that policies which will affect society's health status positively have a significant role to maintain sustainable growth in developed countries and to accelerate economic growth in developing countries. When the current situation of countries in the panel is analyzed, it is observed that they reached a certain level of development – as well as having a higher public sector share than private sector share – in terms of their health expenditures. It follows that signified specific reasons can decrease the impact of health expenditures on income.

Both test results indicate that there is a one-way causality from *INC* to *HEX* for Greece, Poland, the UAE and Indonesia. With the development of a country's economy, its people tend to place greater value on the quality of life, and therefore have a higher expectation of medical services. However, a significant point that should be emphasized here is that the emergence of this impact depends on a country's development level. Therefore, if a country reaches a specific threshold in terms of income and health, an additional increase in income will not have any marginal impact on society's health level. However, level of health expenditure is important to maintain the country's current development level. Therefore, it appears that, even if their income effect is dominant, it doesn't emerge specifically since the impact of economic growth on health expenditure can be influenced by social development level and because of development features of countries in the panel data. Furthermore, in both methodologies, no causality is found between variables for Turkey, India, Malaysia and Thailand.

5. Conclusions

There has been a growing interest in examining the relationship between income and health expenditure. Growth and sustainable growth are significant issues for developing countries that are specified as emerging market economies. As it is known, capital accumulation is a major component of growth and healthcare expenditure is a way to increase

capital accumulation. Although there are differences in the economic structure and health expenditure of the countries in the panel, there is a tendency for an increase both in per capita GDP and health expenditure for all. For this reason, we tested the Granger causality between these variables. To this end, a modified version of the Granger (1969) causality test proposed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996) was used in emerging markets in Europe and Middle East African and Asian countries over the period 1995 to 2013.

According to both the TY and DL test results, a two-way causality is found for the Czech R. and the Russian F. The evidence for the Egypt, Hungary, Korea R., South Africa and Philippines supports the health view over the income view and the evidence for Greece, Poland, South Africa, the UAE, China, Indonesia, and Korea R. supports the income view over the health view. The diversity in the test results may stem from the differences in the public and private shares in total health expenditures, life expectancy, unemployment rates, per capita income and rate of economic growth across the countries.

The empirical results have indicated that income is an important factor for explaining the difference in healthcare expenditure among countries. When economic growth occurs, the proportion of healthcare expenditure in total GDP also increases. Conceptually, a healthy person can not only work more effectively and efficiently but also devote more time to productive activities. Since healthcare expenditure is a core component of human capital investment, the rising trend of healthcare expenditure would tend to raise labor productivity, quality of life and general welfare. Healthcare spending has also been credited for prolonging life expectancy, reducing morbidity and infant mortality rates. Therefore, the growth in healthcare expenditure has a positive influence on GDP. To sum up, economic growth causes an increase in healthcare expenditure, and healthcare expenditure causes an increase in economic growth.

Therefore, it can be stated that healthcare expenditure can be a determinant to maintain sustainable growth for the Czech R., the Russian F., Hungary and the Philippines in the panel; hence, health policies can play a more significant role to determine policies for these countries compared to others. For other countries stated above, it can be shown that healthcare expenditures reached a saturation level; therefore, the effects of healthcare expenditures on growth weaken.

This study indicates that although there isn't a significant difference in terms of income and healthcare expenditures, income level is the main factor in determining the level of healthcare expenditure. However, it should be remembered that in recent years development level is not determined only by income level, since economic growth alone does not guarantee an increase in social welfare. Therefore, development and growth, prior to 1970, were considered to be equal to the increase in the national income. But after 1970, new approaches that aimed to describe development by means of humanistic, social, cultural, environmental and local dimensions have occurred. In addition to the concept of economic growth, the areas of poverty, unemployment, income distribution and regional inequality have begun to be considered. When very high income levels and a high level of human development is achieved, it can be stated that health expenditure have a significant impact to maintain income and that high level of human development in Europe and Middle East African and Asian countries. In empirical literature, although there is no consensus on whether there is a direct relationship between health status of countries and economic development, there is a consensus that higher social health status has a positive impact on the development of the country by increasing productivity. In conclusion, for some of the emerging market economies, it appears that increases in income level stimulate healthcare expenditures

Appendix 1. ADF Unit Root Tests Results for *INC*

Countries	*lngdppc*		*Δ(lngdppc)*		*ΔΔ(lngdppc)*	
	Stat.	p-value	Stat.	p-value	Stat.	p-value
Europe and Middle East African Countries						
Czech R.	-1.6056	0.747	-2.4734	0.335	-4.6552	0.010
Egypt, Arab R.	-4.4928	0.014	-	-	-	-
Greece	-2.3358	0.393	-2.1519	0.484	-3.6264	0.060
Hungary	-0.2139	0.987	-3.5530	0.066	-	-
Poland	-4.2390	0.023	-	-	-	-
Russian F.	-1.9145	0.606	-3.1841	0.120	-5.5032	0.002
South Africa	-2.7263	0.239	-2.4459	0.3464	-4.3958	0.016
Turkey	-2.0206	0.552	-3.9059	0.036	-	-
UAE	-2.3252	0.400	-1.4857	0.794	-4.3934	0.016
Asian Countries						
China	-3.2183	0.118	-1.4224	0.815	-3.8537	0.043
India	-1.6078	0.749	-3.6046	0.060	-	-
Indonesia	-29.7358	0.000	-	-	-	-
Korea R.	-2.3204	0.404	-4.7806	0.010	-	-
Malaysia	-2.6163	0.278	-6.0373	0.001	-	-
Philippines	-0.9293	0.929	-4.5654	0.011	-	-
Thailand	-2.1120	0.505	-4.0905	0.026	-	-

Notes: All models include constant and trend. *Δ* is the first difference operator. Maximum lag number is set to three and optimal lags for each country is determined by the means of Schwarz Bayesian information criterion.

Appendix 2. ADF Unit Root Tests Results for *HEX*

Countries	*lnhexpc*		*Δ(lnhexpc)*		*ΔΔ(lnhexpc)*	
	Stat.	p-value	Stat.	p-value	Stat.	p-value
Europe and Middle East African Countries						
Czech R.	-1.3178	0.849	-3.0916	0.139	-7.6544	0.000
Egypt, Arap R.	-3.4670	0.074	-	-	-	-
Greece	-0.3619	0.981	-3.3893	0.086	-	-
Hungary	-0.7063	0.956	-3.6646	0.054	-	-
Poland	-2.1737	0.473	-3.4359	0.080	-	-
Russian F.	-1.7989	0.660	-3.4980	0.072	-	-
South Africa	-4.1932	0.020	-	-	-	-
Turkey	-2.3380	0.394	-2.7641	0.229	-4.0029	0.032
UAE	-2.2115	0.456	-2.7267	0.239	-4.0358	0.030
Asian Countries						
China	-3.0648	0.143	-3.6986	0.051	-	-
India	-5.3592	0.003	-	-	-	-
Indonesia	-3.7251	0.051	-	-	-	-
Korea R.	-1.3643	0.836	-5.3932	0.003	-	-
Malaysia	-3.1280	0.130	-4.4961	0.014	-	-
Philippines	-1.6730	0.721	-3.9722	0.032	-	-
Thailand	-1.4023	0.824	-4.1087	0.025	-	-

Notes: All models include constant and trend. *Δ* is the first difference operator. Maximum lag number is set to three and optimal lags for each country is determined by the means of Schwarz Bayesian information criterion.

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