Journal of Applied Science and Agriculture, 9(18) December 2014, Pages: 1-9

AENSI Journals

Journal of Applied Science and Agriculture

ISSN 1816-9112

Journal home page: www.aensiweb.com/JASA

Ex-post Forecast of Banks, Insurance, Stock Market and Economic Growth

[1]Wong Hong Chau, [2]Aye Aye Khin and [3]Chong Shyue Chuan

[1&3]Faculty of Accountancy and Management, Universiti Tunku Abdul Rahman (UTAR), Lot PT 21144, Jalan Sg. Long, Bandar Sg. Long, 43000 Kajang, Selangor, Malaysia.
[2]Faculty of Business Management and Profession al Studies (FBMP), Management and Science University, Section 13, 40100, Shah Alam, Selangor, Malaysia.

ARTICLE INFO

Article history:
Received 10 September 2014
Received in revised form
23 October 2014
Accepted 15 November 2014
Available online 23 November 2014

Keywords:
Gross Domestic Product (GDP), Bank, Insurance, Stock Market, VECM, ARIMA.

ABSTRACT

Background: This paper investigates the short and long term relationship of banking, insurance, stock market and Gross Domestic Product. The study applied the Vector Error Correction Model (VECM) and ARIMA Model to examine the short and long term relationship between bank, insurance and stock market indicators with GDP from 2002Q1 to 2013Q2, and compare the forecasting power of these models. The results showed that the variables is co-integrated and not stationary at level term, but stationary at first different. Moreover, the past GDP is the most important variables influence current year GDP in short term, and stock market and bank indicators indicate long term influence on GDP at different significant level. The ARIMA Model appears to possess the best forecasting ability compare to VECM as indicated in Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE) and Theil Inequality Coefficient (U-STAT).

© 2014 AENSI Publisher All rights reserved.

To Cite This Article: Wong, H. C., A.A. Khin, and S.C., Chong. Ex-post Forecast of Banks, Insurance, Stock Market and Economic Growth. ***J. Appl. Sci. & Agric.,*** *9(18): 1-9, 2014*

INTRODUCTION

It is well acknowledged in the academic literature that well-developed financial system enhanced the efficiency of capital mobilization and allocation via effective risk assessments, enhances transparency and accountability, and created an effective external oversight mechanism. Most empirical studies in the nexus of finance and growth show that well developed financial system facilitate the level and pace of economic development. King and Levine (1993), Odedokun (1996), Levine (1997), Nuesser and Kugler (1999), Luintel and Khan (1999), Beck, *et.al. (*2000), Fase and Abma (2003), Rioja and Valex (2004) and Feyen, *et. al.* (2011) employed different methodological techniques against cross sectional or time series data show that banking, insurance and capital market form an integral part of financial system, and exerted profound and long term impact toward various phase of economic development.

The positive effects of financial development on economic growth hinges on its functionality. Specially, financial systems playing important roles in: (1) facilitate the trading, hedging, diversifying, and pooling of risks (2) allocate resources to productive investment (3) monitoring managers and exert corporate control and governance (4) mobilize saving to investment, and (5) facilitating the exchange of goods and services. Indeed, most empirical studies supported that increased availability of financial institutions offered diverse financial instruments greatly reduces transaction and information costs in economy which in turn influences savings rate, investment decisions and undertaking of technological innovations.

Malaysia financial system has played an important supportive role in facilitating various phases of economic development since independent. From initial agriculture based economy to industrialization, and recent knowledge based economy. The strategic role of Malaysia financial sector tends to increase in tandem with Malaysia becomes more integrated with international financial system and global economy. Indeed, the rapid changes in the global economic and financial environment not only influences the domestic financial landscape, but pressurized the Malaysia financial system to be more adaptive and proactive toward improve operation efficiency and innovative product offering in order to cater for more sophisticated and diverse investment and financing needs of the domestic economy. The importance roles of financial sector in propelling economic growth reflected in tremendous growth achieved in private credit, stock market and insurance sector over the last decade. Since 2003, the private credit, insurance premium and stock market turnover had grown

Corresponding Author: Wong Hong Chau, Faculty of Accountancy and Management, Universiti Tunku Abdul Rahman (UTAR), Sg. Long, Bandar Sg. Long, 43000, Kajang, Selangor, Malaysia.
Tel: (603)90194722 Fax: (603)90197062; E-mail: wonghc@utar.edu.my

133%, 105% and 39% respectively (Table 1). This represented approximately 120%, 4% and 40% of Gross Domestic Product (GDP) in 2012 (Figure 1).

Table 1: Private Credit, Insurance Premium and Stock Market Turnover from 2003 to 2012

Year	Private Credit (RM, billion)	Insurance Premium (RM, billion)	Stock Market Turnover (RM, billion)
2003	475.65	18.43	18.44
2004	617.64	19.81	17.09
2005	560.11	21.69	10.93
2006	595.94	22.97	30.75
2007	595.10	24.59	28.26
2008	651.88	26.34	10.20
2009	728.00	28.88	17.04
2010	883.29	31.88	35.72
2011	1003.50	34.73	25.81
2012	1107.98	37.76	25.60

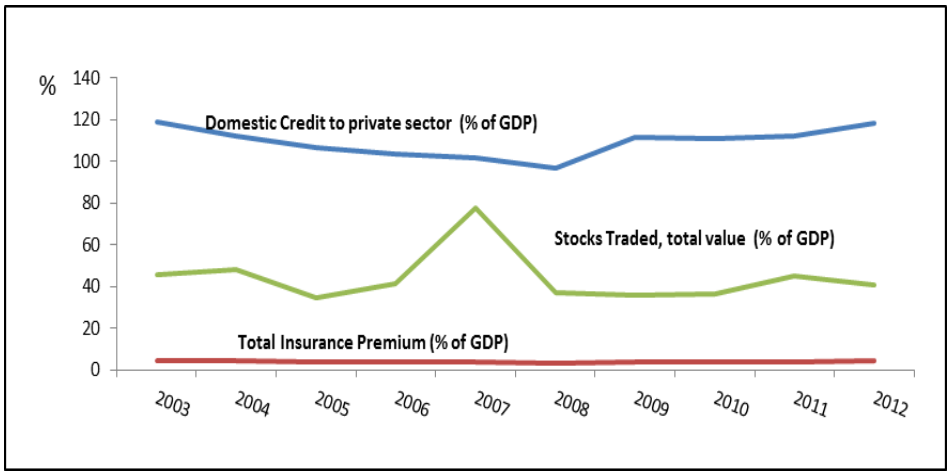


Fig. 1: Domestic Credit, Insurance, and Stock Market Traded Value as Percentage of GDP from 2003 to 2012.

In line with the importance of financial sectors to propel economic development, Malaysia Central Bank (BNM) had initiated Financial Masterplan (2000) and Financial Sector Blueprint (2010) to transform financial system become more progressive and dynamic to advance the nation's vision towards the attainment of a high value-added and high-income economy. Both initiatives are a strategic plan that charts the future direction of the financial sectors development aimed to support the economic transitions towards high value-added and high income country. The results were encouraging as reflected in substantial increase in total banking, insurance assets and market capitalization (Figure 2).

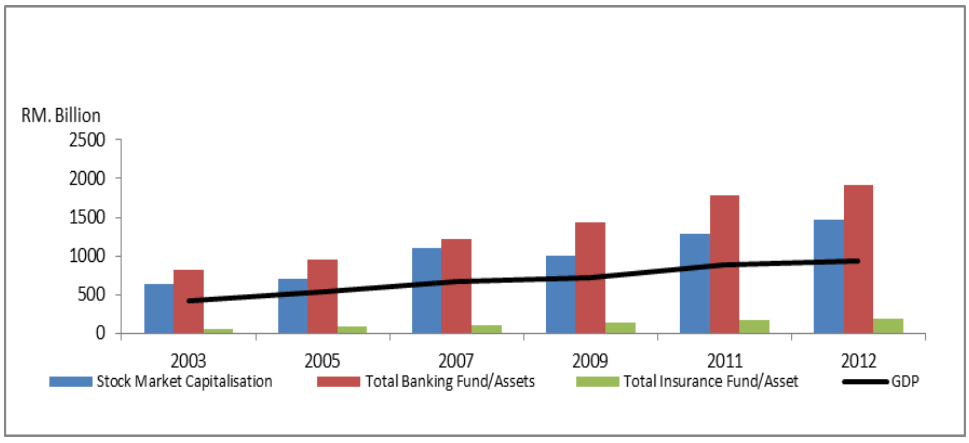


Fig. 2: Total Banking, Insurance Funds, Stock Market Capitalization and GDP From 2003 to 2012

Review of research:

In the early days, Schumpeter (1912) had highlighted the importance of finance in promoting entrepreneurship and economic growth. Several models were built to incorporate the roles of financial development in economic growth. This includes the growth model by Solow (1956) which shows that the development of financial sector can encourage saving and lead to a higher output per worker. More recently, the endogenous growth models by Greenwood and Jovanovic (1990), Bencivenga and Smith (1992) and King and Levine (1993) suggested that both the growth level and rate can be affected by financial development. Moreover, financial development promotes economic growth through effectively channel more savings to investment, increase marginal productivity of capital and encourage saving (Pagano, 1993). However, some researchers argued that financial sector were "demand following", as economic progress there will be increasing needs for sophisticated financial services and ultimately lead to the development of financial sector (Robinson, 1952). Nevertheless, Kugler and Ofoghi (2005), Adam (2009), Han *et al* (2010), Ching *et al* (2010) and Wong and Khin (2013) found bi-directional causality between insurance sector growth and economic development.

Evidence from time series individual countries studies, such as by Jung (1986), Murinde and eng (1994), and Ahmed and Ansari (1998) provide evidence of finance causes growth in developing countries. Similarly, Rousseau and Wachtel (1998) also shown finance causes growth in developed countries. The empirical work involving 16 countries provided by Demetriades and Hussein (1996) showed considerable evidence of bi-directional causality and some evidence of growth causes finance. Nonetheless, there are also economists such as Lucas (1998) who believed that finance is not important at all. All these theories are feasible and hence this issue can only be resolved empirically.

Historically, economists have focused on banks. Bagehot (1873) and Schumpeter (1912) emphasize the critical importance of the banking system in economic growth and highlight circumstances when banks can actively spur innovation and future growth by identifying and funding productive investment. Empirically, King and Levine (1993) showed that the level of financial intermediation was a good predictor of long-run rates of economic growth, capital accumulation, and productivity improvements.

Besides the historical focus on banking, the emergence of Non-bank financial intermediaries (henceforth NBFIs) as one of the important sub-sectors in the financial system development and hence their relationship with economic activity is largely ignored. Indeed, the association between the development of NBFIs and economic growth has not been examined adequately. Until recently, there is an expanding theoretical literature on the links between insurance and stock markets in long-run economic growth. The studies conducted by Catalan (2000), Ward and Zurbruegg (2000), and Boon (2005) showed that insurance sector had a positive influence on short term and long term economic growth. As for stock market analysis, Levine (1998) and Levine and Zervos (1998) indicated stock market positively predicts growth. But Harris (1997) found no evidence of stock market explains growth in per capita output.

The conflicting results highlight the danger of using aggregated data and inappropriate financial indicators in performing causality test between finance and growth. Most of the studies use highly aggregated data, such as M3 or domestic credit which did not distinguish between bank loans, insurance funds and stock market funds. Therefore, the data do not exhibit the pathways which finance affects growth. This was an omission in the existing work and it presents a gap worth covering.

The Model and Empirical Results:

Single Equation Model of Financial Sector and GDP: A short-term model of the GDP equation as a function of related factors (in logs) with banking fund, insurance funds and stock market as follow:

$$GDP_t=\alpha+ \beta_1 BANK_{t-i}+\beta_2 INS_{t-i}+\beta_3 STOCK_{t-i}+\varepsilon_t \quad (1)$$

where

GDP_t	:	Gross Domestic Product of Malaysia (GDP) in period t (RM, billion)
$BANK_t$	:	Total Bank Assets on period t (RM, billion)
INS_t	:	Total Insurance Assets on period t (RM, billion).
$STOCK_t$	:	Stock Market Capitalization on period t (RM, Billion).
α	:	Intercept of regression
$\beta_1, \beta_2, \beta_3$	:	Coefficient of Bank, Insurance and Stock respectively
ε	:	Error term.
t	:	Quarterly data (2002Q1 - 2013Q2)

Methodology:

The models were similar to the models adopted by Rousseau and Wachtel (1998) and Arestis and Demetriades (1997). The study was conducted in 2013 using GDP (RM, thousand million) secondary data from 2003Q1 to 2013Q2 as estimation period in Malaysia. The observations were about 42 used as an ex-post forecast for GDP estimation. The model was estimated using univariate model of Autoregressive-Integrated-Moving Average (ARIMA) model (Box-Jenkins model) (Box and Reinsel, 1994) and comparative estimation

model of single equation econometric model using Vector Error Correction Method (VECM) with co-integration for residual error correction (Gilbert, 1986 and Hendry and Ericsson, 2001), were made in terms of their estimation accuracy based on Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Root Mean Percent Error (RMPE) and (U-Theil) criteria. The models were tested with Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH LM) test (Engle, 1982) of residual tests of the data.

Model Estimation:

Vector Error Correction Method (VECM) is a statistical method developed to apply in non-stationary data that existed co-integration relationship (Gilbert, 1986 and Hendry and Ericsson, 2001). It is restricted vector auto-regression (VAR) that incorporated co-integration so that restricted long term behavior of endogenous variables converge allowing for short term adjustment. The co-integration term is known as error correction term since the deviation from long run equilibrium is corrected gradually through a series of partial short run adjustment. Thus, the VECM equations models of GDP_t are as follow:

$$\Delta GDP_t = \alpha_{10}+\beta_{11}\Delta BANK_{t-1}+\beta_{12}\Delta INS_{t-1}+ \beta_{13}\Delta STOCK_{t-1}+ ß_{14}\,\Delta GDP_{t-1} + \varepsilon_t \quad (2)$$

with, Co-integration Equation:

$$\Delta GDP_{t-1} = \beta_{51}\,\Delta BANK_{t-1} + \beta_{52}\,\Delta INS_{t-1} + \beta_{53}\,\Delta STOCK_{t-1}+ ß_{54}\,\Delta GDP_{t-1} \quad (3)$$

ARIMA Model (Univariate Model)(Box-Jenkins Model):

The autoregressive-integrated-moving average (ARIMA) model is discussed in detail in Hoff (1983), O'Donovan (1983), Cheung and Ng (1996) and Wilson and Keating (2009). This technique applies a univariate approach, which is built on the premise that knowledge of past values of a time series is sufficient to make forecasts of the variable in question. There are two types of basic Box-Jenkins models: autoregressive (AR) models and moving-average (MA) models. ARMA model is the combination between autoregressive and moving average. In terms of the original series such models are called integrated models and the AR and MA models may also be combined to form by Auto Regressive, Integrated, Moving-Average (ARIMA) models.

Model Specification:

The short term Gross Domestic Product (GDP) estimation models based on the Box-Jeckins procedure, univariate time-series model of the autoregressive-integrated moving average ARIMA (p,d,q) (Wilson and Keating, 2009 and Karia and Bujang, 2011) can be specified follows:

Autoregressive Model (AR):

Autoregressive models (AR) are appropriate for stationary time series data. The equation for autoregressive is almost similar to moving average equation, except autoregressive estimates the dependent variable which depends on the historical data rather than the irregular residuals. However, AR is produced from a white noise series by using an equation (4) below:

$$Y = Ø_0 + Ø_1Y_{t-1} + Ø_2Y_{t-1} + Ø_2Y_{t-2} + \ldots + Ø_pY_{t-p} + Ɛ \quad (4)$$

where,

Y_t	=	the response variable at time t Yt-p = the response variable at time lags, these Y play important role in independent variable
$Ø_p$	=	coefficient autoregressive to be estimated
$Ɛ_t$	=	error term, which represent the effects of the variable not explained by the model

Moving Average Model (MA):

Equation (5) shows a moving average (MA) model predicting Y_t (dependent variable) by using the historical data on the forecast errors in predicting Y_t.

$$Y_t = \varepsilon_t - \omega_1\varepsilon_{t-1} - \omega_2\varepsilon_{t-2} - \ldots\ldots\ldots - \omega_q\varepsilon_{t-q} \quad (5)$$

where,

Y_t	=	the response variable at time t
Y_{t-p}	=	the response variable at time lags, t these Y play important role in independent variable.
ε	=	error term, which represent the effects of the variable not explained by the model
ω_q	=	the coefficient of moving average to be estimated.

Autoregressive Moving Average Model (ARMA):

ARMA model is the combination between autoregressive and moving average. It is suitable to use the notation of ARMA (p,q). Term p is the order of the autoregressive part AR(1)(Φ1) and where q is the order of the moving average part MA(1)(θ1). In modelling for linear and stationary time series data, researchers regularly employ the ARMA models due to its superiority, easy implementation, and robustness. General form of the ARMA model can be shown below in Equation (6).

$$Y_t = \varnothing_0 + \varnothing_1 Y_{t-1} + \varnothing_2 Y_{t-2} + \ldots\ldots\ldots + \varnothing_p Y_{t-p} + \varepsilon_t - \omega_1 \varepsilon_{t-1} - \omega_2 \varepsilon_{t-2} - \ldots\ldots\ldots - \omega_q \varepsilon_{t-q} \quad (6)$$

where,

Y_t	=	the response variable at time t
Y_{t-p}	=	the response variable at time lags, these Y play important role in independent variable
$\varnothing_p$	=	coefficient autoregressive to be estimated
ε_t	=	error term, which represent the effects of the variable not explained by the model
ω_q	=	the coefficient of moving average to be estimated.

Model (ARIMA):

A great number of ARIMA model is developed. The general model is known as ARIMA (p, d, q). The difference between ARMA and ARIMA is they are integrated. This is because most of the time series data are non-stationary. Where the assumption of the ARIMA approach is that, the time series data need to be stationary. Therefore, the time series data needs to be differentiated with the autoregressive or moving average approach. Generally, the property of ARIMA is similar to ARMA. Therefore, the equation of ARIMA is exactly like equation (3). The difference between ARIMA and ARMA is only "integrated or differencing". This means, the time series data need to be polish into first difference or second difference before proceeding to another step (Hanke and Wichern, 2009).

GDP_t is related to both past series values and past random errors and it was the stationary series. The ARIMA model of order ARIMA (1,1,1) was found to be the most appropriate model and generate the best forecast with minimum error. The numbers inside the parentheses of ARIMA (1,1,1) model of order (p,d,q) refer to the order of the autoregressive process (p) i.e. AR(1)(Φ1), the degree of differencing required to induce stationary (d), and the order of the moving average process (q) i.e. MA(1)(θ1), respectively. It meant that to find out what the autocorrelation and partial autocorrelation pattern was for the series the GDP_t, we needed to determine the relationship between GDP_t and GDP_{t-1} for all t (see in the Equation 4). Thus, GDP_t was autocorrelated for lag 1; i.e., the autocorrelation pattern for lag 1 was nonzero. Otherwise, the autocorrelation pattern for any lag greater than 1 was zero in the correlogram test.

$$GDP_t = C + AR(1)(\Phi 1)GDP_{t-1} + \ldots\ldots + \Phi pGDP_{t-p} + \varepsilon_t - MA(1)(\theta 1)\,\varepsilon_{t-1} - \ldots\, \theta_q\, \varepsilon_{t-q} \quad (7)$$

where,

GDP_t	=	RM thousand million and C = intercept terms and εt = the disturbance terms.
AR(1)(Φ1)	=	AR parameter of order 1(The Φ1 GDP_{t-1} represented the fit to the series value Real GDP_t)
MA(1)(θ1)	=	MA parameter of order 1(The term $\theta 1 \varepsilon_{t-1}$ and ε_t represented the assumed random error in the data at period t-1 and period t)

As mentioned, when discussing the specification of VECM model as spelled out in the previous section. It is only a univariate approach which is built on the premise that knowledge of past values is sufficient to make forecasts of the variables in question. Here, it is needed to justify of VECM model specification and perhaps also some comparisons with other model specification which is for the forecasting and estimation performance of the estimated model is satisfactory and to diagnose the variation in the errors in a set of forecasts. Moreover, the GDP is changing from time to time and very volatile. Therefore, the standard econometric issues related to the identification in ARIMA model which is clearer to explain in an attempt to improve further what are the significant different between of the models by observing based solely on the modelling of the variance of the estimation errors. It means that whether the independent variable is correlated with the error term in the model and to improve communication and presentation of the paper.

Model Identification:

Unit Root Test (Data Stationary Test) needed to develop the time series into a stationary one by using the unit root test. Pindyck and Rubinfeld (1998), Clements and Hendry (2001), Gujarati (2003) and Enders (2004) explained that most of time series variables are non-stationary, with mean and variance non constant (unit root). If the data contained unit root, the data are called non stationary, which lead to spurious regression result. Therefore, the unit roots test checks for stationarity of the data series. The GDP and related variables for unit root has been tested for stationary, using Augmented Dickey Fuller (ADF) and Phillips-Peron's tests (PP) in Table 1. The results of the unit root test, the GDP at the level data (original data form) is not stationary for unit

root and the variable is significant stationary at the first difference form at the 0.01 level using Augmented Dickey Fuller (ADF) and Phillips-Peron's tests (PP) for unit root.

Model Estimation:

ARCH-LM Test: The ARIMA model with the residual correction method with ARCH (LM) (Autoregressive Conditional Heteroskedasticity Lagrange Multiplier) test (Engle, 1982) will also be developed to estimate the GDP (RM thousand million) in Malaysia. Ho is said that the error term has a constant variance (no heteroskedasticity), and HA is said that the error term has not a constant variance (heteroskedasticity), respectively. Therefore, the probabilities values must be greater than at α 0.05 level for statistically significant in residual estimation error of the GDP model.

This is a Lagrange Multiplier (LM) test for autoregressive conditional heteroskedasticity (ARCH) in the residuals. This particular specification of heteroskedasticity will be motivated by the observation that in many financial time series, the magnitude of residuals appeared to be related to the magnitude of recent residuals. ARCH in itself does not invalidate standard least square inference. The ARCH LM test statistic is computed from an auxiliary test regression. To test the null hypothesis that there is no ARCH up to order in the residuals, we run the regression:

$$e_t^{\,2} = \beta_0 + (\Sigma q \quad \beta_s e_{t-s}\, 2) + \upsilon_t \tag{8}$$

Where, e is the residual. This is a regression of the squared residuals on constant and lagged squared residuals up to order q. The two test statistics from this test regression are, namely, the F-statistic and the Obs*R-squared statistic. The F-statistic is an omitted variable test for the joint significance of all lagged squared residuals. The Obs*R-squared statistic is Engle's LM test statistic, computed as the number of observations times the R2 from the test regression. The exact finite sample distribution of the F-statistic under Ho is not known but the LM test statistic is asymptotically distributed X2 (q) under quite general conditions. The ARCH-LM test is available for equations estimated by least squares, two-stage least squares, and nonlinear least squares.

Model Simulation:

Performance of the model is measured by the validity of its estimate on the basis of its estimation power (Makridakis, 1998: Ferris, 1998: Pindyck and Rubinfeld, 1998). Comparative analysis between single equation econometric model using Vector Error Correction Method (VECM) with co-integration and Autoregressive-Integrated Moving Average model (ARIMA) will be made in terms of their estimation accuracy based on the Root Mean Squared Error (RMSE), the Mean Absolute Error (MAE), the Mean Absolute Percent Error (MAPE) and Theil's Inequality Coefficients (U-STAT) criteria. Performance of the model is measured by the validity of its estimate on the basis of its estimation and forecasting power. In the ex-post simulation, the RMSE of all the endogenous variables are less than one percent and the values of MAE are all small. The values of the Theil's inequality coefficient U are all nearly zero which is that the forecasting performance of the estimated model is satisfactory. MAE, MAPE and RMSE can range from 0 to ∞. They are negatively-oriented scores and lower values are better. The formulas are as below:

$$\text{RMSE} = \sqrt{\frac{\text{ESS}}{n}} \qquad \text{MAE} = \frac{\sum_{t=1}^{n}\left|Y_t - \hat{Y}_t\right|}{n}$$

$$\text{MAPE} = \frac{\sum_{t=1}^{n}\left|\frac{Y_t - \hat{Y}_t}{Y_t}\right|}{n} \times 100\% \qquad \text{U-STAT} = \frac{\text{RMSE}}{\sqrt{\sum_{t=1}^{n}\hat{Y}^2/n} + \sqrt{\sum_{t=1}^{n}Y^2/n}}$$

Note: n = Number of observations; f = Number of parameters; ESS = Error sum of square; Yt = The actual value at time t, $\hat{Y}t$ = The forecast value at time t; n = the number of observations; ESS = The error sum of square.

The Vector Autoregression (VAR) model describes a system in which each variable is a function of its own lag and the lag of other variable in the system. In the first equation GDP_t is a function of its own lag GDP_{t-1}, and the lag of the other variables. In the other equations of $\Delta BANK_t$, ΔINS_t and ……are a function of its own lag of other variable in the system $GDP_{t-1.}$ Together the equations constitute a system known as a Vector Autoregression (VAR). The single equation of Gross Domestic Product (GDP) econometric model with the error reduced methods using Vector Error Correction Method (VECM) with co-integration characteristics (ECM Model) produced the following results:

$$\Delta GDP_t = 0.011 + 0.134\Delta BANK_{t-1} + 0.022\ \Delta INS_{t-1} - 0.056\Delta STOCK_{t-1} + 0.035\ \Delta GDP_{t-1} + 0.016 \tag{9}$$

t-statistics [0.327] [0.055] [0.617] [2.580**]

R-square= 0.349 Adj. R-Square = 0.263
with,
Co-integration equation:

$$-0.455GDP_{t-1} + 0.054\Delta BANK_{t-1} - 0.059\ \Delta INS_{t-1} - 0.607\Delta STOCK_{t-1} = 0 \quad (10)$$

[3.568] [1.067*] [-0.990] [2.374**] t-statistic

The Equation (11) was the result of the ARIMA model of the short-term GDP in Malaysia. Briefly, the model was a univariate approach which was built on the premise that knowledge of past values of a time series was sufficient to make forecasts of the variable in the equation. The term Φ1GDPt-1 (Φ1 is an AR parameter of order 1) represented the fit to the series value GDP_t and the coefficient value was 0.68. The term θ1 ε t-1 (θ1 is a MA parameter of order 1) and ε_{t-1} represented the assumed random error in the data at period t-1 and ε_t represented at period t and the coefficient value is 0.32 and 0.27.

$$GDPt = 0.248 + 0.676(\Phi 1)\ GDP_{t-1} - 0.324(\theta 1)\ \varepsilon_{t-1} + 0.274\varepsilon_t \quad (11)$$

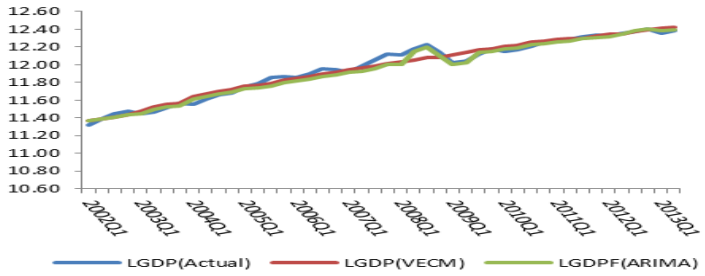
t-statistic [19.459***] [52.534***]
R2 = 0.698 Adjusted R2 = 0.697 Durbin-Watson = 1.97

Heteroskedasticity Test (ARCH LM Test)
F- statistic = 0.726 Prob. F(1,5214) = 0.699***
Obs*R-squared = 0.714 Chi-Square = 0.697***
Note: t-statistics in [ ], *** Statistically significant at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

In the ARIMA GDP equation, the AR and MA parameters explained about 69 percent of the variation in the GDP_e. The parameter diagnostics showed that any given value in GDPt was directly proportional to the previous value real GDPt-1 plus some random error ε_t and ε_{t-1}. Meaning that, what happens this period was only dependent on what happened last period, plus some current random error. The term (- θ1 εt-1) with the minus sign in front of θ1 was conventional only and had no other significance. In Box-Jenkins models, the random error component plays a dominant role in determining the structure of the model. The residual diagnostics ARCH LM test showed that the residuals were significance at the 0.01 level that the model has included the correct parameters. Residual diagnostics and parameter diagnostics comprised the tools available for determining whether a selected model was valid.

Conclusion:

Figure 2 appears that ARIMA Model exhibited a stronger forecasting power as reflected in movement of LGDPF (ARIMA) line more consistent with the actual of GDP (LGDP). The ARIMA Model reported higher R2 and Adjusted R2 reflected that the model had better explanation power against the variation of GDP. In addition, Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and Theil Inequality Coefficient (U-STAT) statistics reported in smaller number in ARIMA Model compared to VECM implied lower errors or residuals of ARIMA Model, hence provided better forecasting power.



	VECM	ARIMA(1,1,1)
R^2	0.349	0.698
Adjusted R^2	0.263	0.697
RMSE	5.46	3.984
MAE	4.307	3.075
MAPE	36.016	25.828
U-STAT	0.228	0.166

Fig. 2: Ex-post Forecast of GDP (RM, thousand million) in Malaysia from 2012Q1 to 2013Q2 and Model Evaluations

REFERENCES

Arestis, P. and P. Demetriades, 1997. Financial development and Economic Growth: Assessing the Evidence. The Economic Journal, pp: 783-799.

Ahmed, S.M. and M.I., Ansari, 1998. Financial Sector Development and Economic Growth: The South-Asian Experience, Journal of Asian Economics., 9: 503-517.

Adams, M.J., L.F. Andersson, Andersson and M. Lindmark, 2009. Commercial banking, insurance and economic growth in Sweden between 1830 to 1998. Accounting, Business and Financial History, 19(1): 21-38.

Avram, K., Y. Nguyen and M. Skully, 2010. Insurance and economic growth: A cross country examination. Monash University, Dept. of Accounting and Finance, Working Paper.

Bagehot, W., 1873. Lombard Street, Homewood, IL: Richard D. Irwin, (1962 Edition).

Bencivenga, V.R., and B.D. Smith, 1992. Deficits, Inflation and the Banking System in Developing Countries: The Optimal Degree of Financial Repression. Oxford Economic Papers, 44: 767-790.

Box, G., G. Jenkins and C. Reinsel, 1994. Time Series Analysis: Forecasting and Control. 3rd Ed., Prentice Hall, New Jersey, ISBN-13: 978-0130607744

Beck, Levine and Loayza. Levine, R., N. Loayza and T. Beck, 2000. Financial Intermediation and Growth: Causality and Causes. Journal of Monetary Economics. 46: 31-77.

Boon, T.K., 2005. Do commercial banks, stock market and insurance market promote economic growth: An analysis of the Singapore Economy. Nanyang Technological University.

Cheung, Y.W., and L.K., Ng, 1996. International Evidence on the Stock Market and Aggregate Economic Activity. Working Paper a351, UCSC

Catalan, M., G. Impavido and A.R. Musalem, 2000. Contractual savings or stocks market development: Which leads? Journal of Applied Social Science Studies., 120(3): 445-87.

Clements, M.P. and D.F., Hendry, 2001. Forecasting with difference-stationary and trend-stationary models. The Econometric Journal, 4: 1-9.

Ching, K.S., M. Kogid and F. Furuoka, 2010. Causal Relation between Life Insurance Funds and Economic Growth Evidence from Malaysia. ASEAN Economic Bulletin., 27(2): 185-200.

Demetriades, P.O., and K.A., Hussein, 1996. Does Financial Development Cause Economic Growth? Time-series Evidence From 16 Countries. Journal of Development Economics., 51: 387-411.

Engle, R.F., 1982. Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation. Econometrica, 50(4): 987-1007.

Enders, W., 2004. Applied Econometric Time Series, Second Edition. John Wiley & Sons, United States.

Ferris, N.J., 1998. Agricultural Prices and Commodity Market Analysis. McGraw Hill, Boston, Massachuset, pp: 142-145.

Feyen, E., R. Rocha and R. Lester, 2001. What drives the development of the insurance sector: An empirical analysis based on a panel of developed and developing countries? Washington, D.C.: The World Bank.

Fase, M.M.G., and R.C.N., Abma, 2003. Financial Environment and Economic Growth in Selected Asian Countries, Journal of Asian Economics., 14: 11-21.

Gilbert, C.L., 1986. Professor Hendry's Econometric Methodology. Oxford Bull Economic Statatistic., 48: 283-307.

Greenwood, J. and B. Jovanovic, 1990. Financial Development, Growth and the Distribution of Income. Journal of Political Economy, 98: 1076-1107.

Gujarati, D., 2003. Basic Econometrics (4th Edition). McGraw-Hill, Inc.

Hoff, C.J., 1983. A Practical Guide to Box-Jenkins Forecasting. Lifetime Learning Publications, California.

Harris, R.D.F., 1997. Stock Markets and Development: A Re-assessment. European Economic Review, 41: 139-146.

Hendry, F.D. and N.R. Ericsson, 2001. Understand econometric forecast. MIT Press, Cambridge.

Hanke, J.E., and D.W. Wichern, 2009. Business forecasting, Pearson International edition. (Ninth edition); 399-512.

Han, L., D. Li, F. Moshirian and Y. Tian, 2010. Insurance Development and Economic Growth. The Geneva Papers on Risk and Insurance - Issues and Practice, 35: 183-199.

Jung, W.S., 1986. Financial development and economic growth: International evidence. Economic Development and Cultural Change., 34(2): 333-346.

King, R.G., and R. Levine, 1993. Finance and growth: Schumpeter might be right. Quarterly Journal of Economic, 108(3): 169-210.

Kugler, M., and R. Ofoghi, 2005. Does insurance promote economic growth: Evidence from UK. Working Paper, Division of Economics, University of Southampton,UK.

Karia, A.A. and I. Bujang, 2011. Progress accuracy of CPO price prediction: Evidence from ARMA family and artificial neural network approach. International Research Journal of Finance and Economics., 64: 66-79.

Levine, R., 1991. Stock Market, Growth, and Tax Policy. Journal of Finance, 46: 1445-1465.

Levine, R., 1997. Financial Development and Economic Growth: Views and Agenda. Journal of Economic Literature., 35: 688-726.

Levine, R. and S. Zervos, 1998. Stock Markets, Banks, and Economic Growth. American Economic Review, 88: 537-558.

Lucas, R.E., 1998. On the Mechanics of Economic Development. Journal of Monetary Economics, 22: 3-42.

Luintel, K.B. and M.A., Khan, 1999. A growth nexus: evidence from a multivariate VAR. Journal of Development Economics., 60: 81-405.

Murinde, V. and F.S.H., Eng, 1994. Financial Development and Economic Growth in Singapore: Demand-following or Supply-leading? Applied Financial Economics, 4: 391-404.

Makridakis, S., S.C. Wheelright and R.J. Hyndman, 1998. Forecasting: Methods and Applications, (3rd ed.). John Wiley, New York.

Nuesser, K., and M. Kugler, 1998. Manufacturing growth and financial development: Evidence from OECD countries. The Review of Economics and Statistics, 58: 638-646.

O'Donovan, T.M., 1983. Short Term Forecasting: An Introduction to the Box-Jenkins Approach. Wiley. New York, ISBN-13: 9780471900139, Pages: 282.

Odedokun, M.O., 1996. Alternative econometric approaches for analyzing the role of the financial sector in economic growth: time-series evidence from LDCs. Journal of Development Economics., 50: 119-146.

Pagano, M., 1993. Financial markets and growth: An overview. European Economic Review, 37(2/3): 613-622.

Pindyck and Rubinfeld, 1998. Econometric Models and Econometric Forecasts, 4th Edition, New York: McGraw-Hill.

Robinson, J., 1952. The Generalisation of the General Theory, in the Rate of Interest and Other. Essays, London: Macmillan.

Rousseau, P.L. and P. Wachtel, 1998. Financial intermediation and economic performance: historical evidence from five industrialized countries. Journal of Money, Credit and Banking., 30(4): 658-678.

Rioja, F., and N. Valex, 2004. Does one size fit all: A reexamination of the finance and growth relationship. Journal of Development Economics., 74(2): 429-447.

Schumpeter, J.A., 1956. The theory of economic development. Harvard University Press.

Solow, R.M.A., 1956. Contribution to the Theory of Economic Growth. Quarterly Journal of Economics, 70: 65-94.

Ward, D. and R. Zurbruegg, 2000. Does insurance promote economic growth: Evidence from OECD countries. Journal of Risk and Insurance., 67(4): 489-50.

Wilson, J.H., and B.Keating, 2009. Business forecasting, McGraw Hill sixth edition, pp: 343-346.

Wong, H.C. and A.A. Khin, 2013. Economic Development Cointegration and Malaysian Life and General Insurance Consumption. Australian Journal of Basic and Applied Sciences, 7(10): 538-546.