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Peer-reviewed and Open access journal
ISSN: 1804-5006 | www.academicpublishingplatforms.com
The primary version of the journal is the on-line version
BEH - Business and Economic Horizons
Volume 14 | Issue 2 | 2018 | pp.229-242
DOI: http://dx.doi.org/10.15208/beh.2018.18

The relationship between economic growth and employee provident fund: An empirical evidence from Malaysia

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Abstract: Over the years, Malaysia has progressively accelerated its economic development, thanks to the adherence to high rates of domestic savings and investment. Of which, the Employees Provident Fund (EPF) is one of the schemes that caters for the private sector workers. Specifically, this paper investigates the relationship between economic growth and EPF investment in Malaysia for the period of 1970 - 2014. The model, which is derived from the Cobb-Douglas production function, is tested by econometric techniques; Johansen cointegration and Granger causality within VECM. While the EPF investment is proven statistically insignificant in the short run, there is evidence of the saving/investment-led-growth hypothesis being the long run phenomenon for Malaysia. In view of the possible over-dependence on investment funds in general going forward, the policy makers are recommended to reinforce the government's initiative in facilitating more business ventures as means to attract incoming funds, including FDI flows, towards streaming into the country.

JEL Classifications: E20, F43, G23

Keywords: Cobb-Douglas, economic growth, EPF investment, saving/investment-led-growth
Citation: Hassan, S., Othman, Z., & Mohaideen, Z. M. (2018). The relationship between economic growth and employee provident fund: an empirical evidence from Malaysia. *Business and Economic Horizons, 14*(2), 229-242. http://dx.doi.org/10.15208/beh.2018.18

1. Introduction

On yearly basis, the stellar economic performance in the context of prolonged macroeconomic stability is remarkably attained by the Association of South East Asian Nations (ASEAN) economies including Malaysia. As a result, this has led to increasing attentions on the related topics among the economists in recent years. In line with the saving/investment-led-growth hypothesis being adhered regionally, the high rates of domestic savings and investment, among others, have constituted as a significant factor for Malaysia to favourably accelerate the steady progress of the nation's economic growth (Mansur, Mamalakis, & Idris, 2011). Throughout the years, Malaysia has demonstrated a promising profile of economic growth rates. For instance, an average annual growth rate (AAGR) of about five percent was registered from 1980 to 1988, increased to the AAGR of nine percent from 1989 to 1991, scaled down to the AAGR of 5.8 percent in 1999 due to the repercussions from the 1997's Asian Financial Crisis (AFC), elevated to the AAGR of 8.5 percent in 2001 before moderated at around 4.5 percent from 2002 onwards (Mansur et al., 2011). Elsewhere, Radelet, Sachs, & Lee (1997) conclude that a direct link does exist between savings and economic growth in which a 10 percent increase in the government savings-to-GDP ratio is tied to a 1.2 percent rise per year in the country's economic development.

Of pension schemes, the Employees Provident Fund (EPF), which is the largest single savings institution since 1951 that currently accounts for a-fifth of total employees'

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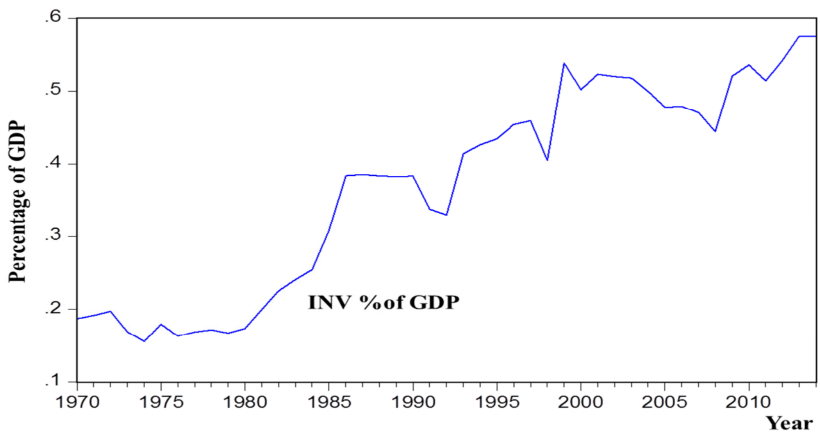
income, is primarily aimed at providing financial security for the elderly private sector workers (Narayanan, 2002). On one hand, EPF is commonly known as a form of social security that offers financial assistance to the workers in the post-retirement periods. On the other, EPF is viewed as a catalyst that positively contributes significant impacts to the country's economic growth either via capital market development or by its economic impact through a corporate engagement (Tan, 2007). As at December 2014, EPF investment assets stood at RM636.53 billion. Of the total, 50.9 percent was invested in fixed income instruments, followed by 42.4 percent in equity investments and the remaining portions of 3.7 percent and 3.0 percent in money market instruments and inflation asset class, respectively (EPF, 2014). Fittingly, the latter objective of its establishment tends to follow the first of three key assumptions among the ASEAN-5 countries that stresses on the policy makers to depend upon EPF for the two-pronged goals; rapid economic growth and reduction in poverty level (Asher, 2000). Thus, the implementation of Malaysia's social security schemes, including EPF, is comparable to some extent with those that effectively take place in neighbouring countries such as Indonesia, Singapore, Thailand and the Philippines.

FIGURE 1. THE EPF INVESTMENT AS A PERCENTAGE OF GDP



In Figure 1, the trend of EPF investment-to-GDP ratio in Malaysia has gradually been on the rise, elevated from 18.7 percent in 1970 to 57.5 percent in 2014. Nevertheless, it is empirically witnessed over the 1970 - 2014 timeframe that there are several inevitable drops in EPF investment-to-GDP ratio due to the occurrence of inauspicious financial crisis episodes such as the 1997's AFC and 2008's Global Financial Crisis (GFC). Alongside, there are continuous developments of economic trends in Malaysia between 1970 and 2014 that cover growing numbers of city dwellers i.e. raised from 3.7 million people in 1970 to 22.1 million people in 2014, decreasing fertility rate i.e. plummeted from 4.9 births per woman in 1970 to 2.0 births per woman in 2014, rising dependency ratio between retired and working populations i.e. heightened from 6.3 percent in 1970 to 8.2 percent in 2014 and increasing old ages group i.e. elevated from 3.3 percent of total people in 1970 to 5.7 percent of total people in 2014 (World Bank, 2016). Altogether, such substantial developments are of importance to be factored in the current and future

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economic conditions of Malaysia besides having the capacities to play respective roles in contributing to the long run and short run variations in economic growth demographically.

2. Literature review

According to Solow (1956) as cited in Mansur et al. (2011), a direct linkage does exist between saving and investment to economic growth. As such, the linkage goes with higher savings will lead to higher investment, which in turn causing higher economic growth. To simply put, such linkage is encapsulated in the saving/investment-led-growth hypothesis.

Correspondingly, a growing number of empirical studies have been undertaken across the globe in order to determine the short run, long run and causal relationships between (but not limited to) saving, investment and economic growth. For instance, an empirical study on Malaysia was undertaken by Tang (2015). He investigated the relevance of the savings-led-growth hypothesis using the quarterly data from 1970:Q1 to 2008:Q4. By employing the Toda & Yamamoto (1995) and Dolado & Lǜtkepohl (1996) (TYDL)'s version of the Granger causality test together with the recursive regression procedure, he claimed the savings-led-growth hypothesis to represent a long run phenomenon and concluded that the dataset of Malaysia does comply with the endogenous growth model. Thus, Barro & Salla-i-Martin (1995) shed light on the model by postulating that a hike in saving rate increases economic growth via its positive effect on investment and capital accumulation.

In favour of Solow and the endogenous growth theory, Jangili (2011) studied the causal direction among saving, investment and economic growth in India over the 1950/51 - 2007/08 timeframe. With the adoption of Johansen-Juselius cointegration test and Granger causality test based vector error correction model (VECM), he unveiled that saving and investment Granger cause economic growth both collectively and individually but not vice versa. In addition, similar results on India were disclosed by Mishra and Jain (2012) and Mehta & Rami (2014) via same methodology but different time series data that cover for the 1950 - 2008 and 1951 - 2012 periods, respectively. Similarly, in other part of the world, Obi, Wafure, & Menson (2012), who employed the Johansen-Juselius cointegration test and error correction model (ECM) approach, declared that saving is a key macroeconomic variable that has impacts on capital accumulation, productivity and economic growth in Nigeria.

On the contrary, there exist empirical studies, which investigate the short run, long run and causal relationships between saving, investment and economic growth, yield differing results. For example, Agrawal (2001) examined the causal direction between saving and economic growth in seven Asian countries namely South Korea, Taiwan, Singapore, Malaysia, Thailand, Indonesia and India for the 1960 - 1994 period. By applying the vector autoregressive (VAR) and VECM approaches, he confirmed that the Granger causal link runs from economic growth to saving in six of the seven countries, even though, there is a feedback effect detected emanating from saving to income and economic growth in three countries like Indonesia, Malaysia and Taiwan. Furthermore, based on the estimations of Engle and Granger's static ordinary least square (OLS) and Stock and Watson's dynamic OLS (DOLS), he revealed the evidence of the high saving rates in Asia are originated from high growth rate of per-capita income, decreasing ratios of dependent group and the operational of some institutional features such as the high central provident fund rates in Singapore.

In the context of Malaysia, there are very few empirical studies in recent years, which are readily available in place, specifically examine the relationship between economic growth, investment and saving looking from the perspective of pension schemes' contribution. By and large, the majority of them are characterized as descriptive and non-saving/investment-led-growth oriented studies which may include such as Narayanan (2002), Mohd. (2013) and Ja'afar & Daly (2016). Overall, it is evident that the issue of relationship between economic growth, saving and investment remains inconclusive which is mainly rooted from the dynamics and causal nature between the variables (Sekantsi & Kalebe, 2015). Because of many studies are found to conform to the notion that saving and investment play a pivotal role to explain economic growth, this study therefore attempts to establish such relationship as well in the specific context of Malaysia.

3. Methodology

Cobb-Douglas production function, which features returns to scale[1], is the workable framework among the economists. This is because it provides a relatively accurate description of the economy and it is easy to work algebraically (Yu, 2005). To begin with, the general function can be expressed as per Equation [1]:

$$Y_t = e^A L_t^{\tau} K_t^{1-\tau} U_t \tag{1}$$

Where Y_t is output, L_t is labour input, K_t is capital input, e is an exponential term, A is the constant term (shift factor), τ is the share of L_t, $1-\tau$ is the corresponding share of K_t, U_t is an error term and t refers to the time subscription.

Therefore, following the works of Tan (2007) and Kharel & Pokhrel (2012), some modifications are applied to the general Cobb-Douglas production function. These include dividing both sides by labour (L_t) input, converting the model into the loglinear specification and capturing other variables of interest to subsequently yield Equation [2]:

$$\begin{aligned} LPGDP_t = {} & A + \beta_1 LCPW_t + \beta_2 LINV_t + \beta_3 LCONR_t + \beta_4 LURB_t \\ & + \beta_5 LFERT_t + \beta_6 LDEPR_{t+} \beta_7 LOAGES_t + \beta_8 D_{1t} + U_t \end{aligned} \tag{2}$$

[1] The return to scale refers to the percentage increase in output when a firm increases all its input quantities. There are three types; economies of scale, constant returns to scale and diseconomies of scale (Yu, 2005).

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where A - the constant term (shift factor); $LPGDP$ - natural log of per-capita output (GDP_t / L_t) (in RM thousand per people); $LCPW$ - natural log of capital-labour ratio (K_t / L_t) (in USD thousand per people); $LINV$ - natural log of EPF investment funds (in RM billion); $LCONR$ - natural log of EPF contribution rates (in percentage); $LURB$ - natural log of urbanization (in million people); $LFERT$ - natural log of fertility rate (in number of births per woman); $LDEPR$ - natural log of dependency ratio (in percentage retired-to-working groups); $LOAGES$ - natural log of old ages group (in percentage of total population).

Additionally, a dummy variable, known as D_1, is included to measure whether the economic shocks from the 1997's AFC event having potential impacts on the growth of per-capita GDP thereafter. Also, β_1 to β_6 are estimated parameters and U_t is the white noise error term.

3.1. Data

Secondary data are used to investigate the relationship between economic growth and EPF investment funds in Malaysia for the 1970-2014 period. Other variables; EPF contribution rates, urbanization, fertility rate, dependency ratio, old ages group and economic shocks from the 1997's AFC event are included as means to increase the robustness of the model. Notwithstanding the retrieval of contribution rates was achieved from the EPF's official website, recent investment funds data were obtained from annual reports via online but the older ones are acquired in paper formats from the National Archives of Malaysia. While economic growth data were taken from the website of Malaysia's Department of Statistics, data on urbanization, fertility rate, dependency ratio and old ages population were collated from the World Bank's website.

3.2. Method of analysis

3.2.1. Unit root test

In time series estimation, the first attempt is to check the stationary properties of the variables or the order of integration both at their intercept and intercept plus trend terms. To determine the stationarity of each series, the Phillips-Perron (PP) test is chosen over other tests including Augmented Dickey-Fuller (ADF). In the unit root testing, compared to those tests, the PP test is proven to have the upper hand in addressing serial correlation problems faced by a variable.

3.2.2. Cointegration, long run and short run relationships

A VAR model is used to assess the long run and short run relationships between $LPGDP$ and independent variables; $LCPW$, $LINV$, $LCONR$, $LURB$, $LFERT$, $LDEPR$, $LOAGES$ and D_1. Alternatively, the variables are illustrated in the matrix form as shown in Equation [3]:

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$$\begin{bmatrix} LPGDP_t \\ LCPW_t \\ LINV_t \\ LCONR_t \\ LURB_t \\ LFERT_t \\ LDEPR_t \\ LOAGES_t \\ D_{1t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \\ \alpha_7 \\ \alpha_8 \\ \alpha_9 \end{bmatrix} + \begin{bmatrix} \beta_{1,1}(L) \ldots & & \beta_{1,9}(L) \\ \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots \\ \beta_{9,1}(L) \ldots & & \beta_{9,9}(L) \end{bmatrix} \begin{bmatrix} LPGDP_t \\ LCPW_t \\ LINV_t \\ LCONR_t \\ LURB_t \\ LFERT_t \\ LDEPR_t \\ LOAGES_t \\ D_{1t} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \\ \varepsilon_6 \\ \varepsilon_7 \\ \varepsilon_8 \\ \varepsilon_9 \end{bmatrix} \quad (3)$$

The long run cointegrating relationship between the variables is estimated via two tests developed in Johansen (1988) namely Trace and Maximum Eigenvalue Tests. Once the variables are found cointegrated over the long run, the short run relationship can be proceeded via the vector error correction model (VECM).

On the non-stationary data, a cointegration analysis is performed in a VAR model for the simple form of Johansen's method as can be seen in Equation [4]:

$$\Delta y_t = \prod y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + Bx_t + \varepsilon_t \quad (4)$$

Where $\Pi = \sum_{i=1}^{p} A_i - I$, $\Gamma_i = -\sum_{j=i+1}^{p} A_j$. As such, the rank of Π refers to the number of cointegrating equations among the components of the vector $y_t$of p variables (or $p = 9$ for this study). On the other hand, in the absence of cointegration, Π is a singular matrix i.e. its rank, $r = 0$. Hence, the rank of Π can take any value from zero to nine. When $r = 1$, there is a unique cointegrating vector meaning that there is a stable long run relationship between the variables. However, for $1 < r < 9$, it implies that there are multiple cointegrating vectors. This indicates that the variables in the system, which have r cointegrating vectors, are proven cointegrated in the long run. Stated conversely, the variables have a long run equilibrium relationship and they are moving together in the long run. The Π matrix can be factored as per Equation [5]:

$$\prod = \alpha\beta'; \ \beta y_t \sim I(0) \quad (5)$$

where the α matrix comprises of the adjustment parameters and the β matrix are the cointegrating vectors. With the Johansen's method, the Π matrix based on unrestricted VAR is able to be estimated. Also, the number of non-zero eigenvalues of Π (or equals r) that applies the trace and maximum eigenvalue statistics can be tested as well.

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According to Granger (1988), if the variables are found cointegrated, the short run Granger causality analysis on the variables has to be performed in a VECM to avoid the misspecification problems. Therefore, the VECM is employed in order to determine the direction of causality between per-capita GDP and independent variables including investment. For this reason, the VECM model that consists of various variables in the system can take the following form as displayed in Equation [6]:

$$y_t = \begin{bmatrix} \Delta LPGDP_t \\ \Delta LCPW_t \\ \Delta LINV_t \\ \Delta LCONR_t \\ \Delta LURB_t \\ \Delta LFERT_t \\ \Delta LDEPR_t \\ \Delta LOAGES_t \\ \Delta D_{1t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \\ \alpha_7 \\ \alpha_8 \\ \alpha_9 \end{bmatrix} + \begin{bmatrix} \beta_{11}(L) \ldots \beta_{19}(L) \\ \ldots \quad \ldots \quad \ldots \\ \ldots \quad \ldots \quad \ldots \\ \ldots \quad \ldots \quad \ldots \\ \ldots \quad \ldots \quad \ldots \\ \ldots \quad \ldots \quad \ldots \\ \ldots \quad \ldots \quad \ldots \\ \ldots \quad \ldots \quad \ldots \\ \beta_{91}(L) \ldots \beta_{99}(L) \end{bmatrix} \begin{bmatrix} \Delta LPGDP_t \\ \Delta LCPW_t \\ \Delta LINV_t \\ \Delta LCONR_t \\ \Delta LURB_t \\ \Delta LFERT_t \\ \Delta LDEPR_t \\ \Delta LOAGES_t \\ \Delta D_{1t} \end{bmatrix} + \begin{bmatrix} \gamma_1 z_{1,t-1} \\ \gamma_2 z_{2,t-1} \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \gamma_9 z_{9,t-1} \end{bmatrix} + \begin{bmatrix} \Phi(L)\ 0 \ \ldots \ 0 \\ 0 \ \Phi(L)\ 0 \ \ldots \ 0 \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ 0 \ \ldots \ 0 \ \ldots \Phi(L) \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \ldots \\ \varepsilon_{9,t} \end{bmatrix} \quad (6)$$

Where y_t is a (9 x 1) vector of the variables in the system, $\alpha's$ denote as a vector of intercept terms, $\beta's$ represent estimated parameters, Δ is a first difference operator and L is a lag operator. Also, $\beta(L)$ and $\Phi\ (L)$ refer to finite polynomials in the lag operator, $z_{t-1}'s$ represent error correction terms and $\varepsilon_t's$ are random disturbance terms.

4. Empirical results

4.1. Descriptive statistics

From Table 1, the mean values of all variables are positive for a total of 45 observations. While INV records its mean value of over 100, $PGDP,\ URB,\ OAGES$ and CPW possess the mean values of 29.06, 11.22, 3.98 and 2.48, respectively. Pertaining to the covered values, INV registers with the interval of 634.32 whereas $DEPR$ posts with the interval of 2.14. Amid $DEPR$ has the lowest standard deviation, INV exhibits the highest standard deviation, thereby implying that its dispersion from the mean is larger than other variables.

TABLE 1. DESCRIPTIVE STATISTICS OF VARIABLES

VARIABLE	MEAN	MEDIAN	MAXIMUM	MINIMUM	STD. DEVIATION
INV	143.01	49.72	636.54	2.22	174.24
PGDP	29.06	20.59	79.43	3.28	23.54
CONR	19.18	20.00	24.00	10.00	4.64
URB	11.22	9.95	22.13	3.65	5.80
DEPR	6.56	6.34	8.23	6.09	0.54
OAGES	3.98	3.66	5.67	3.27	0.62
FERT	3.25	3.45	4.87	1.96	0.85
CPW	2.48	2.77	4.91	0.64	1.21

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4.2. Correlation analysis

Correlation matrix emphasizes the strength of relationship between the variables. As reported in Table 2, many variables are found positively correlated but there are also some variables that have negative correlations with each other.

With regard to the relationship with *PGDP*, all independent variables, excluding *FERT*, are collectively engaged in positive correlations. In term of the relationship strength, strong correlation linkages of over 60 percent with *PGDP* are detected running from *CONR, CPW, DEPR, OAGES, INV* and *URB*, orderly. Meanwhile, there are indications of positively strong correlations of over 50 percent among the independent variables; *INV, CONR, URB, DEPR* and *OAGES*, thus suggesting for the rise of multicollinearity problems especially in the multiple regression. By taking the account of multicollinearity and serial correlation problems, a VAR model is the preferable option to be employed later in the time series analysis.

TABLE 2. ESTIMATED CORRELATION MATRIX OF VARIABLES

VARIABLE	PGDP	CPW	INV	CONR	URB	FERT	DEPR	OAGES
PGDP	1.00	0.77	0.97	0.70	0.98	-0.95	0.84	0.97
CPW		1.00	0.69	0.82	0.81	-0.77	0.43	0.66
INV			1.00	0.59	0.94	-0.89	0.92	0.99
CONR				1.00	0.78	-0.81	0.30	0.59
URB					1.00	-0.98	0.76	0.93
FERT						1.00	-0.71	-0.90
DEPR							1.00	0.94
OAGES								1.00

4.3. Stationary properties of data

In reference to Table 3, all variables are proven as non-stationary series at level. Because of their associated p-values that are beyond the acceptable significance levels, there is a failure to reject the null of a series to contain a unit root. However, the variables are found to have stationary properties after transforming all series into first-differenced variables. As a result, the variables become statistically significant, thus inducing the tendency to reject the similar null hypothesis. Hence, the non-stationary variables have been converted into stationary series at first difference and are cointegrated of same order one i.e. I(1).

TABLE 3. RESULTS OF THE PHILLIPS-PERRON UNIT ROOT TEST

VARIABLE	LEVEL		FIRST DIFFERENCE		CONCLUSION
	INTERCEPT	INTERCEPT PLUS TREND	INTERCEPT	INTERCEPT PLUS TREND	
LPGDP	-1.885 (0.336)	-2.195 (0.480)	-6.048 (0.000)*	-6.398 (0.000)*	I(1)
LCPW	-1.829 (0.362)	-2.224 (0.465)	-4.722 (0.000)*	-4.722 (0.002)*	I(1)

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TABLE 3. RESULTS OF THE PHILLIPS-PERRON UNIT ROOT TEST

VARIABLE	LEVEL		FIRST DIFFERENCE		CONCLUSION
	INTERCEPT	INTERCEPT PLUS TREND	INTERCEPT	INTERCEPT PLUS TREND	
LINV	-2.073 (0.256)	-0.592 (0.975)	-6.661 (0.000)*	-7.277 (0.000)*	I(1)
LCONR	-2.029 (0.274)	-1.700 (0.735)	-5.925 (0.000)*	-6.119 (0.000)*	I(1)
LURB	-1.346 (0.600)	-0.212 (0.991)	-3.908 (0.004)*	-14.125 (0.000)*	I(1)
LFERT	-2.016 (0.279)	-0.846 (0.954)	-3.914 (0.004)*	-3.698 (0.031)*	I(1)
LDEPR	8.402 (1.000)	6.548 (1.000)	-5.065 (0.000)*	-7.707 (0.000)*	I(1)
LOAGES	2.190 (0.999)	6.369 (1.000)	-3.924 (0.006)*	-6.105 (0.000)*	I(1)

Note: Figures in the parentheses are *p*-values. * - indicates the rejection of the null at the five percent level.

4.4. Cointegration and long run relationship

Once the variables cointegrated at I(1), the presence of long run relationship between the variables is determined via the Johansen cointegration test. Hence, Table 4 summarizes the results of the Johansen cointegration test.

TABLE 4. RESULTS OF THE JOHANSEN COINTEGRATION TEST

NULL	EIGEN VALUE	TRACE STATISTIC	CRITICAL VALUE 5%	MAX-EIGEN STATISTIC	CRITICAL VALUE 5%
r = 0*	0.990	659.401	215.123	193.223	61.806
r ≤ 1*	0.948	466.179	175.172	123.986	55.728
r ≤ 2*	0.899	342.192	139.275	96.155	49.586
r ≤ 3*	0.857	246.038	107.347	81.705	43.420
r ≤ 4*	0.783	164.333	79.341	64.193	37.164
r ≤ 5*	0.680	100.139	55.246	47.876	30.815
r ≤ 6*	0.439	52.263	35.011	24.305	24.252
r ≤ 7*	0.410	27.958	18.398	22.164	17.148
r ≤ 8*	0.129	5.794	3.841	5.794	3.841

Note: * - denotes rejection of the null at the five percent significance level.

According to both trace and Max-Eigen statistics, a total of nine cointegrating equations are justified to inevitably exist in the model at the five percent significance level. With such indications being revealed, there is clear evidence that collectively supports for the existence of long run equilibrium relationship between the variables in the model. In fact, it is permissible to discover that more than one cointegrating equations being potentially indicated in the multivariate framework. Owing to the Johansen cointegration procedure, the long run relationship is given by Equation [7]:

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$$\begin{aligned} LPGDP_t = {} & \underset{\substack{(0.012)\\ [-41.500]*}}{0.498LCPW_t} + \underset{\substack{(0.033)\\ [-9.970]*}}{0.329LINV_t} - \underset{\substack{(0.027)\\ [9.000]*}}{0.243LCONR_t} - \underset{\substack{(0.722)\\ [1.837]}}{1.326LURB_t} + \\ & + \underset{\substack{(0.220)\\ [-1.322]}}{0.93LEFRT} - \underset{\substack{(0.497)\\ [11.551]*}}{5.741LDEPR_t} + \underset{\substack{(0.383)\\ [-11.441]*}}{4.382LOAGES} + \underset{\substack{(0.032)\\ [-20.875]*}}{0.668D_{1t}} \end{aligned} \qquad (7)$$

Log Likelihood: 1261.59

Note: Figures in ( ) and [ ] represent standard errors and *t*-statistics, respectively. * - denotes the statistically significant variable at the five percent significance level.

From Equation [7], variables $LCPW$, $LINV$, $LOAGES$, and D_1 by possess negative sign and are found statistically significant, respectively given their *t*-statistic values of more than two (in absolute term). Potentially, these variables will affect $LPGDP$ over the long run. Ceteris paribus, a percent rise in the EPF investment assets would lead to about 0.33 percent increase in the variations of per-capita GDP. Likewise, there would be sizeable increases covering about a 0.5 percent, a 4.4 percent and a 0.7 percent in the total content of per-capita GDP that are in conjunction with a percent increment in the capital-labour ratio, old ages group and economic shocks from the AFC, accordingly.

Pertaining to the potential impact of investment on economic growth, Mansur et al. (2011) enlightens that high domestic saving and investment ratios, of which EPF is the largest single savings institution, have accompanied Malaysia with high rate of economic growth notably over the 1970 - 1990 timeframe. Also, Abdul Razak & Mohd. Dali (2013) conclude that the EPF's investment assets, which are embedded with transitory rebound factors, has remarkably made a strong comeback in spurring the nation's economy especially in the post-1997 periods, including the 2009's tumultuous year, in order to register an asset size of RM440.52 billion as at 31 December 2010. Furthermore, economic growth in economy is determined by labour productivity in which its dynamics are influenced by capital-labour ratio (Volek, 2012). With a ratio of 0.5 or equivalently 1:2 in a multiple form over the long run, this means that labour remains to play a dominant role in driving the country's economic growth compared to human capital. Thus, this result is found inconsistent with Jajri & Ismail (2010) on Malaysia for the period of 1981 - 2007. Moreover, there is a tendency of age structure in developing countries to affect economic growth through a positive way. In the light of improved health, this will induce individuals to prolong their working life and postpone their retirements especially during their older years (Rutger & Jeroen, 2011).

Meanwhile, $LCONR$ and $LDEPR$ are proven to have negative relationships with $LPGDP$ and are statistically significant in the long run at the five percent significance level. In this respect, EPF contribution rate and old dependency ratio will play respective roles in contributing negative externalities to deter the long term growth of per-capita economic development. Specifically, a percent permanent increase in the EPF contribution rate would cause a 0.24 percent reduction in the formation of per-capita GDP. Similarly, a percent unavoidable rise in the old dependency ratio is translated into a 5.74 percent decrease in the total content of per-capita GDP. For instance, it is crucial to lower the EPF contribution rate, i.e. from 11 percent to eight percent, as means to bolster domestic consumption among households towards boosting the nation's economic growth in the coming years (Borneo Post, 2016). In addition, one reason may explain the negative effect

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of old dependency ratio on economic growth is that the old ages group is seen as a financial burden in terms of lowering savings and economic production (Rutger & Jeroen, 2011).

From Equation [7], both variables $LURB$ and $LFERT$, which are positive and negative values, are statistically insignificant with $LPGDP$ in the long run at the five percent significance level. Thus, both factors can be ignored since the *t*-statistic values of smaller than two (in absolute term).

4.5. Short run relationship

The Granger causality test within VECM is then employed to assess the potential short run relationship between the cointegrated variables. As such, the results are reported in Table 5.

Empirically, it is observed that the coefficient of the ECT_{t-1} term in Table 5 is in negative value and statistically significant at the five percent significance level. On this note, per-capita GDP will have a key role to play in the short run based on its speed of adjustments as the system temporarily depart from the long run equilibrium. For example, there is a 115 percent of the short run adjustment is required by per-capita GDP. Since its value is over 100 percent, the speed of adjustment of the model is expected to be quicker from the short run to long run.

TABLE 5. SHORT RUN RESULTS FROM THE GRANGER CAUSALITY TEST WITHIN VECM

VARIABLE	COEFFICIENT	STANDARD ERROR	T-STATISTIC	P-VALUE
Dependent Variable: ΔLPGDP				
ΔLPGDP(-1)	0.103	0.192	0.536	0.596
ΔLCPW(-1)	0.242	0.112	2.159	0.039*
ΔLINV(-1)	-0.111	0.154	-0.718	0.478
ΔLCONR(-1)	-0.081	0.135	-0.603	0.551
ΔLURB(-1)	22.075	6.147	3.591	0.001*
ΔLFERT(-1)	-1.402	1.065	-1.317	0.198
ΔLDEPNR(-1)	0.245	4.354	0.056	0.956
ΔLOAGES(-1)	-4.637	6.252	-0.742	0.464
$ΔD_1$(-1)	-0.260	0.080	-3.236	0.003*
@TREND(70)	0.012	0.004	3.094	0.004*
C	-1.081	0.313	-3.455	0.002*
ECT(-1)	-1.151	0.360	-3.195	0.003*
R^2	0.489		Durbin-Watson statistic	2.141
Adjusted R^2	0.308		Prob(*F*-statistic)	0.015

Note: Note: * and ** indicate H0: $\beta i = 0$ being rejected at the five percent significance level.

Furthermore, the model contains corresponding intercept and trend terms, which refer to the country specific effects, are statistically significant at the five percent significance level in the short run. More importantly, with regard to the significance of other variables, it is worth to note that the first lagged terms of $\Delta LCPW$ and $\Delta LURB$ are in positive signs and statistically significant at the five percent significant level. Also, it is witnessed that the first lagged term of ΔD_1 is a negative value and statistically significant at the five percent significance level.

Explicitly, the results indicate that a percent increase in capital-labour ratio will lead to a 0.24 percent rise in per-capita growth in the short run. With the value of ratio is smaller than one, a gradual shift toward human skills will generate a considerable boost in supporting for the continued growth of per-capita GDP in the short run. Likewise, there will be a sizeable hike of 22.08 percent in the per-capita GDP formation that is associated with a percent advancement in urbanization in the short term. In contrast, a percent increment in economic shocks from the 1997's AFC event will bring a detrimental effect of 0.26 percent to deter the ongoing progress of per-capita GDP in the short run.

Thus far, the short run effect of human capital on economic growth as disclosed from this study is consistent with previous empirical studies such as Chuang (2003) on Taiwan for the period of 1952 - 1995, Chaudhry, Malik and Faridi (2010) on Pakistan for the 1972-2007 period. With regard to the causality of urbanization on economic growth, previous studies such as Michieka and Fletcher (2014) on Kenya for the 1971 - 2009 period and Asif et al. (2015) confirmed that such relationship does exist in respective countries. Also, the finding of a financial crisis episode or the 1997's AFC event in particular to have a negative impact on economic growth is aligned with Fukuda (2012) on the emerging Asian economies namely India, Indonesia, Korea, Malaysia and Thailand for the 1982:Q1 - 2007:Q4 period but contradicts with Azam et al. (2011) on Pakistan for the 1972 - 2010 period.

5. Policy implication, recommendation and conclusion

As far as the relationship between economic growth and EPF investment assets is concerned, the results disclose the long run evidence of the adherence to the saving/investment-led-growth hypothesis by Malaysia. Associated with that, there are growing concerns on over-dependence of economic growth on investment funds possibly coming from EPF scheme and other channels such as foreign direct investment (FDI) portfolios and different types of savings that will unfavorably lead to the financial instability in the coming years. For this reason, Mansur et al. (2011) stressed that the availability of technology and innovation is imperative to partially meet the requirements for the transition of Malaysia from the agriculture-based to low- and high-tech industrial developments. In this regard, the policy makers are recommended to reinforce the government's initiative in facilitating more business ventures as means to attract incoming funds, including FDI flows, towards streaming into the country. By doing so, these financial incentives are anticipated to positively trigger the nation's export competitiveness notably in the aspects of the management, marketing of export industries and technology.

Acknowledgements

The authors would like to express their deepest gratitude to Ministry of Higher Education and Universiti Utara Malaysia (UUM) for funding the study under the PBIT research grant (S/O Code: 12620) in which this study represents a part of the overall research project.

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