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TESTS FOR CAUSALITY BETWEEN INSURANCE DEVELOPMENT AND ECONOMIC GROWTH USING ASYMPTOTIC AND PANEL BOOTSTRAP DISTRIBUTIONS

Abstract. *This study applies bootstrap panel Granger causality test to examine the relationship between insurance development and economic growth in 7 Middle Eastern countries: Saudi Arabia, United Arab Emirates, Iran, Kuwait, Oman, Jordan, and Israel. According to our results, the relationship between life insurance development and economic growth can be significantly affected by country-specific factors; life insurance and macro economy generally have bi-directional Granger causal relationship in higher income level countries, such as United Arab Emirates, Kuwait, and Israel; non-life insurance can do better in promoting economic growth in low-income Middle Eastern countries, such as Oman, Jordan, and Saudi Arabia; both demand-following and supply-leading pattern widely exit in the nexus of economic growth and insurance development for life and non-life insurance sectors. These results have important economic and policy implications for the 7 Middle Eastern countries under study.*

Keywords: *Life and Non-life insurance, Economic Growth, Demand-following, Supply-leading, Bootstrap Panel Causality Test.*

JEL classification: C23, R11

1. Introduction

The aim of this study is to analyze the causal relationship that potentially exists between life and non-life insurance industry and economic growth in Middle Eastern countries. Since 2000, the Islamic insurance sector has been growing more than 15 percent per annum, yet the market is still at its tip, especially in the Middle East. According to the reports presented at a recent Islamic Insurance conference, the Middle Eastern insurance sector is set to grow at a 25% annual average rate. The Islamic insurance market will grow five-fold over the next 10 years and the Shariah-compliant insurance is expected to be $14 billion worth by 2015. The characteristics of Middle Eastern countries are tied up by their common political, economic and social structures. The creation of the Middle East as a regional entity on May 25, 1981 was aimed to achieve coordination, integration and interconnection between its members. This necessarily implies the harmonization and the gradual unification of different regulations and structures. The insurance demands have been boosted by the rapid growth rate of GDP and a high immigration flow of labor. For example, the development of the mortgage market that saw spectacular boom in this region in addition to the new regulations, that made mandatory for immigrants as well as locals to have health insurance and vehicle insurance, boosted the market and generated a new dynamism in the sector. As consequence, the region saw the inception of a new market conditions characterized by an increasing competition particularly driven by the gradual liberalization of the sector and its openness to international giant insurers as well as regional firms. Increasing importance insurance sector has been investigated about its role in economic growth in Middle Eastern countries. Given this situation, it is essential that issue should be addressed about the relationship between insurance sector and economic growth in Middle East.

Insurance market activities may contribute to economic growth, both as financial intermediary and provider of risk transfer and indemnification by allowing different risks to be managed more efficiently and by mobilizing domestic savings (Ward and Zurbruegg, 2000). More specifically, insurance can have effects such as promoting financial stability, mobilizing savings, facilitating trade and commerce, enabling risk to be managed more efficiently, encouraging loss mitigation, fostering efficient capital allocation and also can be a substitute for and complement of government security programs. In fact, economic growth is characterized by the soundness of a national insurance market. On the other hand, development of insurance sector, including life and non-life insurance, are found to be significantly affected by economic growth (Outreville, 1990; Li et al., 2007). While some empirical evidences dealing with the interaction between insurance development and economic growth for both developed countries and less developed countries seem convincing, unfortunately thus far none has been proven to be conclusive. Especially, the literature dealing specifically with the Middle East is sparse.

To sum up, the previous evidences are still absent in several aspects. First, causal relationship between insurance development and economic growth is still unclear. Ward and Zurbruegg (2000) have pointed out that it is important to accommodate the potential for causal relationships to differ in size and direction across countries. They suggest that the role of insurance in the economy may be varied across countries. This could happen when the influence of insurance market development, while channeled through indemnification and financial intermediation, is tempered by country-specific factors. However, the evidence on the causal relationship between insurance activities and economic growth is scarce on country level; studies about the cases of Middle Eastern countries are also neglected without exception. Patrick (1966) identifies two possible patterns in the causal relationship between financial development and economic growth. One is "demand-following" pattern which is the creation of modern financial institutions with their financial assets and liabilities, and related financial services are in response to the demand for these services by investors and savers in the real economy. The other pattern is named as "supply-leading" where the expansion of the financial system precedes the demand for its services. These two kinds of patterns are tested in the study of relation between insurance development and economic growth (see, for instances, Outreville, 1990; Kugler and Ofoghi, 2005), but more evidences are needed to clarify this issue. Secondly, more lights should be shed on the impacts of life insurance and non-life insurance on economic growth. Arena (2008) finds evidence that life and non-life insurance has different impacts on economic growth for different levels of economic development measured by GDP per capita. Life and non-life insurance have an impact on economic growth at the low and middle stages of economic development. However, life insurance would have a bigger impact on economic growth at low levels of economic development and non-life insurance at middle levels. Though these results are provoking, the difference between life and non-life insurance are not fully understood without considering the region-specific factor, such as regulation, culture, government spending on social security, etc. which leave space for the study targeted to Middle Eastern countries.

Furthermore, conventional time-series data tests not only failed to consider information across countries, but also had lower power. In order to increase the power in testing for relationship, many researchers developed the use of panel data. The existing literature has mainly relied on cross-section and time series analysis. By utilizing information on both the intertemporal dynamics and the individuality of the insurance market, the efficiency of econometric results are greatly improved. A review of the literature reveals only a handful of empirical studies. For instance, using a panel data analysis, Ward and Zurbruegg (2000) analyze nine Organization for Economic Co-operation and Development (OECD) countries and found that the insurance industry (represented by total insurance premia) Granger causes real GDP in Canada and Japan. Causality is bi-directional in Italy, but no causal relation can be established for other countries. Kugler and Ofoghi (2005) examined the relationship between insurance and GDP growth in the United Kingdom under the lens of cointegration analysis. They found an overwhelming support for a long-run relationship between different insurance sectors and economic growth. Arena (2008) studied causal relationship between insurance market activity and economic growths of panel data for 55 countries using data of life and non-life insurance premiums in order to assess potentially different effects on economic growth, measured by growth in real GDP per capita. Moreover, insurance activity is found to Granger cause economic growth in most of the sectors. A number of studies have examined the relationship between the insurance and economic growth; however, most of these studies have utilized asymptotic methods in the estimation and testing of parameters. It is well-known that these methods lose power when the probability distributions are non-normal. Since it is well-established that time series are non-normally distributed, in contrast with previous studies, we use a bootstrapping approach. It is well-recognized that bootstrapping results in more reliable estimates of parameters (Hacker and Hatemi-J, 2006) and thus our study provides new evidence on the issue of causal effect between insurance activities and economic growth.

As a major emerging economy, Middle Eastern countries are characterized for rapid development in both insurance market and national economy in last decades. The traditional nature of the economic activity in this region favored the development of the financial intermediation activities leaving underdeveloped the other financial service activities. Hence, the insurance sector remained underdeveloped despite the continuous effort of the government regulators to boost it. This was worsened by the continuous debate about the compliance of such an activity with the religious rules, particularly the life insurance products. Although local insurance markets are still modestly developed in terms of insurance density in relation to their western counterparts, insurance premium growth in Middle Eastern countries have outpaced economic growth. Since the reform and opening up, Middle Eastern countries insurance businesses have increased quickly, which played an active role in improving protecting economy, stabilizing society and benefiting people.

The causal relationship between insurance development and economic growth in Middle Eastern countries is not clearly known yet. In this study, we investigate it by using bootstrap panel Granger causality approach, the panel causality analysis which takes into account cross-sectional dependency (so-called the bootstrap panel causality developed by Kónya (2006)) and try to indentify the interaction patterns in seven countries of Middle East. This study contributes to the literature in several aspects. First, it provides further evidences on different effects of life insurance and non-life insurance in Middle Eastern countries, to our knowledge, this article is the first to compare the impacts of life insurance and non-life insurance on economic growth using country-level data, especially in Middle Eastern countries. Second, specific patterns of interaction between economic growth and life/non-life insurance are detected and test results show that the interaction patterns vary across countries. Third, this study is one of the few researches focusing on relationship between insurance development and economic growth in Middle Eastern countries and has important policy implication for Middle Eastern countries and other developing countries.

The reminder of this empirical study is organized as follows. Section 2 outlines the methodology of the Bootstrap Panel Granger causality. Section 3 presents the data used and discusses the empirical findings and policy implications. Section 4 concludes the paper.

2. Methodology

Investigating Granger causality within panel data framework requires a careful treatment. First issue in that respect is to control for a possible cross-sectional dependency across countries since a shock affecting one country may also affect other countries because of a high degree of development as well as of regional economic integration. The Monte Carlo experiment carried out by Pesaran (2006) emphasizes the importance of testing for the cross-sectional dependence in a panel data study and also illustrates the substantial bias and size distortions when cross-sectional dependence is ignored (Pesaran, 2006). Second issue is to decide whether the slope coefficients are treated as homogenous and heterogeneous to impose the causality restriction on the estimated parameters. The causality from one variable to another variable by imposing the joint restriction for the panel is the strong null hypothesis (Granger, 2003) and the homogeneity assumption for the parameters is not able to capture heterogeneity due to country specific characteristics (Breitung, 2005). In the insurance and economic growth nexus, as in many economic relationships, while there may be a significant relationship in some countries vice versa may also be true in some other countries.

Based on above discussion, our empirical analysis starts with testing for cross-sectional dependency, followed by examining slope homogeneity across countries. Then, we decide which panel causality method should be employed to appropriately determine the direction of causality between life insurance/non-life insurance and economic growth in Middle Eastern countries. In what follows, we outline the essentials of econometric methods used in this study.

3.1 Cross-sectional dependency tests

The cross-sectional dependency among countries in previous studies implies that a shock affecting one country may spill on other countries. When we consider 7 countries in Middle Eastern countries, cross-sectional dependency may play crucial role in detecting causal linkages among economic series since countries are highly integrated and have a high degree of economic development.

To test for cross-sectional dependency, Breusch and Pagan (1980) proposed a Lagrange test. The construction of the test statistic depends upon the estimation of the following panel data model:

$$y_{it} = \alpha_i + \beta_i' x_{it} + \varepsilon_{it} \quad \text{for} \quad i = 1, 2, ..., N; \quad t = 1, 2, ..., T \tag{1}$$

where i is the cross section dimension, t is the time dimension, x_{it} is $k \times 1$ vector of explanatory variables. As shown in equation (1), the individual intercepts (α_i) and slope coefficients (β_i) are allowed to vary across countries. The null hypothesis of no-cross sectional dependency and the alternative hypothesis of cross-sectional dependency are described as:

$H_0 : Cov(u_{it}, u_{jt}) = 0$, for all t and $i \neq j$

$H_1 : Cov(u_{it}, u_{jt}) \neq 0$, for at least one pair of $i \neq j$

In order to test the null hypothesis against the alternative, Breusch and Pagan (1980) developed the Lagrange multiplier statistic as:

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^{2} \tag{2}$$

where $\hat{\rho}_{ij}$ is the sample estimate of the pair-wise correlation of the residuals from Ordinary Least Squares (OLS) estimation of Equation (1) for each i. Under the null hypothesis, LM statistic is asymptotically distributed as chi-square with $N(N-1)/2$ degrees of freedom. It is important to note that the LM test is valid for N relatively small and T sufficiently large. This drawback is tried to be solved by Pesaran (2004) by the following scaled version of the LM test:

$$CD_{lm} = \left(\frac{1}{N(N-1)}\right)^{1/2}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T\hat{\rho}_{ij}^{2}-1) \tag{3}$$

Under the null hypothesis with $T \to \infty$ first and then $N \to \infty$, this test statistic has the standard normal distribution. Even though CDlm is applicable even for N and T large, it is likely to exhibit substantial size distortions when N large and T small. The shortcomings of the LM and the CDlm tests clearly show a need for a cross-sectional dependency test that can be applicable with large N and small T. In that respect, Pesaran (2004) proposed the following test statistic:

$$CD = \sqrt{\left(\frac{2T}{N(N-1)}\right)}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \tag{4}$$

Under the null hypothesis with T→∞ and N→∞ in any order, the CD test has asymptotic standard normal distribution.

CD test has exactly mean zero for fixed T and N and is robust to heterogeneous dynamic models including multiple breaks in slope coefficients and/or error variances, as long as the unconditional means of y_{it} and x_{it} are time-invariant and their innovations have symmetric distributions. However, the CD test has an important drawback that it will lack power in certain situations in which the population average pair-wise correlations are zero, although the underlying individual population pair-wise correlations are non-zero (Pesaran et al., 2008, p.106). Pesaran et al. (2008) proposes a bias-adjusted test which is a modified version of the LM by using the exact mean and variance of the LM statistic. The bias-adjusted LM test is constructed as:

$$LM_{adj} = \sqrt{\left(\frac{2T}{N(N-1)}\right)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \frac{(T-k)\hat{\rho}_{ij}^2 - \mu_{Tij}}{\sqrt{v_{Tij}^2}} \tag{5}$$

where μ_{Tij} and v_{Tij}^2 are respectively the exact mean and variance of $(T-k)\hat{\rho}_{ij}^2$, that are provided in Pesaran et al. (2008, p.108). Under the null hypothesis with first T→∞ and then N→∞, LM_{adj} test is asymptotically distributed as standard normal.

3.2 Slope homogeneity tests

Determining whether slope coefficients are homogeneous or heterogeneous is also important in a panel causality analysis by imposing causality restrictions on estimated coefficients. In Equation (1), the null hypothesis of slope homogeneity and the alternative hypothesis of heterogeneity can be described as:

$H_0 : \beta_i = \beta$, for all i

$H_1 : \beta_i \neq \beta_j$, for a non-zero fraction of pair-wise slopes for $i \neq j$.

In order to test for the null hypothesis, the familiar approach is to follow the Wald principle. Accordingly, test of slope homogeneity is $H_0 : \beta_1 = ... = \beta_N$ where the Wald statistic is asymptotically distributed as chi-square with N-1 degrees of freedom (see, Mark et al., 2005). The test based on the Wald principle is valid for cases where the cross section dimension (N) is relatively small and the time dimension (T) of panel is large; the explanatory variables are strictly exogenous; and the error variances are homoscedastic.

Similar to the Wald principle, Swamy (1970) developed the slope homogeneity test on the dispersion of individual slope estimates from a suitable pooled estimator. Even though Swamy's test is valid for panel with fixed N and large T just as the Wald test, it allows for cross-section heteroscedasticity. The Swamy test for slope homogeneity is:

$$S = \sum_{i=1}^{N} \left(\hat{\beta}_i - \hat{\beta}_{WFE} \right)' \frac{x_i' M_\tau x_i}{\hat{\sigma}_i^2} \left(\hat{\beta}_i - \hat{\beta}_{WFE} \right) \tag{6}$$

where $\hat{\beta}_i$ is the pooled OLS estimator, $\hat{\beta}_{WFE}$ is the weighted fixed effect pooled estimator, $M\tau$ is an identity matrix, and $\hat{\sigma}_i^2$ is the estimator of σ_i^2. In the case where N is fixed and T→∞, the S test has an asymptotic chi-square distribution with k(N-1) degrees of freedom.[1]

3.3 Panel Causality Test

According to Granger (1969), the Granger causality means that the knowledge of past values of one variable (X) helps to improve the forecasts of another variable (Y). If there are cross-sectional dependency and heterogeneity across countries, the method utilized should account for these features. Even though different panel causality approaches have been advocated, the bootstrap panel causality approach proposed by Kónya (2006) is able to account for both cross-sectional dependency and country-specific heterogeneity. In detecting causal relationships, the bootstrap panel causality approach of Kónya (2006) is based on Seemingly Unrelated Regression (SUR) estimation of the set of equations and the Wald tests with country specific bootstrap critical values. Since country-specific

[1] We refer an interested reader to Pesaran and Yamagata (2008) for the details of Swamy's test and its extension for panels where *N* and *T* are both large. Since *N* is small relative to *T* in our study, we used the Swamy test.

bootstrap critical values are used, the variables in the system do not need to be stationary, implying that the variables are used in level form irrespectively of their unit root and cointegration properties. By imposing country specific restrictions, we can also identify which and how many countries exists Granger causal relation.

The system to be estimated in the bootstrap panel causality approach can be formulated as follows:

$$
\begin{aligned}
y_{1,t} &= \alpha_{1,1} + \sum_{i=1}^{ly_1} \beta_{1,1,i} y_{1,t-i} + \sum_{i=1}^{lx_1} \delta_{1,1,i} x_{1,t-i} + \varepsilon_{1,1,t} \\
y_{2,t} &= \alpha_{1,2} + \sum_{i=1}^{ly_1} \beta_{1,2,i} y_{2,t-i} + \sum_{i=1}^{lx_1} \delta_{1,2,i} x_{2,t-i} + \varepsilon_{1,2,t} \\
&\vdots \\
y_{N,t} &= \alpha_{1,N} + \sum_{i=1}^{ly_1} \beta_{1,N,i} y_{N,t-i} + \sum_{i=1}^{lx_1} \delta_{1,N,i} x_{1,N,t-i} + \varepsilon_{1,N,t}
\end{aligned}
\tag{7}
$$

and

$$
\begin{aligned}
x_{1,t} &= \alpha_{2,1} + \sum_{i=1}^{ly_2} \beta_{2,1,i} y_{1,t-i} + \sum_{i=1}^{lx_2} \delta_{2,1,i} x_{1,t-i} + \varepsilon_{2,1,t} \\
x_{2,t} &= \alpha_{2,2} + \sum_{i=1}^{ly_2} \beta_{2,2,i} y_{2,t-i} + \sum_{i=1}^{lx_2} \delta_{2,2,i} x_{2,t-i} + \varepsilon_{2,2,t} \\
&\vdots \\
x_{N,t} &= \alpha_{2,N} + \sum_{i=1}^{ly_2} \beta_{2,N,i} y_{N,t-i} + \sum_{i=1}^{lx_2} \delta_{2,N,i} x_{N,t-i} + \varepsilon_{2,N,t}
\end{aligned}
\tag{8}
$$

where y denotes the GDP per capita growth rate, x refers to the indicator of insurance density, measured by annual life insurance/non-life insurance premium payments divided by population, l is the lag length. Since each equation in this system has different predetermined variables while the error terms might be contemporaneously correlated (i.e., cross-sectional dependency), these sets of equations are the SUR system.

To test for Granger causality in this system, alternative causal relations are likely to be found for a country: (i) there is one-way Granger causality from X to Y if not all $\delta_{1,i}$ are zero, but all $\beta_{2,i}$ are zero. (ii) There is one-way Granger causality running from Y to X if all $\delta_{1,i}$ are zero, but not all $\beta_{2,i}$ are zero. (iii) There is two-way Granger causality between X and Y if neither $\delta_{1,i}$ nor $\beta_{2,i}$ are zero. (iv) There is no Granger causality between X and Y if all $\delta_{1,i}$ and $\beta_{2,i}$ are zero.

Since the results from the causality test may be sensitive to the lag structure, determining the optimal lag length(s) is crucial for robustness of findings. Thereby, prior to estimation, we have to specify the number of lags. For a relatively large panel, equation and variable with varying lag structure would lead to an increase in the computational burden substantially. To overcome this problem, following Kónya (2006) we allow maximal lags to differ across variables, but to be the same across equations. We estimate the system for each possible pair of ly_1, lx_1, ly_2, and lx_2 respectively by assuming from 1 to 4 lags and then choose the combinations which minimize the Schwarz Bayesian Criterion.[2]

3. Data and Empirical Results

In this study, we evaluate the long-run relationship between insurance and economic growth. This paper uses cross-country and annual panel data set over 1995-2010 which covers 7 Middle Eastern countries: Saudi Arabia, United Arab

[2] As indicated by Kónya (2006), this is a crucial step because the causality test results may depend critically on the lag structure. In general, both too few and too many lags may cause problems. Too few lags mean that some important variables are omitted from the model and this specification error will usually cause bias in the retained regression coefficients, leading to incorrect conclusions. On the other hand, too many lags waste observations and this specification error will usually increase the standard errors of the estimated coefficients, making the results less precise.

Emirates, Iran, Kuwait, Oman, Jordan and Israel. During this period, it is clear that the rapid economic growth in the Middle East is the most compelling reason for international insurers to look at this region. To measure insurance development, we use the insurance density, measured by annual life insurance/non-life premium payments divided by population. These data is derived from Sigma published by Swiss Re. The change of real GDP per capita is used to proxy for the economic growth. All data of this indicator is taken from the World Development Indicators of World Bank.

As outlined earlier, testing for cross-sectional dependency and slope homogeneity in a panel causality study is crucial for selecting the appropriate estimator. Taking into account cross-sectional dependency and country-specific heterogeneity in empirical analysis is crucial since countries could be highly integrated and have close economic relations. Thereby, our empirical study starts with examining the existence of cross-sectional dependency and heterogeneity across the countries under study. To investigate the existence of cross-section dependence we carried out four different tests (LM, CD_{lm}, CD, LM_{adj}) and illustrated results in Table 1. It is clear that the null of no cross-sectional dependency across the countries is strongly rejected at the conventional levels of significance, implying that the SUR method is appropriate rather than country-by-country OLS estimation.[3] Table 1 also reports the results from the two slope homogeneity tests (Wald and S). Both tests reject the null hypothesis of the slope homogeneity, supporting specific heterogeneity in Middle Eastern countries. The rejection of slope homogeneity implies that the panel causality analysis by

[3] The cross-sectional dependency furthermore implies that examining causal linkages between life and non-life premium and economic growth in Middle Eastern countries requires taking into account this information in estimations of causality regressions. In the presence of cross-sectional dependency, SUR approach is more efficient than country-bycountry ordinary least-squares (OLS) method (Zellner, 1962). Therefore, the causality results obtained from SUR estimator developed by Zellner (1962) will be more reliable than those obtained from the country-specific OLS estimations.

imposing homogeneity restriction on the variable of interest results in misleading inferences. In this respect, the panel causality analysis based on estimating a panel vector autoregression and/or panel vector error correction model by means of generalized method of moments (GMM) and of pooled ordinary least square estimator is not an appropriate approach in detecting causal linkages between life and non-life premium and economic growth in Middle Eastern countries.

Table 1. Cross-sectional dependency and homogeneity tests

Study	Test	Life Insurance	Non-Life Insurance
Breusch and Pagan (1980)	LM	168.855***	140.723***
Pesaran (2004)	CD_{lm}	22.814***	8.474***
	CD	12.696***	10.920***
Pesaran and Yamagata (2008)	LM_{adj}	4.971***	9.172***
Mark *et al.* (2005)	*Wald*	8.699***	6.887***
Swamy (1970)	*S*	9.586***	7.592***

Note: *** indicates significance at the 0.01 level.

The existence of the cross-sectional dependency and the heterogeneity across Middle Eastern countries provides evidence on the suitability of the bootstrap panel causality approach. The results from the bootstrap panel Granger causality analysis[4] are reported in Tables 2-5. Results from Table 2 shows that economic growth is a significant Granger cause of life insurance development in Saudi Arabia, United Arab Emirates, Iran, Kuwait and Israel. Failure to reject the null hypothesis of non causality running from economic growth to life premium prevails in other two countries means that for most Middle Eastern countries economic growth cause life insurance to increase. Specifically, the results suggest that the interaction between life insurance and economic growth follows demand-following pattern for these five countries. On the other side, from Table 3 we can find for four Middle Eastern countries, except for Iran, Oman and Jordan, life insurance market activities are driving force for economic growth. Iran also

[4] We refer to Kónya (2006) for the bootstrap procedure on how the country specific critical values are generated.

follows demand-following pattern in interaction relationship between life insurance and economic growth. So, bi-direction interaction relationship exists in Saudi Arabia, United Arab Emirates, Kuwait and Israel for life insurance and economic growth nexus. To sum up, life insurance development and economic growth seems to have constructive interaction in Saudi Arabia, United Arab Emirates, Kuwait and Israel, economic growth can cause life insurance to grow in Iran, but the opposite does not hold.

Table 2. Real GDP Per Capita Growth does not Granger Cause Life Insurance

	Wald Statistics	Bootstrap Critical Value		
		1%	5%	10%
Saudi Arabia	15.404**	30.613	14.598	9.456
United Arab Emirates	26.002**	44.889	24.451	16.688
Iran	14.994*	38.089	19.528	13.753
Kuwait	20.285**	28.661	13.380	9.073
Oman	5.926	39.892	20.852	14.085
Jordan	0.893	31.824	16.270	10.928
Israel	17.196*	42.309	19.297	12.617

Note: 1. ** and * indicate significance at the 0.05 and 0.1 levels, respectively.

2. Bootstrap critical values are obtained from 10,000 replications.

Table 3. Life Insurance does not Granger Cause Real GDP Per Capita Growth

	Wald Statistics	Bootstrap Critical Value		
		1%	5%	10%
Saudi Arabia	13.918*	44.202	20.424	12.863
United Arab Emirates	17.415**	29.668	15.233	10.309
Iran	5.882	41.4225	18.143	11.804
Kuwait	21.982**	46.295	19.509	12.228
Oman	2.122	44.077	19.867	12.866
Jordan	0.520	32.911	13.816	8.894
Israel	16.702**	28.065	13.666	8.789

Note: 1. ** and * indicate significance at the 0.05 and 0.1 levels, respectively.

2. Bootstrap critical values are obtained from 10,000 replications.

Table 4 presents causality test results from economic growth to non-life insurance development for Middle Eastern countries. The results show economic growth is Granger cause for non-life insurance development with 4 out of 7 countries rejecting the null hypothesis at at least 10% significance level. Different from others, Iran, Oman and Jordan generally fails to show the same feature. The results also suggest that the interaction between non-life insurance and economic growth follows demand-following pattern for these four countries.

Table 4. Real GDP Per Capita Growth does not Granger Cause Non-Life Insurance

	Wald Statistics	Bootstrap Critical Value		
		1%	5%	10%
Saudi Arabia	14.591**	32.102	13.721	90.23
United Arab Emirates	14.044*	31.346	16.720	11.553
Iran	10.954	35.145	18.449	12.349
Kuwait	9.585*	25.834	12.638	8.254
Oman	0.629	46.007	22.638	15.235
Jordan	4.620	57.429	26.277	18.002
Israel	11.692*	31.287	15.161	10.216

Note: 1. ** and * indicate significance at the 0.05 and 0.1 levels, respectively.

2. Bootstrap critical values are obtained from 10,000 replications.

According to the results of Table 5, it is statistically significant that non-life insurance development of four Middle Eastern countries, say, Saudi Arabia, United Arab Emirates, Oman, and Jordan, tend to drive the economic growth. Among others, Oman and Jordan shows supply-leading pattern. It complements bi-direction relationship of non-life insurance and economic growth in Saudi Arabia and United Arab Emirates.

Table 5. Non-Life Insurance does not Granger Cause Real GDP Per Capita Growth

	Wald Statistics	Bootstrap Critical Value		
		1%	5%	10%
Saudi Arabia	23.016**	40.137	20.484	14.241
United Arab Emirates	18.275**	33.321	17.477	11.816
Iran	0.953	46.648	23.140	16.356
Kuwait	4.039	53.278	23.598	15.519
Oman	23.631*	51.434	26.088	17.813
Jordan	31.166**	45.901	20.616	12.470
Israel	3.557	37.623	17.405	11.498

Note: 1. ** and * indicate significance at the 0.05 and 0.1 levels, respectively.

2. Bootstrap critical values are obtained from 10,000 replications.

With the summary of causality test in Table 6, different interaction patterns between cases of life and non-life insurance sectors can be compared. Several interesting findings can be derived from the results. First, generally speaking, economic growth is found to be powerful drive for both life and non-life insurance development in higher income level countries, like Saudi Arabia, Kuwait, and Israel. Second, the interaction pattern of the nexus of economic growth and insurance development is much more regular in life insurance sector than in non-life insurance sector, the reason might be that the life insurance is easily affected by the ‘insurance culture’ or religion which varies across countries. Third, non-life insurance seems to play active role in low income countries, like Oman, Jordan, and Saudi Arabia, except for Iran, this finding is inconsistent with Arena (2008) who found non-life insurance plays larger role for middle income level countries but not for low income ones. Last but not the least, Saudi Arabia and United Arab Emirates have bi-direction causal relationship between economic growth and insurance development for both life and non-life insurance sectors, which means that in these two countries insurance industry is functioning as it is expected in theories, governments of these two countries can promote economy through developing insurance industry, and insurance industry can benefit from economic growth.

Table 6. Summary of Causality Test between Real GDP Growth and Life/Non-life Insurance

Economic Region	GDP → Life insurance	Life insurance → GDP	Effect
Saudi Arabia	◎	◎	Bi-direction
United Arab Emirates	◎	◎	Bi-direction
Iran	◎		Demand-following
Kuwait	◎	◎	Bi-direction
Oman			
Jordan			
Israel	◎	◎	Bi-direction
Economic Region	GDP→ Non-life insurance	Non-life insurance→ GDP	
Saudi Arabia	◎	◎	Bi-direction
United Arab Emirates	◎	◎	Bi-direction
Iran			
Kuwait	◎		Demand-following
Oman		◎	Supply-leading
Jordan		◎	Supply-leading
Israel	◎		Demand-following

The insurance industry in the Middle East region is still in its infancy, despite having a long history in some countries in the region. The premiums in Middle East are roughly 0.33 percent of total world premiums, and the contribution of the industry to the GDP of the region is small by international standards (low penetration ratios). It is especially low in lower income level countries as Iran, Oman and Jordan. This indicates that insurance is not yet used as a vehicle for risk management or savings. However, the insurance industry has experience tremendous growth over the past few years, coupled with the prosperity of the region due to high oil prices, growing incomes, and the huge investments taking place in the Gulf Cooperation Council countries, which all point to the opportunities of being involved and participating in this growth. Our findings have important implications for further development of macro economy and insurance industry as well in Middle Eastern countries.

4. Conclusions

Using bootstrap panel Granger causality, we examine the relationship between insurance development and economic growth in 7 Middle Eastern countries, say, Saudi Arabia, United Arab Emirates, Iran, Kuwait, Oman, Jordan, and Israel, for life and non-life sectors, respectively. According to our results, the relationship between life insurance development and economic growth seem to be significantly affected by country-specific factors; life insurance and macro economy generally have a bi-directional Granger causal relationship in higher income level countries, like United Arab Emirates, Kuwait, and Israel; non-life insurance can do better in promoting economic growth in low-income Middle Eastern countries, such as Oman, Jordan, and Saudi Arabia; despite of the unfavorable culture for insurance industry, both demand-following and supply-leading pattern widely exit in the nexus of economic growth and insurance development for life and non-life insurance sectors in Middle Eastern countries. Considering the potential effects of insurance industry, Middle Eastern countries that are concerned with demographic challenges and problems with developing insurance sectors should continue to implement incentives for stimulating insurance companies to participate more in providing the private supplement to public pension and healthcare pillars, or some risk-transfer products. With these improvements, insurance sector would contribute more to economic growth. On the other hand, the widely existing demand-following pattern indicates that players of the insurance markets can be expected to benefit from the booming economy of these countries. These results could be useful for Middle Eastern governments that seek to improve economic growth as they suggest the need for implementation of simulative policies for the development of insurance industry.

Acknowledgements

This work is supported by the National Natural Science Fund (71271157) and "Post-70" Scholar Groups Development Project of Wuhan University.

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