The effect of Financial and non-Financial variables on economic growth; a study on Middle East Countries

SeyedFarshid Ghorashi[1] ; Mohammad Bazdar[2] ; Atousa Goodarzi[3]

[1] Dept. of Eco College of Insurance, Allameh Tabatab'i University, Tehran, Iran

[2] Dept. of Eco College of Insurance, Allameh Tabatab'i University. Tehran, Iran

[3] Dept. of Eco College of Insurance, Allameh Tabatab'i University. Tehran, Iran

ABSTRACT

The aim of this study is to find the dynamic relationship between financial, non-financial, and economic growth in 8 Middle east countries with mid and low-income levels for the 15 years from 2005 to 2019. This study uncovers the causality relationship among indicators using the panel vector auto-regressive (VAR) and vector error correction model (VECM) approach. The results demonstrate that insurance asset size and international tourism are significant causative factors in both the long and short run on the economic growth of the countries under study, as they are cointegrated and affect each other in the long run. Moreover, other financial variables, including liquid liabilities and final consumption expenditure, are also found to have a granger cause in economic growth. In addition to financial variables, non-financial factors such as interest rate, secondary school, and unemployment rate are significant causal factors in economic growth. Also, the impulse response function also reveals that GDP initially responds negatively to shocks in all variables. However, in the long run, it becomes positively responded to reach the equilibrium, whereas the scenario is reversed for unemployment. Overall, this paper provides valuable insights into the relationship between financial, non-financial, and economic growth in Middle-east countries with mid and low levels of income, which could inform policymakers and researchers interested in the economic development of these countries. The findings suggest that policymakers should focus on enhancing financial and non-financial sectors in order to grow the economy as these are the causative factor for economic growth.

Keywords: Panel data, vector auto-regressive (VAR), vector error correction model (VECM), Granger-Causality, Financial variables, Non-financial variables

1   Introduction
1.1 What this paper is about?

Many financial and non-financial variables highly influence the economy's operation. Most of the research concentrates on financial variables, and it is essential to know that the banking and insurance sectors are two important branches that formed the financial industry. On the one hand, the insurance sector mainly considers risk transfer and loss indemnity, which might alleviate the risk threats by maintaining an entity's resistance to the risk and encouraging production activities. On the other hand, one indicator that could help enhance economic growth is the banking industry. Economic growth will grow if the funds between investment and saving work efficiently, encouraging capital formation (Chang 2018). However, in this paper, besides considering Insurance and Banking variables, the effect of some other indicators such as Interest rate, Enrollment in secondary school, Unemployment, Financial Consumption Expenditure, and Population on the economy is analyzed. Thus, the primary aim of this paper is to find the impact of both financial and non-financial development on economic growth in selected Middle east countries.

Much extensive research utilizes the role of the insurance market on economic growth. As insurance covers disasters and managing economic uncertainty, it seems to be one of the most critical factors for economic growth, so in this study, the causal relationship between insurance and economic growth is analyzed. Also, the banking sector is essential for economic growth in different ways than insurance. The banking sector is one of the channels for investment and saving money, and as a result, it enhances capital formation. Thus, in this paper, banking and insurance are two of the independent variables for finding the relationship between them and GDP.

Many studies analyze the relationship between insurance, banking, and economic growth, using different study methods like Pooled, Time series, panel data, and cross-sectional. Thus, in the first section of the literature, studies that cover the relationship between financial variables and economic growth are summarized.

1.2. Impact of financial development and economic growth.

Studies such as (Emara & El Said, 2021), (Kaushal & Ghosh, 2018), (Pradhan, Arvin et al. 2017), (Pradhan, Arvin, & Norman, 2015), (Ruiz, 2018), and (Sethi & Acharya, 2018) considering financial development and economic growth. Considering different areas and countries, these studies indicate a significantly positive long-term relationship between financial development and economic growth. They suggested that enhancing the financial system could boost countries' economic growth. However, in the short run, the result for each nation varies. They consider banking and insurance indicators as financial variables. Furthermore, Apergis and Poufinas (2020), Haiss and Sümegi (2008), Adams et al. (2009), and Pradhan, Bahmani, and Abraham (2023) utilized insurance as one of the most important

indicator for economic growth in the long and short-run. In these studies, insurance has a positive and considerable relationship with economic growth. At the same time, C.-C. Lee et al. (2016) and Olayungbo and Akinlo (2016) indicated that the impact of insurance on economic growth could be positive or negative in the long and short run based on the research area and given countries. In Table 1, one can see other studies for effecting financial development on economic growth.

Table 1 studies which considering the effect of insurance and banking variables on economic growth.

Study	Method	Case of Study (number or the name of the countries)	Year of Investigation
(C.-C. Lee et al., 2016)	GMM (Generalized method of moments)	77	1994-2005
(C.-C. Lee & Chang, 2015)	Panel data models	50	1996-2005
(Dash et al., 2018)	Vector error correction model	19 Eurozone region	1980-2017
(Asongu & Odhiambo, 2020)	Panel Threshold Regression	48 African countries	2004-2014
(Dahiya & Kumar, 2020)	Bayesian VAR framework	India	2005-2017
(Wang, Lee, Lin, & Tsai, 2018)	Panel Vector Autoregression Model	22	2004-2013
(Wang et al., 2018)	Fixed Effect Model	20	2006-2015
(Caporale & Helmi, 2018)	VECM (Vector error correlation model)	14	2001-2016
(Arena, 2008)	Generalized method of moment (GMM)	55	1976-2004
(Chang & Lee, 2012)	Novel Threshold Model	92	1996-2008
(C.-C. Lee, Lee, & Chiu, 2013)	SURDAF	41	1979-2007
(Chen, Lee, & Lee, 2012)	Dynamic panel regression	60	1976-2005

1.3 Studies which considering non-financial development on economic growth.

The second section of the literature discusses the studies related to other variables, namely secondary school, unemployment, Interest Rate, international tourism, and final consumption expenditure.

1.4 Impact of education on economic

Many studies analyzing the relationship between education and economic growth, and the results vary based on the data, locations, and model specifications. Olayungbo and Akinlo (2016) show that education is not homogeneous, and the effect of this parameter is different on economic growth due to different education measurements and data. Moreover, Cohen and Soto (2007), Krueger and Lindahl (2001), and Easterly and Levine (1997) prove that education

is one of the key factors which could boost the economy. Also, Glewwe, Maiga, and Zheng (2014) show that education affects economic growth, but the significance level differs among countries. On the other hand, Hoeffler (2002) and Bloom, Canning, and Chan (2006) indicate no significant relationship between education and economic growth.

1.5 Impact of unemployment on economic growth

In the economic study, the unemployment rate is one variable that usually affects economic growth and vice versa. There are many studies, with different methods, that confirm that economic growth and unemployment have a long run relationship. Mohseni and Jouzaryan (2016), Soylu, Çakmak, and Okur (2018), Makaringe and Khobai (2018), and Uddin and Rahman (2022) reveal that unemployment impact negatively and significantly on economic growth. All of the mentioned studies used different models and locations with the same conclusion.

1.6 The impact of interest rate on economic growth

In addition, there is research about the impact of interest rates on economic growth, and depending on religious factors, and countries, the conclusion is different. Mushtaq and Siddiqui (2016) utilize that interest rate does not significantly affect economic growth in Islamic countries, while interest rate in non-Islamic nations positively and significantly affects saving. However, for both Islamic and non-Islamic countries, investment is affected negatively by interest rates. Some studies, such as (Drobyshevsky, Trunin, Bogachkova, & Sinelnikova-Muryleva, 2017) and (Bosworth, 2014), indicate that interest rate does not damage economic growth. In other words, the connection between economic growth and interest rate could be stronger. K. Lee and Werner (2022) studied 19 countries worldwide, and they found that interest rates could positively correlate with economic growth under certain circumstances.

1.7 Tourism industry and expenditure consumption and the effect of them on economic growth

Moreover, (Sequeira & Campos, 2005) investigated all countries with reliable data, and they found that tourism has little impact on economic growth. Also, some studies, such as (Akinboade & Braimoh, 2010) and (Bouzahzah & El Menyari, 2013), use the VAR approach, and they conclude that in the long and short run, there is unidirectional causality between economic growth and tourism. Furthermore, consumption expenditure is another indicator usually used in economic studies. (Hajamini & Falahi, 2014), (Rehman, Ma, Alvarado, & Ahmad, 2023) show that consumption expenditure has a long-run causality relationship with economic growth, and this variable has a significant negative effect on economic growth.

1.8 Studies which use granger causality method

In the last section of the literature, studies that use granger-causality are investigated. As in this paper, the prime purpose is to find the dynamic relationship between independent variables and economic growth and find the possibility of causation. In Table 2, the newest research uses the Granger-cause method to find the relationship between independent indicators and economic growth.

Table 2: Studies which considering Granger-Causality method in their analysis.

Study	Case of Study	Year of Investigation
(Maradana et al., 2019)	European Economic Area	1989-2014
(Y. Su et al., 2021)	China	2000-2019
(Enilov & Wang, 2022)	23 countries worldwide	1981-2017
(Wu & Wu, 2019)	11 Asian Countries	1995-2015
(Aluko & Adeyeye, 2020)	41 African Countries	1985-2017
(C. Su, Xu, Chang, Lobont, & Liu, 2020)	China	1952-2014
(Bilen, Yilanci, & Eryüzlü, 2017)	12 Mediterranean countries	1995-2014
(Pradhan, Arvin, & Bahmani, 2018)	49 European Countries	1961-2014
(Pradhan, Dash, Maradana, Jayakumar, & Gaurav, 2017)	19 Eurozone Countries	1980-2014
(Mhadhbi, Terzi, & Bouchrika, 2020)	25 countries worldwide	1970-2012
(Gupta & Singh, 2016)	BIRCS	1992-2013
(Guerra, 2017)	Mexico	2001-2016

1.9 The novelty of this study

Although many studies focus on the causation between economic growth and financial development or economic variables, this study differs from previous research in two ways. First, the study sample differs as we select low and mid-level income from Asia and Africa. Second of all, most of the papers focus on financial or non-financial variables solely. However, this paper uses a mixture of financial and non-financial variables using three different models with two approaches. VAR and VECM are used as indicators in one of our cointegrated models. However, there is no cointegration among other variables in models 2 and 3, and use VAR approach to find the causality. Toward this end, this paper aims to find possible causation between variables. In order to find the direction of causation, a cointegration test and for finding the direction of causation, vector error correction model (VECM) and Vector autoregressive (VAR) are used.

The remainder of this paper is summarized as follows. Section 2 represents data, variables, and model, section 3 presents the empirical result and possible explanation, and the last section is the conclusion.

2   Data and Variables

2.1 Data gathering

This paper focuses on data from eight Middle east countries, covering 15 years from 2005 to 2019. Real per capita growth (GDP) is the dependent variable, and a combination of financial (insurance asset size, liquid liabilities in the financial system, and final consumption expenditure) and non-financial variables (International Tourism, Unemployment, Interest rate, and Secondary School) are independent variables, each defined in Table 3. Data from the (Worldbank n.d.) is used for all countries except Iran, for which data from the statistical yearbook published by the Central Insurance Company of Iran is used (Central Insurance n.d. n.d.). Due to data availability, this study is used data from 2005 to 2019 as the data is not available for 2020,2021, and 2022 in the (Worldbank n.d.). Considering these variables, the paper seeks to provide insights relevant to studying Middle east countries. The location of this study can be seen in figure 1.


*Figure 1: Location of the Study*

Table 3: Definition of Variables

| Variables	Definition of Variables
GDP	Gross Domestic Products is the finished value of all finished product that produced by a country (Current US dollars)
INS	Insurance assets size, including life and non-life insurance
Unemployment	The percentage of total labor force who are without work
LLY	Liquid liabilities in the financial system and equals currency plus demand and interest-bearing liabilities of banks and other financial intermediaries
International Tourism, Receipt	Including all payment by inbound visitors
IR	Interest Rate is Lending Interest rate which is measured by GDP
Secondary School	The whole number of people who enroll in secondary school both in private and public school.
FCE	Final Consumption Expenditure is the summation of household and government expenditure

2.2 The trend of the data in this study

In this section, the trend of the variables is summarized. Here, the trend between independent and dependent indicators
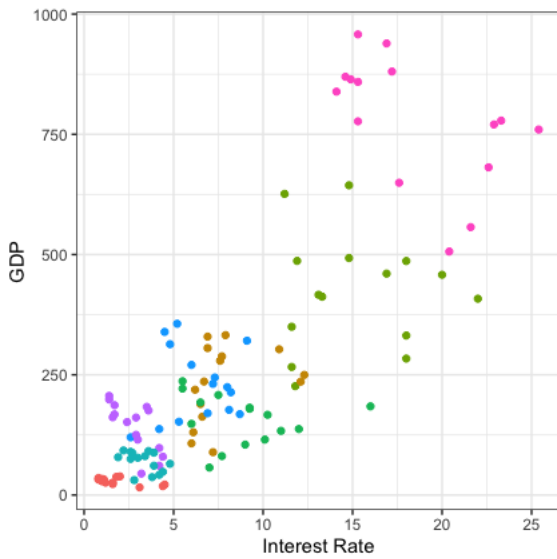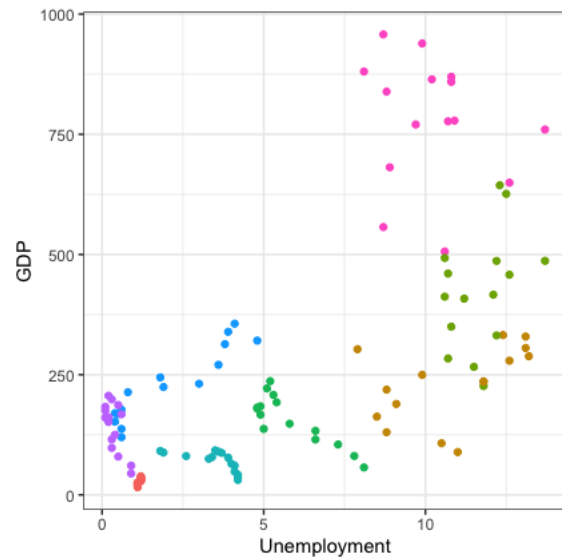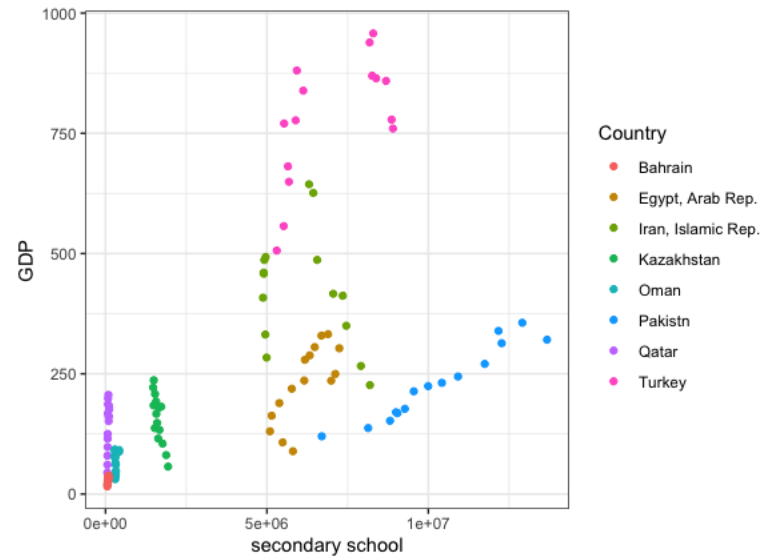
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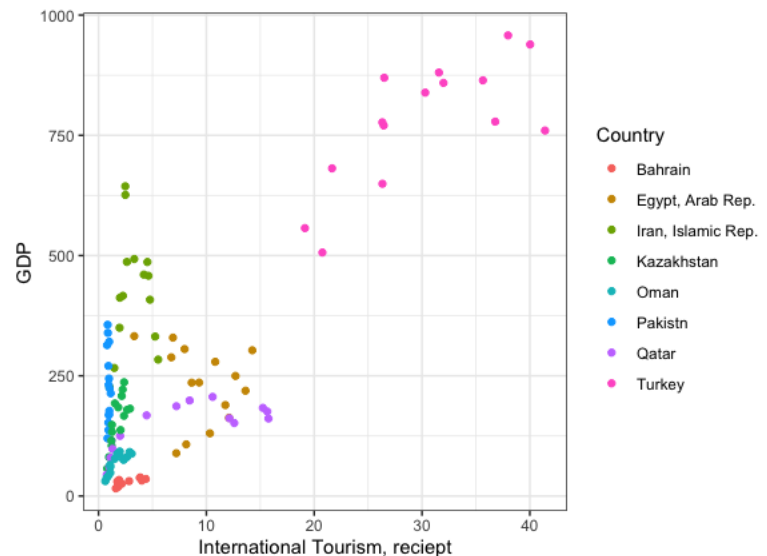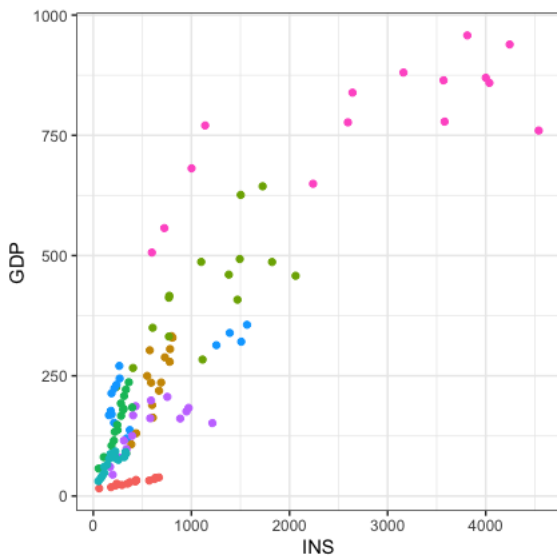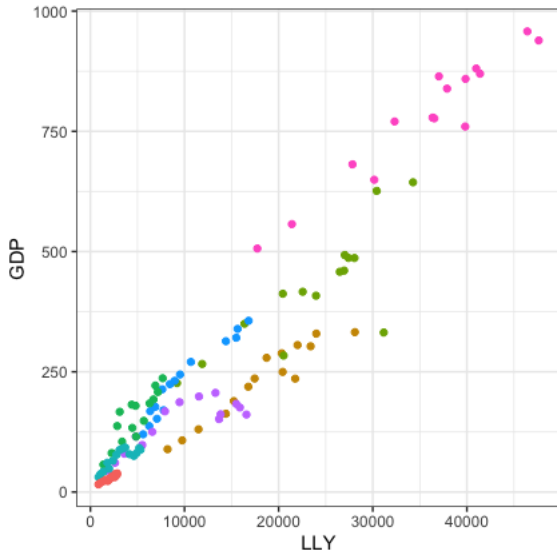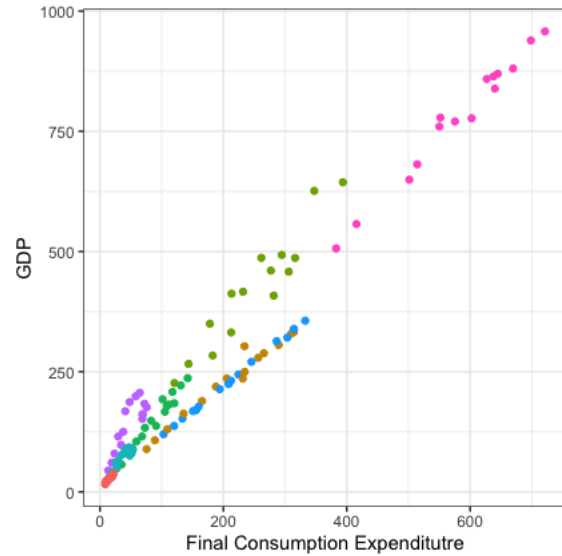
Figure 2: The relationship between GDP and Independent Variables

Figure 2 showcases the positive correlation between GDP and independent indicators. INS has a relatively weaker connection with GDP than LLY and FCE. The graph also reveals that International Tourism, Unemployment, and Interest Rate have significant relationships with GDP for most countries. As these independent variables increase or decrease, GDP follows the same trend. However, the graph shows no relation between GDP and secondary school or population for all countries.

Turkey leads in GDP, INS, LLY, interest rate, international tourism, and unemployment compared to Bahrain, Oman, and Qatar. Moreover, Pakistan has the highest secondary school enrolment rate among these nations.

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مطالعات مدیریت، اقتصاد
و حسابداری صنعت محور

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Gross Domestic Product (GDP) by Year and Country

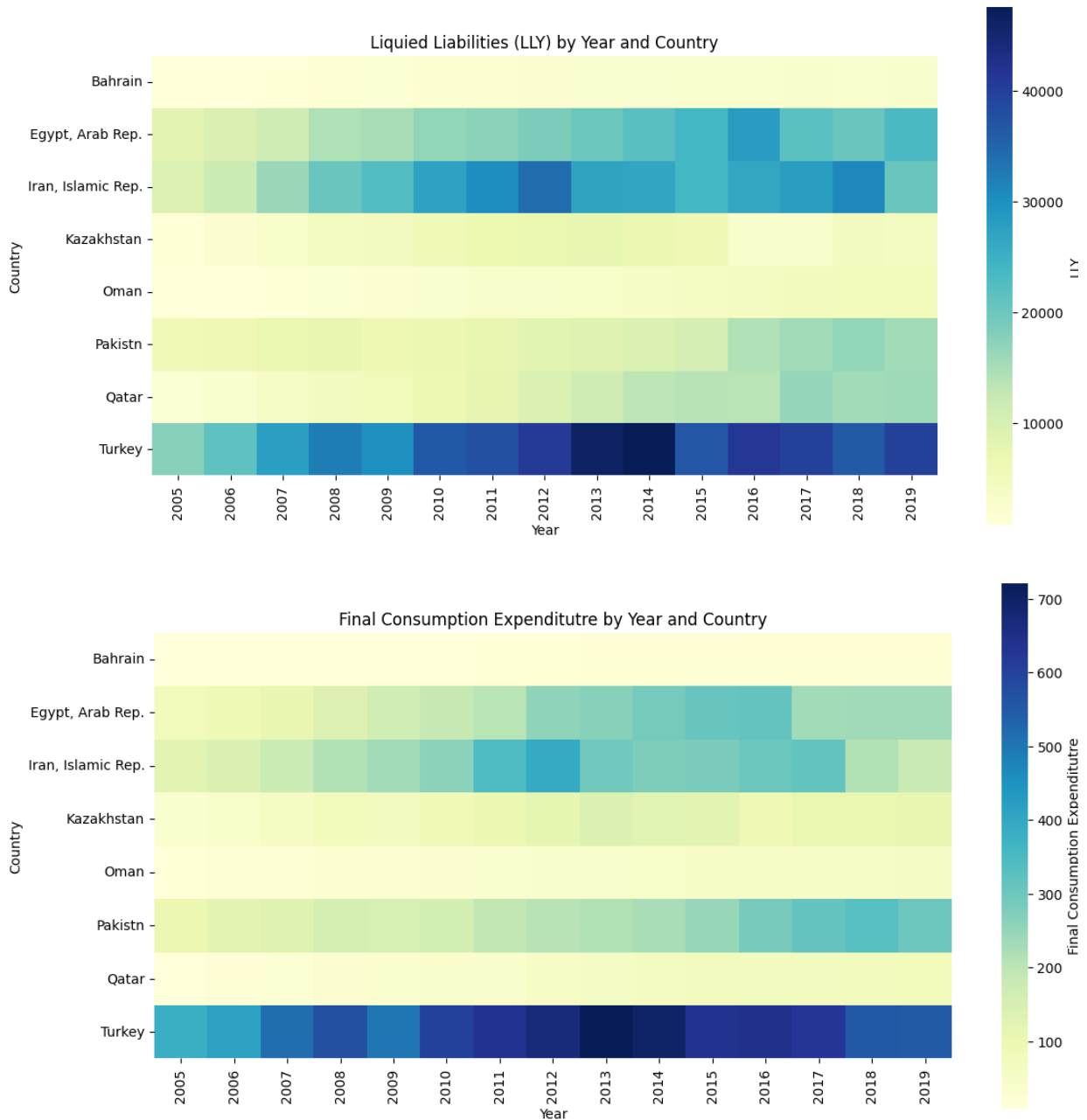Insurance asset size (INS) by Year and Country
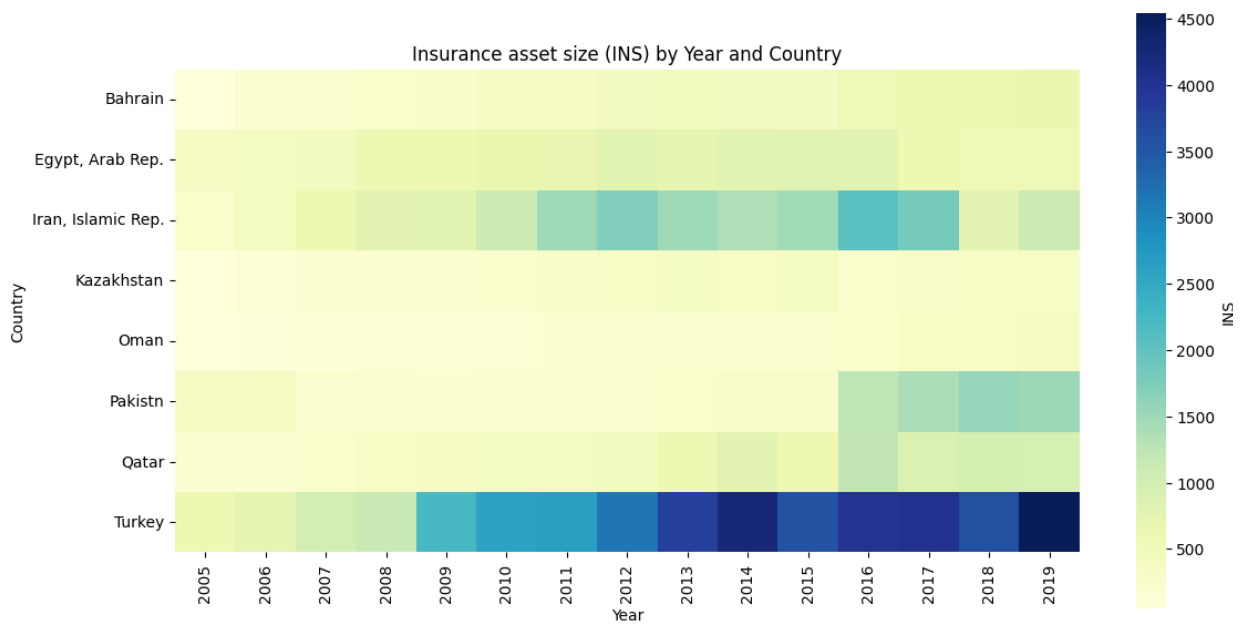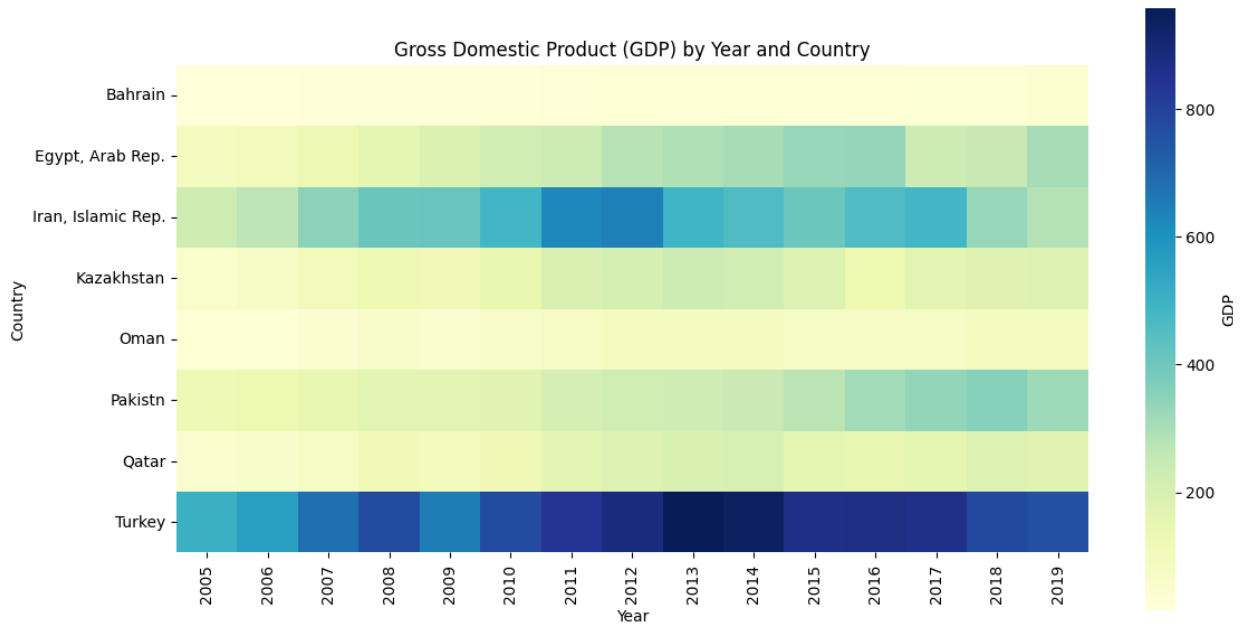
Figure 3: Trend in the financial variables

Error! Reference source not found. represents the trend of the GDP and independent variables during a given period for each country individually. The first plot which shows the trend of GDP show that the GDP for turkey is highest

compare to other countries, although the value has been decreasing after 2017. On the other hand, the least amount belongs to Oman, and Bahrain. The GDP of Iran had been increasing until 2013, after that it experienced a fluctuation and after 2017, it started to decline. Nevertheless, after Turkey, Iran, Pakistan and Qatar has the highest INS. However, this scenario for LLY is not true, and LLY for Egypt is significantly higher that Iran, Pakistan, and Qatar, even though less than Turkey. The last plot shows the other financial variables for each country, and based on the figure 2, final consumption expenditure for Pakistan was gradually increased. However, the final consumption expenditure for Turkey and Egypt was decreasing. This value for Bahrain, Oman, and Qatar was almost constant and lower compare to all countries.

The first plot shows the trend of GDP for each country over 15 years, and other plots show the trend of financial variables in this study. The trend of FCE, LLY, and INS is almost the same as the GDP, and these financial variables have a significant relationship with GDP.

2.3 Data pre-processing

Table 4: Summary statistics of variables

Variables	GDP	INS	Unemployment	LLY	International Tourism, Receipt	IR	Secondary School	Final Consumption Expenditure
Mean	257.31	815.64	5.708	13352.7	7.15	8.08	3966823	180.44
Median	180.50	429.19	4.8	8321.4	2.36	6.550	3409304	114.50
Min	15.97	52.52	0.1	853.4	0.62	0.8	55186	8.59
Max	957.78	4539.93	13.7	47632.9	41.41	25.4	13677810	721.42
Variance	$5.78e^4$	$9.48e^5$	$2.02e^1$	$1.44e^8$	$9.62e^1$	$3.71e^1$	$1.45e^{13}$	$3.37e^4$
Standard Deviation	$2.40e^2$	$9.73e^2$	4.49	$1.20e^4$	9.80	6.09	$3.81e^6$	$1.83e^2$

Table 4 summarizes statistics for the variables measured in the countries under study, including GDP, INS, Unemployment rate, LLY, international tourism, interest rate, secondary school enrollment, and final consumption expenditure (FCE).

According to data, Turkey had the highest GDP, INS, LLY, and FCE and the highest rate of international tourism. In contrast, Bahrain had the lowest GDP, FCE. Also, Bahrain has the least amount of unemployment rate. It is worth noting that while Turkey has the highest rate of international tourism, Oman has the least international tourism value. Regarding secondary school enrollment, Pakistan had the highest enrollment rate, while Qatar had the lowest. These findings suggest that there may be a correlation between a country's economic development and its investment in education.

Regarding unemployment, Turkey had the highest rate, while Qatar had the lowest. The high unemployment rate in Turkey could be a concern for policymakers in the country. Meanwhile, Qatar's low unemployment rate could indicate a thriving economy and job market.

Furthermore, the data shows a significant variation in the variables across the countries studied. For instance, the difference between the highest and lowest GDP values is substantial, while Turkey has a GDP over 60 times larger than Bahrain. Moreover, in terms of LLY, the data reveals that Turkey had the highest LLY, while Bahrain had the lowest, and the variation is too significant. This suggests that there may be a financial system that varies across countries.

Overall, the findings of this study offer insights into the economic and social landscape of the countries under study, highlighting areas of strength and areas for improvement. By better understanding economic growth and development factors, policymakers can make more informed decisions to support their countries' progress.

Table 5: Correlation matrix

Variables	GDP	INS	Unemployment	LLY	International Tourism, Receipt	IR	Secondary School	Final Consumption Expenditure
INS	0.880	1						
Unemployment	0.638	0.482	1					
LLY	0.947	0.869	0.703	1				

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International Tourism, Receipt	0.798	0.840	0.409	0.786	1		
IR	0.797	0.613	0.743	0.755	0.576	1	
Secondary School	0.578	0.436	0.477	0.567	0.281	0.510	1
Final Consumption Expenditure	0.976	0.863	0.633	0.928	0.798	0.775	0.663	1

Table 5 shows the correlation matrix, which provides valuable insights into the relationships between the different variables in the dataset. GDP has a strong positive correlation with INS, LLY, FCE, and International Tourism also shows a positive correlation with GDP. Interestingly, secondary school enrollment has a relatively weak correlation with all other variables, indicating that other factors may be at play regarding education.

However, the table also highlights a potential issue of multicollinearity between LLY, INS, and FCE. The problem of multicollinearity occurs when at least two independent indicators in a regression model are correlated. In this case, if LLY, INS, and FCE are used simultaneously in a model, the estimates of their individual effects become less reliable. The VIF method was used (Table 6) to measure the degree of multicollinearity between variables to address this issue. The VIF for LLY and FCE was above the threshold of 5, indicating that they are highly correlated and may impact the model. It is suggested to use these variables one at a time in the model to avoid the issue of multicollinearity.

Moreover, it is worth noting that both LLY and INS are financial variables, and according to (Chang, 2018), LLY and INS have a relationship and can affect each other. Therefore, it may be useful to consider using all three financial variables (INS, LLY, and FCE) separately to better understand their effects on the dependent variables.

Overall, the correlation matrix provides important information for researchers and policymakers when making decisions and designing models based on this dataset. It is crucial to consider the potential issue of multicollinearity and consider using variables separately to avoid any bias in the result.

Table 6: VIF values

Variables	**VIF**

INS	3.729770
Unemployment	1.581692
LLY	8.921125
International Tourism, Receipt	3.036397
Interest Rate	1.056737
Secondary School	1.760435
Final Consumption Expenditure	7.316058

3   Methodology:

3.1 Panel data

Panel data is a type of data including observations of different cross-sections during a specific time. Using panel data has brought several advantages. First, panel data contains more information, reliability, and efficiency than pure time series and cross-sectional data. Moreover, Panel data could detect and measure the statistical effect and minimize the biased conclusion that usually arises from time-series and cross-sectional data. Also, Panel data could be characterized as balanced and unbalanced when the data set contains the same number of observations for all groups called balanced panel data. In contrast, the data could be more balanced if missing values exist in the data set (Hsiao, 2007).

3.2 Differences between VCEM and VAR

Both VCEM and VAR approach are common method to use in economic studies. Studies such as (Zungu & Greyling, 2022), (Mtar & Belazreg, 2023), and (Elhorst, Gross, & Tereanu, 2021) use VAR and studies like (Pradhan & Bagchi, 2013), (Thierry, Jun, Eric, Yannick, & Landry, 2016), and (Obayelu & Salau, 2010) use VCEM approach. In this study, as data are correlated, and as a result, three models are generated and one of the model is cointegrated. Hence, both VECM and VAR approach are applied in this study in contrast to other studies that usually use one of these models. The Vector autoregressive model is used for finding Granger-causality, while sometimes, based on the

cointegration, the stationary of data Vector error correction model (VCEM) is used. VCEM is a cointegrated VAR that consists of the order p-1 on the differences of the indicators.

3.3 VCEM model

Based on the mentioned data set, balanced panel data and the general following model is represented for one of the models used in this paper.

$$GDP_{it} = \alpha_{it} + \beta_{1i}NFI_{it} + \beta_{2i}INS_{it} + \varepsilon_{it} \tag{1}$$

Where i=1, 2,…, N indicates the country of the sample, and t=1, 2,…, N represents the period.

In equation (1), GDP is the dependent variable, and NFI and INS are independent indicators. NFI represents four variables: Unemployment, Secondary School, Interest Rate, and International Tourism. Receipt and INS shows Insurance asset size. Also β_1 and β_2 indicate the long-run estimate for GDP. When all variables are non-stationary at the first level and cointegrated, the VECM method should be used, and the model is presented as follows;

The following VCEM model is used for model 1:

$$\begin{bmatrix} \Delta GDP_{it} \\ \Delta NFI_{it} \\ \Delta INS_{it} \end{bmatrix} = \begin{bmatrix} \mu_{1j} \\ \mu_{2j} \\ \mu_{3j} \end{bmatrix} + \sum_{k=1}^{p} \begin{bmatrix} \alpha_{11ik}(L)\alpha_{12ik}(L)\alpha_{13ik}(L) \\ \alpha_{21ik}(L)\alpha_{22ik}(L)\alpha_{23ik}(L) \\ \alpha_{31ik}(L)\alpha_{32ik}(L)\alpha_{33ik}(L) \end{bmatrix} \begin{bmatrix} \Delta GDP_{it-k} \\ \Delta NFI_{it-k} \\ \Delta INS_{it-k} \end{bmatrix} + \begin{bmatrix} \tau_{1i}ECT_{it} \\ \tau_{2i}ECT_{it} \\ \tau_{3i}ECT_{it} \end{bmatrix} + \begin{bmatrix} \lambda_{1it} \\ \lambda_{2it} \\ \lambda_{3it} \end{bmatrix} \tag{2}$$

Where Δ is the first different and i=1,2,…, N , t=1,2,…, T, and λ_{mit} (m=1,2,3) is distributed normally and independently randomly variables for all i and t with zero means and finite heterogeneous variance. Also, as described earlier, NFI means non-financial independent variables (Interest rate, Unemployment, Secondary school, International Tourism). Moreover, ETCs are error-correction terms that result from the cointegration equation. The ETCs show the dynamic long-run relationship between variables, although the difference indicators represent the short-run relationship. Due to the cointegration and integration of variables at the order one, the above model is meaningful.

3.4 VAR approach

However, there is no cointegration between LLY, FCE, and other non-financial variables. Thus the Vector auto-regressive model is used for causality and to find the relationship between them. The VAR method used the current and past values of the variable and the current and past values of other indicators. Thus, for LLY and FCE, the following models are used;

The VAR model in this study summarizes as follows;

$$(\text{Model 2}): GDP_{it} = \sum_{j=1}^{L} \alpha_{yj} NFI_{it-j} + \sum_{j=1}^{L} \alpha_j LLY_{it-j} + \varepsilon_{it}^{GDP} \qquad (3)$$

$$(\text{Model 3}): GDP_{it} = \sum_{j=1}^{L} \alpha_{yj} NFI_{it-j} + \sum_{j=1}^{L} \alpha_j FCE_{it-j} + \varepsilon_{it}^{GDP} \qquad (4)$$

Where y= 1,2,3,4 is the number of NFI variables, ε is the error term, and the index of t and i represent the number of countries and year, respectively.

4 Empirical result and discussion

4.1 Brief summary of the method

In this section of the paper, the panel unit root test, granger causality, is analyzed to find the possible long-run and short-run relationship between economic growth, financial and non-financial variables, and impulse response function. At first-panel, unit-root and cointegration tests are utilized to find if the data is stationary or not and the cointegration of the data, and based on the result, the best model for finding the causality relationship is concluded.

Test	Variables	Level	Model 1	Model 2	Model 3	Unit root interference
IPS	GDP	0 1	-1.23 −4.99*	-1.23 −4.99*	-1.23 −4.99*	I(1)
	Unemployment	0 1	-4.65 −6.49*	-4.65 −6.49*	-4.65 −6.49*	I(1)
	IR	0 1	-0.66 −5.18*	-0.66 −5.18*	-0.66 −5.18*	I(1)
	Secondary School	0 1	0.54 −4.19*	0.54 −4.19*	0.54 −4.19*	I(1)
	International Tourism	0 1	2.39 −6.39*	2.39 −6.39*	2.39 −6.39*	I(1)
	INS	0 1	1.00 −8.95*			I(1)
	LLY	0 1		-1.46 3.46*		I(1)
	FCE	0 1			-1.29 -2.81	I(1)
Test	Variables	Level	Model 1	Model 2	Model 3	Unit root interference
ADF-Fisher	GDP	0 1	-1.81 −4.44*	-1.81 −4.44*	-1.81 −4.44*	I(1)
	Unemployment	0 1	-1.49 −4.00*	-1.49 −4.00*	-1.49 −4.00*	I(1)
	IR	0 1	-1.89 −5.96*	-1.89 −5.96*	-1.89 −5.96*	I(1)
	Secondary School	0 1	-2.42 −4.21*	-2.42 −4.21*	-2.42 −4.21*	I(1)
	International Tourism	0 1	-1.23 −4.99*	-1.23 −4.99*	-1.23 −4.99*	I(1)
	INS	0 1	-0.26 −4.71*			I(1)
	LLY	0 1		-1.47 −4.76*		I(1)
	FCE	0 1			-2.03 −3.80*	I(1)
Test	Variables	Level	Model 1	Model 2	Model 3	Unit root interference
PP-test	GDP	0 1	-6.50 −90.23*	-6.50 −90.23*	-6.50 −90.23*	I(1)
	Unemployment	0 1	-6.55 −83.46*	-6.55 −83.46*	-6.55 −83.46*	I(1)
	IR	0 1	-11.61 −97.39*	-11.61 −97.39*	-11.61 −97.39*	I(1)
	Secondary School	0 1	-12.78 −116.32*	-12.78 −116.32*	-12.78 −116.32*	I(1)
	International Tourism	0 1	1.84 −99.83*	1.84 −99.83*	1.84 −99.83*	I(1)
	INS	0 1	-1.32 −100.38*			I(1)
	LLY	0 1		-6.08 −92.54*		I(1)
	FCE	0 1			-7.89 −72.12*	I(1)
Cointegration inferences			Y	N	N	

Table 7: Panel unit root test

4.2 Panel unit root and cointegration test result

The unit root test is critical to find possible cointegration (Engle & Granger, 1987) between variables and the best method for causality (Granger, 1988). Whenever the time series indicators are stationary at the first level, the panel unit root test is used to find the degree of integration among indicators. In In this section of the paper, the panel unit root test, granger causality, is analyzed to find the possible long-run and short-run relationship between economic growth, financial and non-financial variables, and impulse response function. At first-panel, unit-root and cointegration tests are utilized to find if the data is stationary or not and the cointegration of the data, and based on the result, the best model for finding the causality relationship is concluded.

, three different panel unit roots ((Dickey and Fuller 1979), (Phillips & Perron, 1988), and (Im, Pesaran, & Shin, 2003)) tests are examined to find the possible cointegration and use the best method for causality. As different panel unit root tests are well described in several economic papers and textbooks, this paper has no further description. According to In this section of the paper, the panel unit root test, granger causality, is analyzed to find the possible long-run and short-run relationship between economic growth, financial and non-financial variables, and impulse response function. At first-panel, unit-root and cointegration tests are utilized to find if the data is stationary or not and the cointegration of the data, and based on the result, the best model for finding the causality relationship is concluded.

, after the first difference, all variables are stationary at the significant level of 1 %, while at first, all indicators are non-stationary. As a result, based on the panel unit root test, the vector Autoregressive model is the best method for consideration to find the dynamic relation between dependent variables and independent indicators. In this section of the paper, the panel unit root test, granger causality, is analyzed to find the possible long-run and short-run relationship between economic growth, financial and non-financial variables, and impulse response function. At first-panel, unit-root and cointegration tests are utilized to find if the data is stationary or not and the cointegration of the data, and based on the result, the best model for finding the causality relationship is concluded.

represents the Johansen cointegration (Johansen, 1995) result, and it can be seen that model 1 does have at least one cointegration, while models 2 and 3 do not have a cointegration among indicators.

Thus, the best approach for model 1 is Vector Error Correction Model (VCEM), as there is a long-run relationship among variables.

The panel Vector Auto Regressive model (VAR) is used for models 2 and 3 because there is no cointegration between variables.

4.3 Granger causality empirical test result for model 1

The causality test is obtained to find the possible source of causation and the direction of causality among GDP, Unemployment, Interest Rate, Secondary School, International Tourism, and INS in model 1. Moreover, as mentioned above for model 1, based on cointegration and panel unit root test results, the VCEM model is used to find the short and long-run causal relationship between 6 variables.

The main hypothesizes in model 1 describe as follows;

- GDP granger-cause Unemployment and vice versa
- GDP granger-cause Interest rate and vice versa

- GDP granger-cause International Tourism and vice versa
- GDP granger-cause secondary school and vice versa
- GDP granger-cause INS and vice versa
- NFI granger cause INS and vice versa

Table 8: Hypotheses tested

cases	Casual flows	Restriction
1	GDP⇒FI; GDP⇒FI	$\alpha_{12ik} \neq 0$ $\tau_{1i} \neq 0$ $\alpha_{22ik} \neq 0$
2	GDP⇒NFI; NFI⇒GDP	$\tau_{2i} \neq 0$
3	NFI⇒FI; FI⇒NFI	$\alpha_{13ik} \neq 0$ $\tau_{1i} \neq 0$ $\alpha_{22ik} \neq 0$
		$\tau_{2i} \neq 0$
		$\alpha_{23ik} \neq 0$ $\tau_{1i} \neq 0$ $\alpha_{32ik} \neq 0$
		$\tau_{3i} \neq 0$

Table presents the restriction for both long and short-run for causality relationships among variables.

Table summarizes short- and long-term causality between variables in Model 1. The test was conducted under the level of significance 1%, 5%, and 10%. According to Table , GDP is the dependent indicator in Model 1, and the lagged error-correction terms are statistically significant. Under these circumstances, GDP tends to converge to its long-run equilibrium in response to GDP regressors. Based on the result in the table, it can be concluded that all variables, both INS (Financial variable) and non-financial variables are significant for economic growth. The GDP has a negative sign in the estimated lagged ETC, which resulted in the effecting of a shock in all independent variables on GDP will be adjusted in the long run, and the rate of return to equilibrium is 241Also, INS and international tourism have a long-run causality for independent variables. In other words, economic growth, secondary school, unemployment, international tourism, and INS have a granger cause in the long run. Also, GDP and non-financial indicators have a granger-cause on INS.

Table 9: Granger- Causality test for model 1

Dependent Indicators	Independent Indicators						Long-run causality (ECT_{-1})
	GDP	Unemployment	International Tourism	Interest Rate	Secondary School	INS	
GDP	-	12.7420 (6.5115)·	-5.0106 (4.0432)	-4.9578 (3.7280)	-0.2974 (14.3987)	0.0711 (0.0480)	-2.4138 (1.040)*
Unemployment	0.0014 (0.0079)	-	0.0026 (0.1179)	-0.0525 (0.1088)	-0.1058 (0.4200)	-0.0002 (0.0014)	-0.0091 (0.0304)
International Tourism	-0.0235 (0.0087)**	0.0876 (0.2095)	-	0.1830 (0.1199)	1.0613 (0.4632)*	0.0007 (0.0015)	-0.1199 (0.0335)***
Interest Rate	0.0038 (0.0121)	0.0381 (0.2924)	-0.1240 (0.1816)	-	0.5133 (0.6466)	-0.0032 (0.0022)	-0.0704 (0.0467)
Secondary School	-0.0010 (0.0040)	0.0304 (0.0972)	-0.0093 (0.0604)	-0.0495 (0.0557)	-	0.000065 (0.0007)	-0.0129 (0.0155)
INS	-2.9589 (1.1164)*	61.0378 (26.9849)*	-23.9203 (16.7557)	-15.4675 (15.4496)	85.0545 (59.6708)	-	-16.3838 (4.312)***

On the other hand, short and long-run causality tests and the direction of variables are summarized in Table . As can be seen, the dependent variable GDP has a unidirectional causality relationship with INS and International Tourism. Also, Unemployment and INS, both independent variables, have a unidirectional causality with each other. Thus, if the primary policy for policymakers is a growing economy, they should focus on insurance asset size as there is a close linkage between GDP and INS in developing countries. Pradhan, Arvin, and Norman (2015) show that insurance is one of the essential factors for economic growth for OECD countries. However, they showed a bidirectional causality between insurance and economic growth compared to this paper, which shows a unidirectional causality between those two indicators.

Table 10: Summary of the direction of short and long-run causality

Causal Relationship	GDP vs NFI	GDP vs FI	FI vs NFI
Model 1	GDP ≠ Unemployment	GDP ⇒ INS	Unemployment ⇒INS
	GDP ⇒ International Tourism		INS ≠ Interest Rate
	GDP ≠ Interest Rate		INS ≠ Secondary School
	GDP ≠ Secondary School		INS ≠ International Tourism

4.4 Granger cause for model 2 and 3

نهمین کنفرانس بین‌المللی
مطالعات مدیریت، اقتصاد
و حسابداری صنعت محور

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As described earlier, for dynamic linkage between dependent and independent variables in model 2 and model 3 panel vector autoregressive (VAR) approach is used because there is no cointegration among variables. This model allows variables to use past values of each other.

Table summarizes the causality relationship between economic growth and independent variables. GDP has a causality relationship with International Tourism Secondary School with the 10% and 5 % of significance, respectively. In comparison, the interest rate has a granger-cause with GDP under the significance level of 10 %. Moreover, GDP has causation with LLY and FCE for the financial variables. All of the mentioned variables have unidirectional causation, and there is no bidirectional causation among indicators.

Table 11: Granger-Causality test for model 2 and model 3

| Model	Variables	Null hypothesis (first variable does not granger cause second variable)	P-value
Model 2	GDP vs Unemployment	GDP vs Unemployment	0.1102
		Unemployment vs GDP	0.4644
	GDP vs International tourism	GDP vs International tourism	0.0648
		International tourism vs GDP	0.5602
	GDP vs Interest Rate	GDP vs Interest Rate	0.1778
		Interest Rate vs GDP	0.0732
	GDP vs Secondary School	GDP vs secondary school	0.0135
		Secondary school vs GDP	0.9832
	GDP vs LLY	GDP vs LLY	0.0000
		LLY vs GDP	0.3059
Model	**Variables**	**Null hypothesis (first variable does not granger cause second variable)**	**P-value**
Model 3	GDP vs Unemployment	GDP vs Unemployment	0.1102
		Unemployment vs GDP	0.4644
	GDP vs International Tourism	GDP vs International Tourism	0.0648
		International Tourism vs GDP	0.5602
	GDP vs Interest Rate	GDP vs Interest Rate	0.1778
		Interest Rate vs GDP	0.0732
	GDP vs Secondary School	GDP vs Secondary School	0.0135
		Secondary School vs GDP	0.9832
	GDP vs FCE	GDP vs FCE	0.0000
		FCE vs GDP	0.3059

4.5 Impulse response function

In this part of the empirical result, the impulse response is utilized to visualize the dynamic relationship between economic growth, financial and non-financial variables. Variables that come later have a lagged effect of one period on indicators that will come ahead, while variables that come first will impact indicators that come contemporaneously.
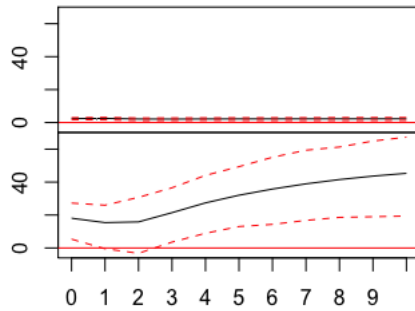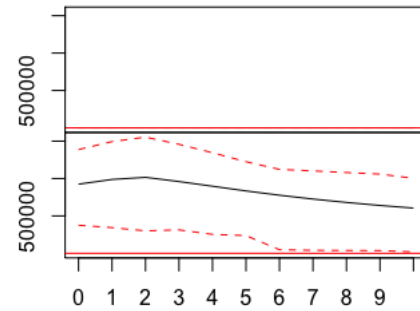
4.6 Impulse response for model 1
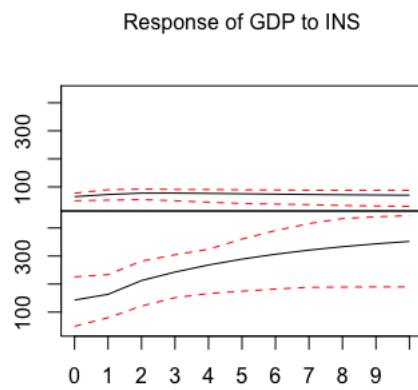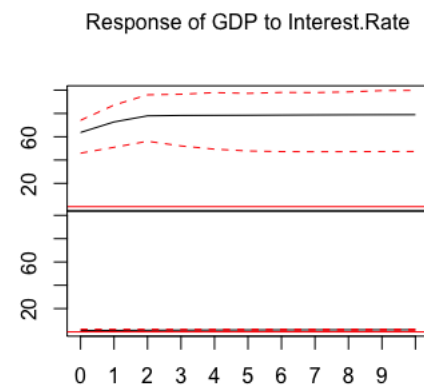
Response of GDP to INS

Response of GDP to Interest.Rate

5 % Bootstrap CI, 100 runs

5 % Bootstrap CI, 100 runs

Response of GDP to International.Tourism..reciep

Response of GDP to secondary.school
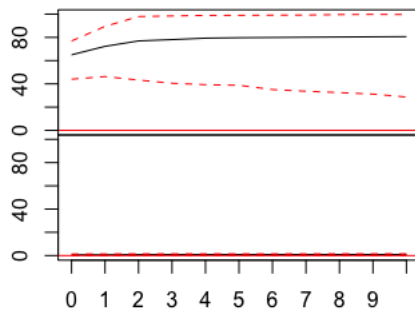
5 % Bootstrap CI, 100 runs

5 % Bootstrap CI, 100 runs

Response of GDP to Unemployment

5 % Bootstrap CI, 100 runs

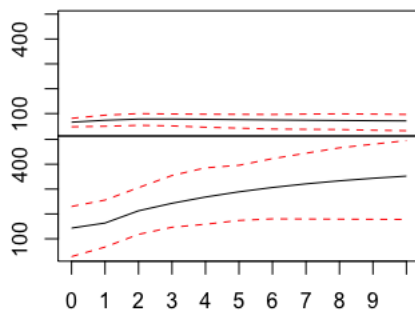*Figure 4: Response of GDP to a shock of Independent variables in model 1*

Figure 4 and Figure 5 indicate the responses of GDP to a shock of other variables and the response of the other variables to a shock of GDP, respectively, in Model 1. It is worth mentioning that the response of all variables to a shock stabilized in 10 years. INS and International Tourism play a critical role in a shock of GDP in the given period and vice versa. However, the responses of the Secondary Schools to a shock of GDP are insignificant as same as the responses of GDP to a shock of Secondary school. Also, GDP responds to a shock of Unemployment and Interest rate, while it is not as significant as a shock to INS and International Tourism. The dashed lines represent the confidence interval (95%), and if the line falls between the dashed lines, the null hypothesis, which means no impact of
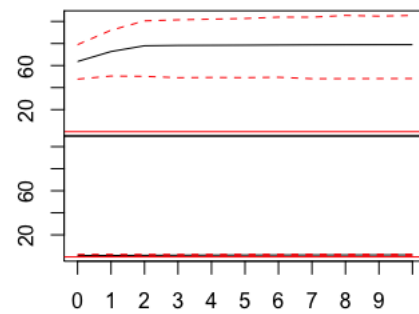
a particular shock, could not be rejected. Moreover, the responses of all indicators are very similar, regardless of which variables are used.
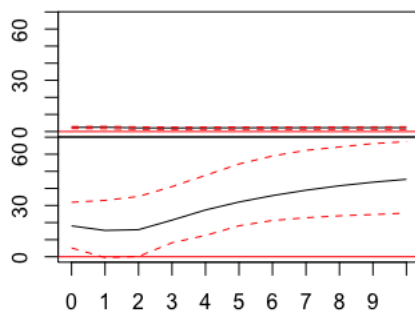

Response of INS to GDP

5 % Bootstrap CI, 100 runs
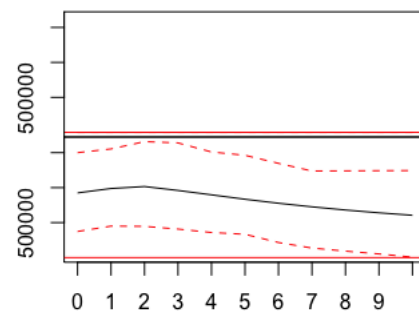

Response of Interest.Rate to GDP

5 % Bootstrap CI, 100 runs

Response of International.Tourism..reciept to GD
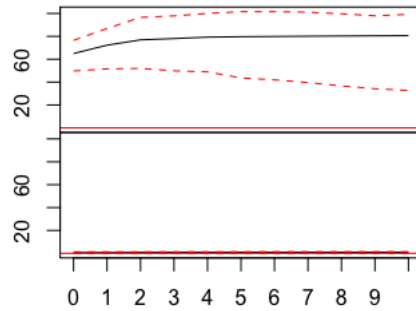
5 % Bootstrap CI, 100 runs

Response of secondary.school to GDP
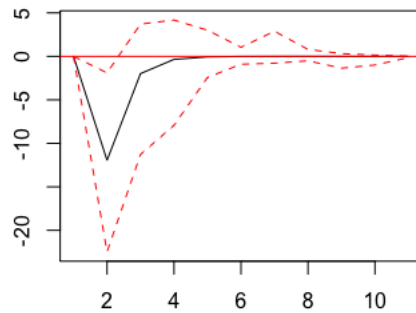
5 % Bootstrap CI, 100 runs

Response of Unemployment to GDP
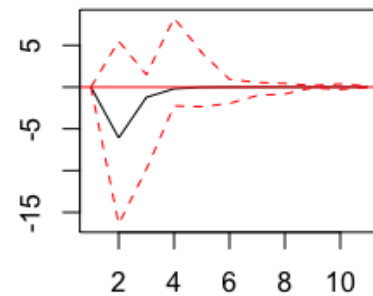

5 % Bootstrap CI, 100 runs

Figure 5: Response of Independent Variables to a shock of GDP in model 1

4.7 Impulse response for model 2 and 3

Response of GDP to Interest Rate

95 % Bootstrap CI, 100 runs

Response of GDP to International Tour

95 % Bootstrap CI, 100 runs

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Response of GDP to Secondary School

95 % Bootstrap CI, 100 runs

Response of GDP to Unemployment

95 % Bootstrap CI, 100 runs

Response of GDP to LLY

95 % Bootstrap CI, 100 runs

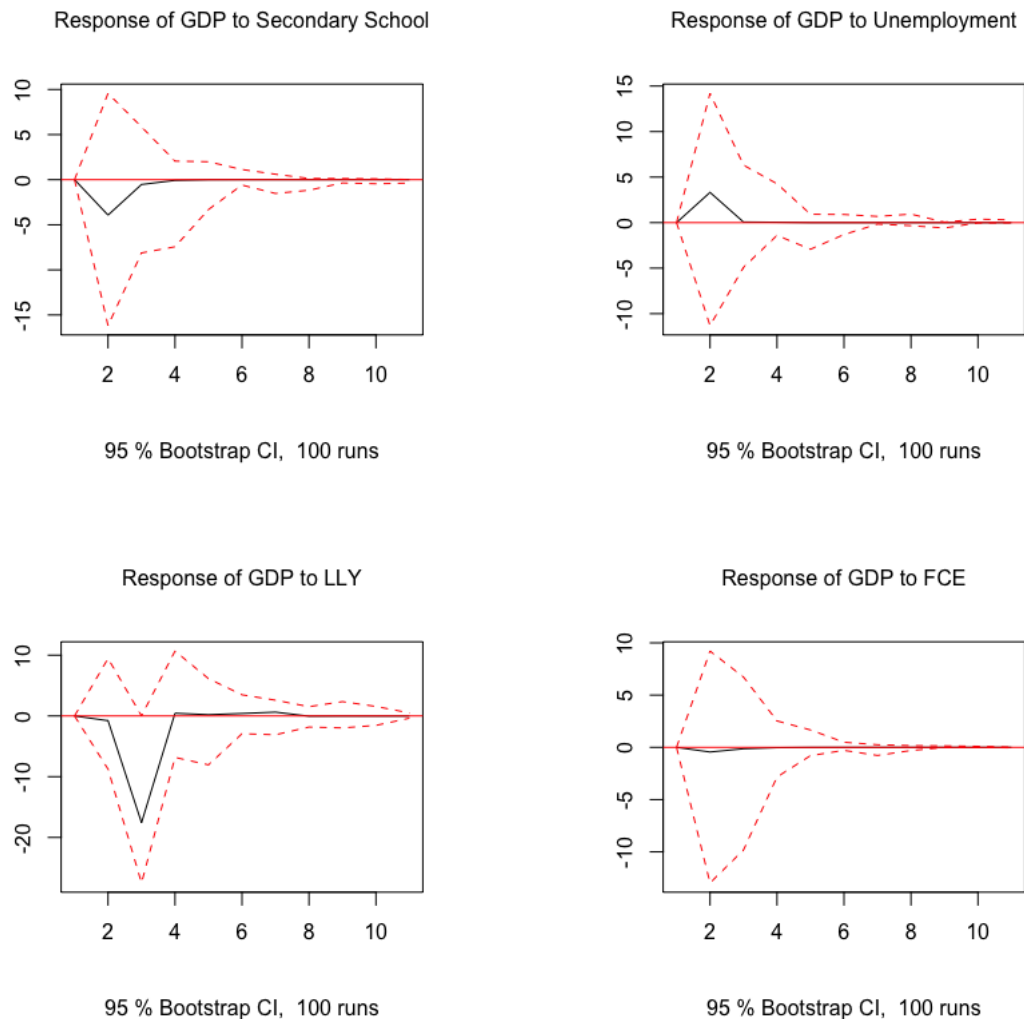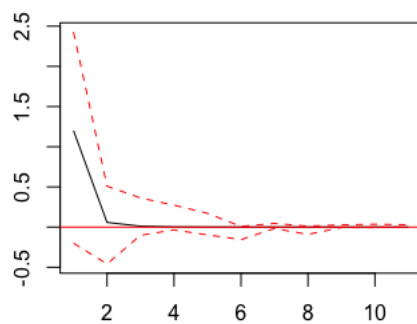Response of GDP to FCE

95 % Bootstrap CI, 100 runs

Figure 6: Response of GDP to a shock of Independent variables in model 2 and model 3

Figure 6 represents the responses of GDP to a shock of other variables in models 2 and 3. Figure 6 shows that GDP has negatively responded to a shock of all variables except FCE and Unemployment for the first two years. After that, GDP responds positively to a shock of all indicators except FCE and Unemployment. Moreover, a shock to FCE is statistically insignificant to GDP. At the same time, GDP positively responds to the shock of Unemployment for the first two years. After that, Unemployment has a negative impact on GDP. Also, Figure 7 indicates the responses of independent variables to a shock of GDP. As seen in Figure 7, all variables negatively respond to a shock of GDP.
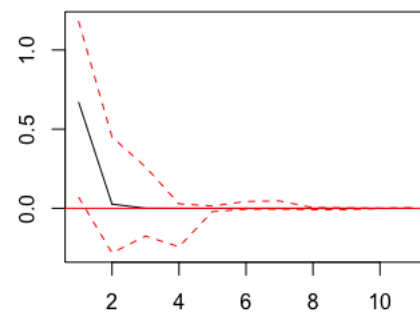
Nevertheless, the response of LLY and FCE became insignificant after two years and again negatively responded to a shock of GDP, and also, the LLY and FCE fell considerably compared to other variables.

Response of Interest Rate to GDP

Response of International Tourism, Reciept to GD

95 % Bootstrap CI, 100 runs
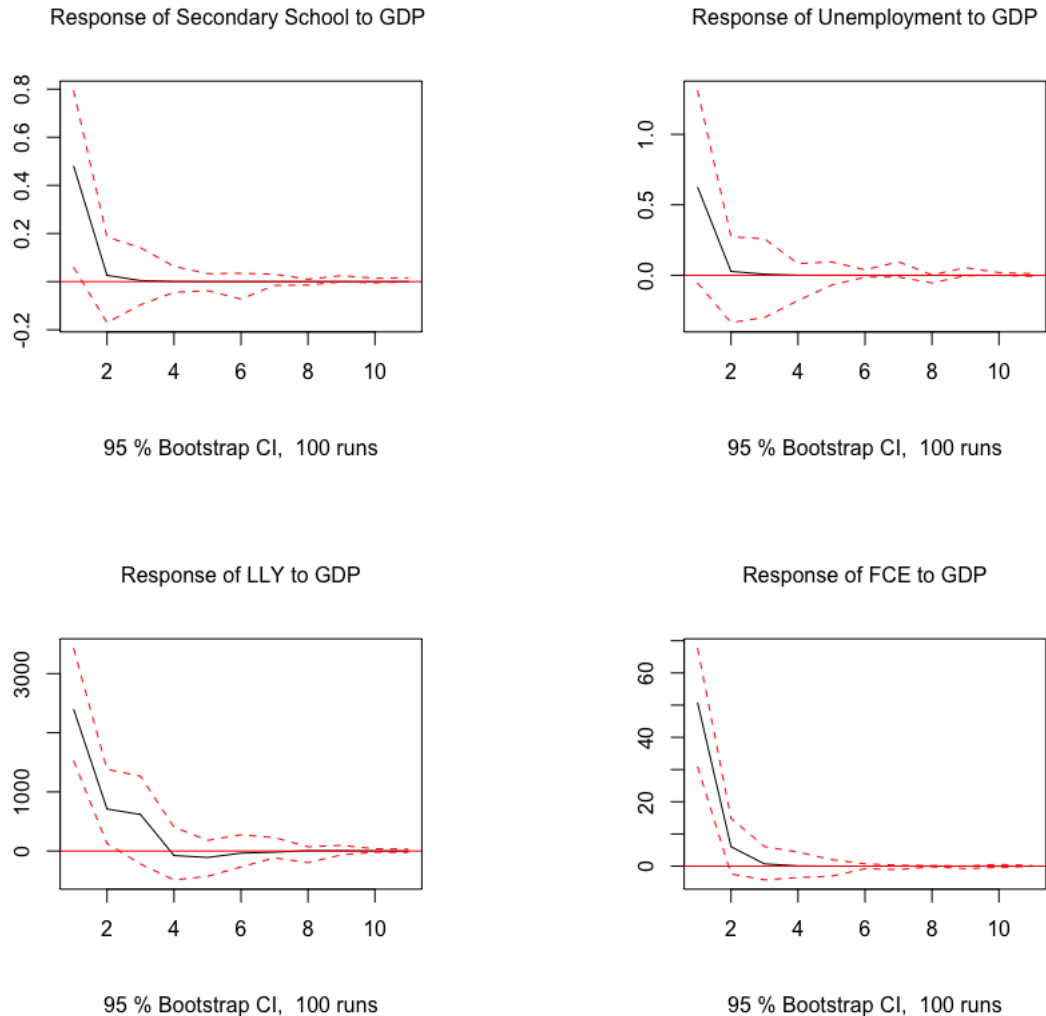
95 % Bootstrap CI, 100 runs

Figure 7: Response of Independent variables to a shock of GDP in model 2 and model 3

4.8 Discussion

The findings reveal that financial indicators are crucial for enhancing the economy in Middle east countries. In this study, insurance asset size has a long-term relationship with economic growth and is a causative factor for GDP. These findings are consistent with (Pradhan, Arvin, et al., 2017), (Liu, Lee, & Lee, 2016), and (Pan & Su, 2012). These studies consider different regions. Thus, regardless of the study's location, insurance variables are important factors in economic growth. Also, the impulse response function shows that a shock to insurance asset size changes the response to economic growth. This scenario is the same for liquid liabilities of the financial system, which are one of

the banking variables. Also, this study reveals that, besides financial variables, non-financial variables are important, and policymakers should focus on them. In this study, similar to (Kreishan, 2011), unemployment is not a causative factor. However, some studies, such as (Makaringe & Khobai, 2018) and (Akeju & Olanipekun, 2014), show that unemployment is an important factor in economic growth. Thus the policymakers should apply policies based on their region and data. As mentioned above, most studies are concerned with financial variables, while the effect of non-financial variables, such as tourism and secondary school, could not be denied. The results reveal that secondary school and international tourism causally affect economic growth. Holik (2016) and Schubert, Brida, and Risso (2011) find the same result. Overall, in this paper, the mixtures of financial and non-financial variables are used with different methods in Asian and African countries, which is the novelty of this paper.

Moreover, this paper could help authors for future research by finding the effect of other non-financial variables, using more specific indicators for both financial and non-financial variables, and checking the impact of these variables on economic growth specifically. Also, it is important to find out why some variables are important in some countries and not in others.

Policymakers could benefit from this study by enhancing the insurance asset size and LLY. Also, they should consider the tourism industry and education. By applying this kind of policy, the economy will grow in these countries.

5 Conclusion

This paper investigates the dynamic relationship between financial and non-financial variables and economic growth. Based on the data, both VCEM and VAR approaches are used for the models as there are correlations between the financial variables. Using data from 8 countries over 15 years, from 2005 to 2019, indicates that insurance asset size and economic growth have cointegration and long-term relationships. Using the Granger-cause test, it is found that INS and international tourism have long and short-run causative factors on economic growth concerning other variables. Moreover, the result reveals that GDP has a granger-cause with FCE and LLY (other financial variables used in models 2 and 3). Also, there is a causality between secondary school, international tourism, and economic growth. Also, a shock to LLY, secondary school, unemployment, and interest rates changes the response to economic growth. Hence, a shock to all financial variables changes the response to economic growth.

This study shows that using financial variables simultaneously to find the impact on economic growth may conclude a biased result, unreliable, and misguided policymakers for boosting the economy. However, using one of them at a time significantly affects economic growth.

This study have two major limitations. First of all, in this paper, it could not possible to find the relationship between all financial variables on economic growth as the data are correlated. So, in order to address the problem of multicollinearity, three models should be used with different independent variables. In addition to this, the data is not available for the most recent years 2020, 2021, and 2022.

Our study could help policymakers enhance the economy by considering the financial system's insurance asset size and liquid liabilities. Also, based on our study, focusing on educated people, the tourism industry, and reducing the interest rate could promote economic growth in low and mid-level Asian and African countries. Most policymakers focus on financial development to enhance their economy. However, this study reveals that, besides financial variables, they should consider some factors such as tourism, interest rate, and secondary school, as changing these variables change the response of economic growth.

Lastly, it is highly recommended that future paper use other financial data that are not correlated in order to find the effect of financial indicators on economic when using together, not separately. Also, it is worth to mention another suggestion for authors to use this methodology and data for developed countries and compare with this study that use less developed countries and find the differences.

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