Fah Choy, Chia, Skitmore, Martin, Runeson, Goran, & Bridge, Adrian
(2011)
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Asian Conference on Real Estate, 2011-10-03 - 2011-10-05.

Property Investment, Construction and Economic Growth: The Case of Malaysia

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Abstract

It is generally accepted that there is a close relationship between property investment and construction activity. The construction sector plays a crucial role in economic development, especially for a developing nation such as Malaysia. However, the volume of new properties added to the property market is only a fraction of the total volume of the property market. Is the conventional assumption of the relationship between property investment and construction supported by empirical data? This paper revisits the tripartite relationships between economic growths, property investment and construction activities with official Malaysian 2000Q1-2010Q4 quarterly time series data. The Granger causality tests are used to establish the causality runs from the GDP to the value of property transactions, and the growth of construction activities to GDP growth. The result is expected to be useful for policymakers and industrial practitioners in formulating industrial policies and corporate strategies.

Keywords: property investment, construction activity, economic growth, developing nations.

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1. Introduction

The construction industry is a major generator of jobs and constitutes an important component of gross domestic product (GDP). However, added-value, or the 'net' output of construction is only a small part of the total construction process; a large percentage of total construction output consists of intermediate inputs from other sectors of the economy - mainly the building materials and service industries. In 2010, construction activity contributed 3.23% (RM24.77 billion) added-value to the GDP (RM765.97 billion) in Malaysia. The construction products – buildings and infrastructure - are a repository of wealth; form the largest component of the tangible assets which constitute the wealth of nations [1]. In Malaysia, the value of property transactions amounted to RM107.44 billion in year 2010. This is equivalent to 14% of Gross Domestic Product (GDP). It is generally accepted that there is a close relationship between property investment and construction activity. A scatter plot of the value of property transactions and construction added-value in Malaysia for the period of 2000Q1 to 2010Q4 is shown in Figure 1. This indicates a high coefficient of determination (R^2 = 0.81) for the two variables. However, the ratio of construction added-value to the value of property transactions had changed over time as indicated in Figure 2. This declines from an average of 35% in the early of 2000s to around 25% at the end of the decade. What has caused these changes? Does the conventional assumption of the relationship between property investment and construction still hold? This empirical study revisits this relationship using official Malaysian quarterly time series data.

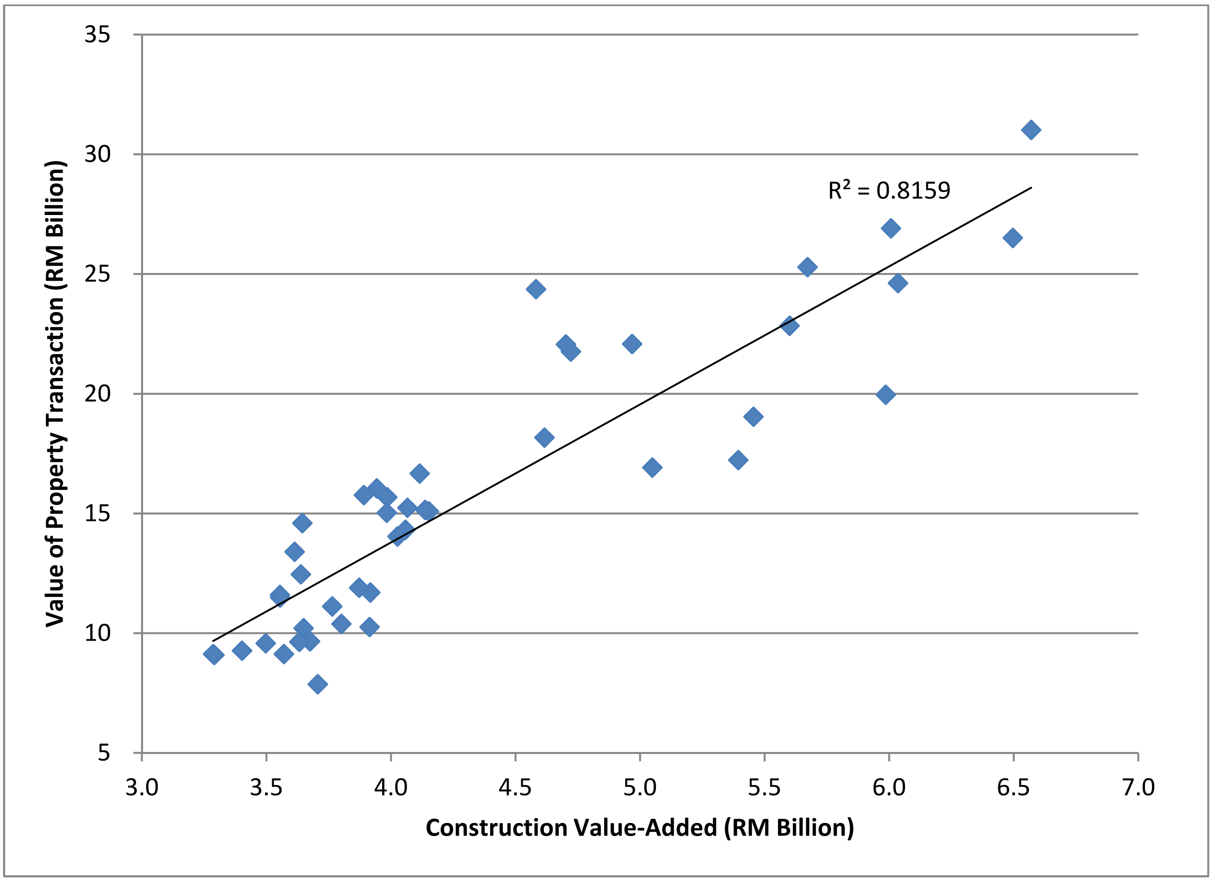

Figure 1 - Value of property transactions and construction added-value in Malaysia (2000Q1-2010Q4)

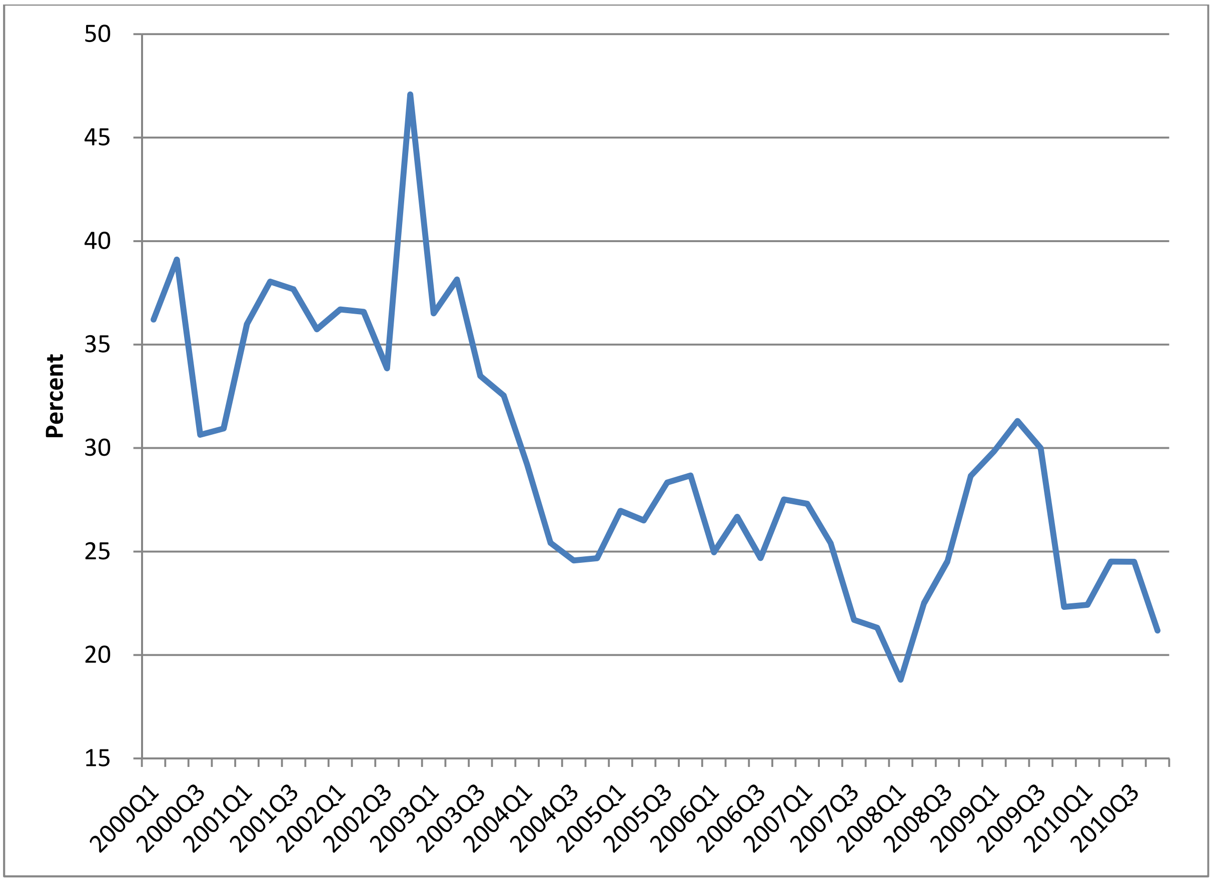

Figure 2 - Ratio of construction added-value to value of property transactions in Malaysia (2000Q1-2010Q4)

2. Previous studies

There have been many studies concerning the direction of causality between construction and GDP. However, attempts to generalize the results of these empirical studies are inconclusive [2]. The causality of GDP on construction activity from 1983Q1 to 1995Q1 was found in Hong Kong [3]. Meanwhile, a bi-directional causal relationship between construction and the overall economy between 1986Q3 and 1999Q2 was found in Singapore [4]. The impact of the construction output takes approximately six quarters to affect GDP and the manufacturing sector, and a year to reach the finance and business sectors [5]. A unidirectional causality of construction activity on economic growth was found in Taiwan over the 1979Q1-1999Q4 period [6]. Chan and Nieh employed multivariate error-correction models (ECM) in their studies. In the case of China, a bi-directional causal relationship was identified by Zheng and Liu (2004). The study also concluded that construction investment had a strong short-run effect on economic growth, whereas economic growth had a long-term effect on construction [7]. The growth in construction industry coinciding with a growth in GDP with three year lag was found in Ghana based on time series data from 1968 and 2004 [8]. The relationship between construction and the national economy of Trinidad and Tobago has also changed over time under different circumstances; during the economic upturn, the economy led construction; and during the economic downturn, construction drove the economy [9].

3. Research Methods

This paper considers a time series of (1) GDP, (2) construction added-value, and (3) value of property transactions for the 2000Q1-2010Q4 quarterly periods - making a total of 44 quarterly observations. All data are in billions Ringgit (RM) at current year prices. Figure 3 is a plot of the quarterly GDP, construction added-value, and value of property transactions. The first impression obtained from these graphs is that all the time series shown in Figure 3 seem to be 'trending' upward, albeit with some fluctuations.

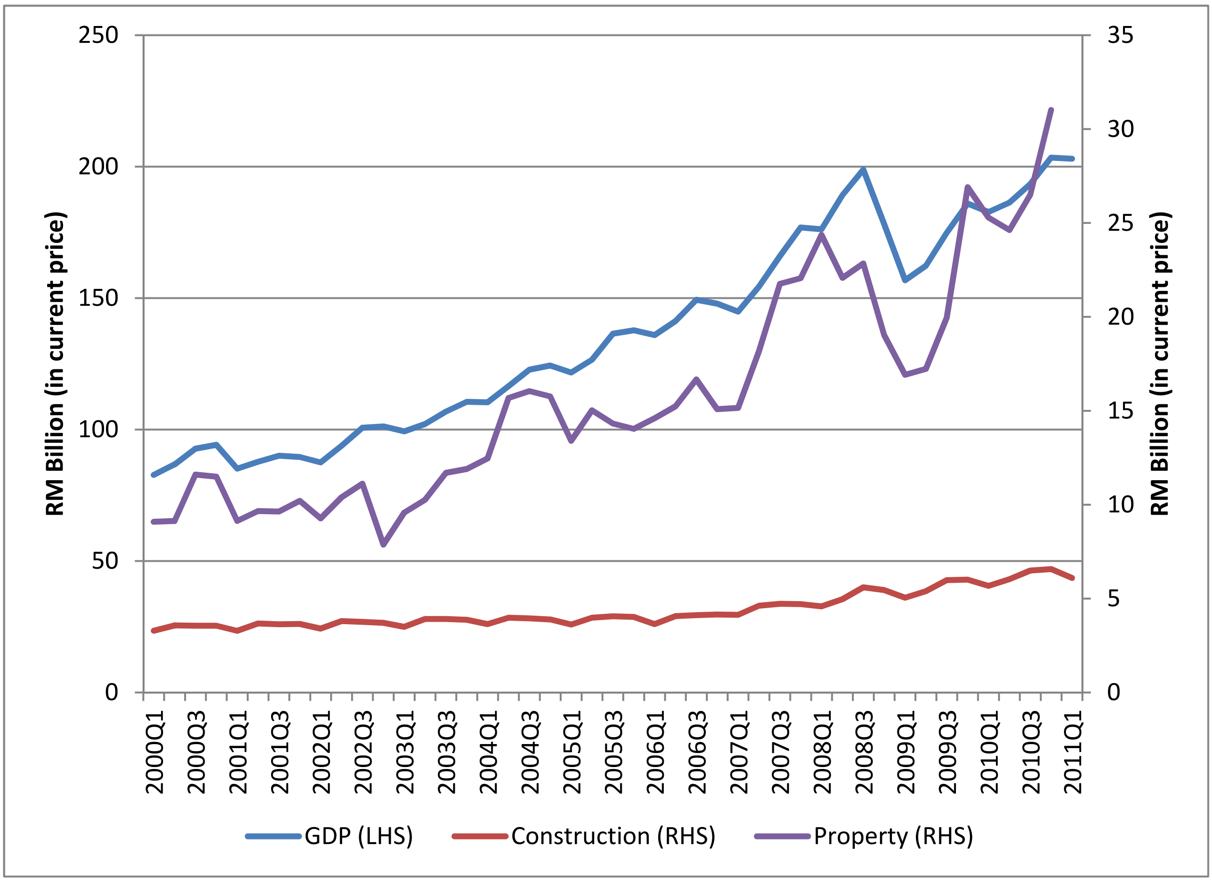

Figure 3 - GDP, construction added-value and value of property transactions in Malaysia (2000Q1 to 2010Q4)

It is important to determine if the relationship between economic variable is spurious or nonsensical. Spurious regressions can arise if the time series is not stationary (Gujarati 2003). If a time series is nonstationary, we can study its behavior only for the time period under consideration. Each set of time series data will therefore be for a particular episodic. As a consequence, it is not possible for it to be generalized to other time periods [10]. If a time series is stationary, its mean, variance, and auto covariance (with various lags) remain the same irrespective of the point at which they are measured; that is, they are time invariant. Such a time series tends to return to its mean, and fluctuations around this mean will have a broadly constant amplitude [10]. Therefore tests for stationarity should precede tests for causality. At the formal level, stationarity can be checked by determining if the time series contains a unit root. The Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) tests can be used for this purpose.

Granger tests were used to find out the nature of causality between

(a) construction added-value and GDP,
(b) property value and GDP, and
(c) construction added-value and property value

for the period 2000Q1 and 2010Q4.

Granger causality tests are essentially tests of the predictive ability of time-series models. Causality is inferred when the lagged value of a variable, say X_t, has explanatory power in the regression of a variable Y_t on lagged value of Y_t and X_t. Granger causality is absent when $f(X_t \mid X_{t-1}, Y_{t-1})$ equals $f(X_t \mid X_{t-1})$. The definition states that, in the conditional distribution, the lagged values of Y_t add no information to the explanation of the movements of X_t beyond that provided by the lagged values of X_t itself. If X_t is weakly exogenous and if Y_{t-1} does not cause X_t, then X_t is strongly exogenous [11]. Vector autor egression (VAR) can be used to test this hypothesis. Tests of the restrictions can be based on simple *F* tests on the single equations of the VAR model. That the unrestricted equations have identical regressors means that these tests can be based on the results of simple ordinary least squares (OLS) estimates [11]. The Granger causality test assumes that the information relevant to the prediction of the respective variables, X and Y, is contained solely in the time series data of these variables. The test involves estimating the following pair of equations:

$$Y_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j Y_{t-j} + u_t \qquad (1)$$

$$X_t = \sum_{i=1}^{n} \lambda_i X_{t-i} + \sum_{j=1}^{n} \delta_j Y_{t-j} + \varepsilon_t \qquad (2)$$

where it is assumed that the disturbances u_t and ε_t are uncorrelated. Equation (1) postulates the current Y values are related to the past values of itself as well as that of X, and (2) postulates a similar behavior for X [10]. The four possible cases are:

1. Unidirectional causality from X to Y is indicated if $\sum \alpha_i \neq 0$ and $\sum \delta_j = 0$.
2. Unidirectional causality from Y to X is indicated if $\sum \alpha_i = 0$ and $\sum \delta_j \neq 0$.
3. Bilateral causality is suggested when $\sum \alpha_i \neq 0$ and $\sum \delta_j \neq 0$.
4. Independence is suggested when $\sum \alpha_i = 0$ and $\sum \delta_j = 0$.

4. Results

In order to investigate the stationary properties of the data, univariate analysis of each of the three time series (value of property transactions, construction added-value and GDP) were carried out by testing for the presence of a unit root. The Dickey-Fuller (DF), augmented Dickey-Fuller (ADF) t-test and Philips Perron (PP) Z-tests for individual time series and their first and second differences are shown in Table 1. It is obvious from the DF, ADF and PP tests that, at conventional levels of significance, none of the variables represent a stationary process. The DF, ADF and PP tests, using the first and second difference of the three time series, indicate the tests to be individually significant at the 1% level. As differencing once produces stationarity, it is concluded that each of the series of property value, construction added-value and GDP is integrated in order 1, *I*(1).

Table 1
Tests for integration of value of property transactions, construction added-value and GDP

			Property	Construction	GDP	GFCF
ADF	Level	Intercept	0.08	0.98	0.28	-0.13
		Trend and intercept	-3.55**	-0.63	-3.37*	-3.61**
		None	3.91	1.85	2.93	1.27
	1st difference	Intercept	-5.74***	-1.83	-7.36***	-2.40
		Trend and intercept	-5.82***	-2.59	-7.37***	-2.54
		None	-5.35***	-0.84	-3.14***	-1.97**
	2nd difference	Intercept	-5.68***	-26.05***	-9.30***	-11.85***
		Trend and intercept		-25.62***	-9.16***	-11.67***
		None	-5.73***	-26.33***	-9.42***	-12.01
DF	Level	Intercept	0.47	-0.02	1.17	0.20
		Trend and intercept	-2.44**	-1.19	-2.38	-3.13
	1st difference	Intercept	-5.81***	-1.74*	-7.40***	-1.20
		Trend and intercept	-5.88***	-1.13	-7.42***	-1.70
	2nd difference	Intercept	-7.81***	-0.14	-9.42***	-0.76
		Trend and intercept	-9.22***	-0.32	-8.98***	-1.39
PP	Level	Intercept	1.23	-0.13	0.82	-0.48
		Trend and intercept	-2.19	-1.59	-2.22	-3.16
		None	3.91	-0.13	7.17	3.02
	1st difference	Intercept	-5.81***	-7.59***	-6.19***	-8.78***
		Trend and intercept	-6.98***	-10.22***	-6.14***	-9.52***
		None	-5.35***	-6.98***	-4.92***	-6.67***
	2nd difference	Intercept	-18.21***	-15.18***	-9.91***	-21.45***
		Trend and intercept	-20.77***	-15.03***	-9.66***	-21.18***
		None	-18.14***	-15.52***	-10.18***	-22.04***

The asterisk *, ** and *** denote the rejection of the null hypothesis of unit roots at 10%, 5% and 1% significance levels, respectively.

The results of the Granger causality tests using quarterly lags up to 13 lags are presented in Table 2. The null hypothesis in each case is that the variable under consideration does not 'Granger-cause' the other variable. By and large, the results presented in Table 2 show that:

(a) The causality runs from GDP to property value for lags 3 to 12 quarters with exception of lags 4 and 7 quarters. For lag 7 quarters, the causality is from the property value to GDP.
(b) The causality also runs from GDP growth to property value growth for lags 2, 10 and 11 quarters, but runs from property value growth to GDP growth at lag 7 quarters.
(c) Granger causality does not exist in either direction between property value growth and construction added-value growth.
(d) There is a unidirectional causality from construction added-valued growth to GDP growth; the causality runs from construction added-value growth to GDP growth for lags 2 to 10 quarters with the exception of lags 6 and 9 quarters.

Table 2
Tests of Bivariate Granger Causality between value of property transactions and GDP, value of property transactions growth and construction added-value growth, and GDP growth and construction added-value growth

Variables	Quarters of lag	Direction of causality			
		$V_1 \rightarrow V_2$		$V_2 \rightarrow V_1$	
		F value	Prob.	*F* value	Prob.
V_1- Property value , V_2- GDP	1	1.6782	0.2026	1.6268	0.2095
	2	0.5989	0.5547	1.6777	0.2007
	3	1.7564	0.1741	2.9148	0.0483*
	4	1.3307	0.2806	1.8344	0.1473
	5	1.7546	0.1550	2.7989	0.0358*
	6	1.4560	0.2336	4.3445	0.0039*
	7	2.5979	0.0409*	2.1695	0.0781
	8	2.4050	0.0556	3.1600	0.0188*
	9	1.8564	0.1343	2.8595	0.0321*
	10	1.3901	0.2841	2.8723	0.0390*
	11	1.3141	0.3372	2.9831	0.0480*
	12	1.1588	0.4396	4.0030	0.0375*
	13	0.8874	0.6138	1.3392	0.4227
V_1- GDP growth, V_2- Construction Value-added growth	1	0.5437	0.4652	0.0067	0.9351
	2	3.0059	0.0617	3.5634	0.0384*
	3	1.8996	0.1483	3.1088	0.0391*
	4	0.6810	0.6104	3.8222	0.0122*
	5	0.8527	0.5246	3.8129	0.0093*
	6	0.7278	0.6315	2.4102	0.0563
	7	0.6810	0.6866	2.9823	0.0233*
	8	0.6883	0.6971	3.1861	0.0182*
	9	0.4857	0.8634	2.4218	0.0589
	10	0.7145	0.6990	2.8834	0.0385*
	11	0.8303	0.6195	2.0220	0.1388
	12	1.0555	0.4928	1.8648	0.2083
	13	1.1522	0.4912	5.1882	0.0621
V_1- Property Value growth, V_2- Construction Value-added growth	1	0.7749	0.3841	3.0187	0.0902
	2	0.3370	0.7161	1.6869	0.1994
	3	0.3535	0.7869	1.4146	0.2560
	4	0.6202	0.6516	1.6446	0.1890
	5	0.5417	0.7430	1.7864	0.1494
	6	1.1192	0.3808	0.8360	0.5543
	7	0.9735	0.4755	0.6484	0.7117
	8	0.8632	0.5634	0.8468	0.5754
	9	0.9149	0.5379	0.7617	0.6521
	10	0.6030	0.7846	0.9363	0.5349
	11	0.6602	0.7456	1.1457	0.4260
	12	1.4296	0.3443	3.2335	0.0799
	13	1.06151	0.5514	1.6139	0.3854
V_1- Property value growth , V_2- GDP growth	1	1.0399	0.3141	1.1145	0.2976
	2	2.1246	0.1342	3.3879	0.0449*
	3	1.8526	0.1569	2.0769	0.1222
	4	2.1437	0.0998	2.4285	0.0695
	5	1.2451	0.3159	2.0899	0.0977
	6	3.0392	0.0235	2.1206	0.0881
	7	2.7848	0.0325*	1.7880	0.1429
	8	2.1122	0.0895	1.6588	0.1772
	9	1.8537	0.1396	1.3142	0.3074
	10	1.7684	0.1734	3.1117	0.0332*
	11	1.6096	0.2420	3.2120	0.0453*
	12	1.0205	0.5207	1.8614	0.2295
	13	0.5067	0.8322	4.8605	0.1094

The asterisk * denote the rejection of the null hypothesis of unit roots at 5% significance levels.

5. Conclusions

In summary, the direction of causality runs from GDP to the value of property transactions. Property investment is a process of capital accumulation. Economic growth reinforces the value of property transactions by boosting property investment. The escalated value of property transactions explained why there is a decline in the ratio of construction added-value to the value of property transactions from an average of 35% in the early 2000s to around 25% at the end of the decade. Although the Granger Causality test does not identify any relationship between construction activity and value of property transactions, the growth of construction activity caused the growth of GDP which, in turn, has generated a higher property value.

Malaysia is a developing economy. Construction activity is still an important driver of the economic growth. The various projects planned under the Tenth Malaysia plan (2011-2015) and the Economic Transformation Programme are likely to be the catalyst for its economic growth.

To conclude this discussion of Granger causality, it is necessary to keep in mind that the question being examined is whether the direction of causality can be detected statically when there is a temporal lead-lag relationship between two variables. If causality is established with this kind of relationship, this suggests that a variable can be used to better predict another variable than by simple extrapolation. In this case, it seems that predicting the property values can be done better - by considering the lagged value of GDP and then predicting economic growth by considering the lagged value of construction growth.

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