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MALAYSIAN PROPERTY MARKET, THE STOCK MARKET AND MACROECONOMIC VARIABLES

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Abstract
This study examined the interactions and linkages between the property market, stock market, and macroeconomic variables. The stock market, in the long run, has a significant impact on property. Changes in house prices and stock markets have wealth and credit-price effects spilled over to economic growth. Both property and equity markets have a close dependency on income, inflation and monetary policy. The inference and dynamic relationship within asset markets have the capacity to explain the boom and bust cycles. The great potential lies with property and stock market interaction mechanisms to reflect economic conditions and as a source to enrich the present macroeconomic indicators. The Malaysian equity market was observed to be significantly co-integrated with the disaggregated real estate market (state level). The real estate market was mainly found to have a positive relationship with the stock market, GDP per capita (income) and consumer price index (CPI). However, real estate always had a negative relationship with interest rates. While real estate had a positive relationship with real GDP per capita in the long run, the relationship was not significant. This insignificance relationship covers all states and property types. The income coefficients were low and most of non-causality in the short run. This suggests a need for cautious from house price overheating. Price upsurge beyond the reach of the public may get caught with a sudden decline of the people's affordability level. The impact of property price increase was higher than CPI (inflation). The inflation positive response on property is unusual as it normally follows the interest rate being negative. The shortage of affordable houses has pushed up prices. Inflation coefficients were mainly significant and much higher compared to stock and income coefficients. In short term dynamic linkages, bidirectional causality was detected between lending rates and the overall property market. This suggests a high temporal impact of monetary policy on the property market at the national level.

***Keywords**:* Property, stock, macroeconomics, interactions, economic indications

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INTRODUCTION

Property and stock markets are an integral part of the economy and must not be treated separately. On the other hand, more often, issues on house price, low investment and inflation were observed in isolations. Lessons learned from the economic crisis proved that a healthy economy comes from both healthy stock and property market, and vice versa. This suggests that the linkages between stock and property market granted a common basis of inference. This study is positive with the mechanism of interactions between the assets markets' ability to reflect on real economic activities. The asset markets interactions evidences may hold the foundation for a reliable and useful analysis, which might be added to the present macroeconomic indicators. The knowledge gap is noticeable as there is a need for more relevant and effective economic indicators. Without suitable and sufficient economic signals, critical constraints facing the economy remain hardly guided. The magnitude of the problem can be severe as it may drag the whole economy. More guided economic indicators may have avoided the overbuilding and over-investment as property glut may have crippled the banking and financial industry.

The function of property in the wider economy is rarely being considered together. Friggit (2009) suggested that it would be worthy to consider house prices in their correlation with real and financial variables, such as bonds or stock exchange prices. Miller et al. (2011) observed that house price movements have significant effects on economic growth, as well study by Anderson and Beracha (2010) noted home price changes are positively related to returns on stocks and bonds.

Property, Stock Market and Economic Performance Linkages

Property and stock, share some similar characteristics that they are both main components of the financial system. Both total property value and stock market capitalisation will increase by the increase in the surplus fund, the new capital formation (economic investment) or flow of financial capital, a general growth in GDP and reduction in interest rates. It was noted in Table 1.0 that a drop by 53.4% in total stock market capitalisation in 1997 was followed by a drop by 47.5% in total property transaction value in 1998. Whilst a drop by 40% in total stock market capitalisation in 2008 was followed by a drop by 8.3 % in total property market transaction value in 2009. This suggest that there are some forms of linkage and correlation between the stock market and property market.

Table 1.0: Comparing the Property, Stock and Variables

Year	(RM Billion) Total Property Transaction Value	% Change	(RM Billion) Total Stock Market Capitalization	% Change	% Real GDP Growth	% Average Lending Rate	CPI
1990	16.6	-	132	-	9.7 8.7	8.99	70.6
1991	18.7	12.7 14.4	162	22.7	7.8	9.72	73.6
1992	21.4	10.3 25.8	246	51.9 152	8.0 9.2	10.29	77.1
1993	23.6	34.2	620	(17.9)	9.5 8.2	9.65 8.24	79.9
1994	29.7	22.9	509	11.2	8.0	9.28	82.8
1995	39.8	8.4	566	42.6	(6.9)	10.12	85.7
1996	49.0	(47.5)	807	(53.4)	6.1 8.3	11.51	88.7
1997	53.1	23.3	376	(0.3)	0.3 4.4	9.72	91.0
1998	27.9	14.0	375	47.5	5.5 7.2	7.75 7.46	95.8
1999	34.4	(1.5)	553	(19.7)	5.2 5.9	6.67 6.51	98.5
2000	39.2	0	444	4.7	6.3	6.11 5.98	101
2001	38.6	12.2	465	0.4	4.6	6.12 6.57	101.6
2002	38.6	38.6	467	37.0	(1.7)	6.29 6.08	106.9
2003	43.3	(5.3)	640	12.8	7.2	4.83	108.6
2004	60.0	8.5	722	(3.74)		5.06	116.7
2005	56.8	25.2	695	22.2			123.2
2006	61.6	14.5	849	30.3			130.4
2007	77.1	(8.3)	1,106	(40.0)			140.2
2008	88.3	32.7	664	50.6			144.3
2009	81.0		1,000	27.5			146.5
2010	107.5		1,275				159.2

Source: JPPH, Bursa Malaysia and Bank Negara (1990 – 2010).

From the Figure 1.0 performance pattern evidence, we can conclude that the property and capital markets have some forms of meaningful relationship. To have an overall picture of the various index performance, Figure 1.0 indicates the main indexes i.e. Malaysian all house price index, FTSE BM Property Index and FTSE BM Composite Index. It is notable that both Malaysia house price index and FTSE BM KL Composite Index graphs shared an almost common performance pattern, although they are not exactly similar.

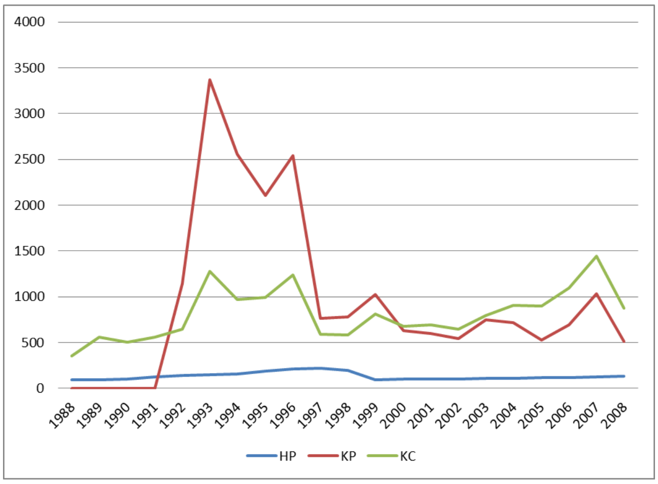

Figure 1.0: Various Index Performance Graph
Source: JPPH (NAPIC) & Malaysian Bourse (1988 – 2008).
Note: HP: Malaysian all house price index, KP: FTSE BM Property Index, KC: FTSE BM Composite Index

PROBLEM STATEMENTS

This study sympathised with Gallin (2006); who noted US house price has grown too quickly, too high in relative to per capita income. He does not support other literatures who found house price and income are cointegrated.

Inadequate and less effective economic signals in the environment today are indeed a serious challenge. The current economic indicators are seen as lack of internal feedbacks which the asset markets themselves could instead tell better. More research is yet to be intensified to rectify these limitations and at the same time to strengthen this statement. This study observed the great potential lies within the property and stock market interaction analysis as a source to enrich the present macroeconomic indicators. The inference effects between asset markets have the capacity to explain the boom and bust cycles. Given the importance of asset markets to the macro economy and their intense interactions with macroeconomic performance as manifested by the Asian and the global financial crisis, the unique asset markets relationship is inclined of taking the guiding role. There is too little evidence on Malaysian asset market interaction to tell whether the property market and stock market are cointegrated, segmented, mixed or changing relationships.

LITERATURE REVIEW

Theory on Property Market – Stock Market Relations

The most appropriate theory to describe the linkage between real estate and capital market is the theory of wealth effects and credit–price effects. This theory reflects the bonding and interaction effects of the assets market. House price, being both investment and consumption goods, is affected by stock market fluctuations through the well-known wealth effects. The increasing share of stocks in investment portfolios and increases in stock prices may motivate people to invest in housing, resulting in translation into higher housing prices. With real estate dominance due to the credit-price effect, the property market may lead to the stock market.

In assessing house price-stock price relations in Thailand, Mansor (2010) noted that the results obtained unequivocally suggested the presence of the wealth effect in the relationship between house prices and stock prices. Namely, in a vector error-correction setting, house prices seem to bear the burden of making adjustment towards the long-run relationship that ties the variables together.

Mansor (2010) also observed that houses and stocks are considered as investment alternatives. At the same time, the former is also viewed as consumption goods. The unexpected gains in stock prices reflecting the increasing share of the stocks in the investment portfolio and wealth and motivate households to rebalance their portfolios by investing in or consuming more housing services. This is the so-called wealth effect, thus, posits a causal direction from stock prices to house prices. Meanwhile, the credit-price effect tends to suggest a reverse causation from house prices to stock prices and admits the possibility of persistent spiralling upturns in both prices.

Traditionally, Eddie (2012) found the Hong Kong stock market and property market are highly correlated, from which either one of these two effects arise: wealth effect (i.e. from stock market to property market) and credit price effect (i.e. from property market to stock market). The wealth effect is usually observed, as the stock market leads the property market.

The wealth effect between stock and property market is asymmetric in the US and it is more significant when the stock price outperforms the housing price over a certain level (I-Chun et al. 2012). As the bull market induces an increase in the stock prices, it subsequently creates wealth for investors. The difference between stock prices and real estate prices reaches a certain level, housing prices soar thereafter. In this market condition, cointegration exists among the markets.

Empirical Study on Asset Markets – Macroeconomic Relations

There are rapid rises in housing or real estate wealth effect either by a sharp increase in asset valuations, an increase in GDP or increase in stock activities. Asset prices have a wealth effect on consumption and economic activity.

National and regional factors are said to have influenced the price increase in the housing boom. Anderson and Beracha (2010) noted home price changes are positively related to returns on stocks and bonds, where home prices in expensive areas or owners of high-priced homes have greater exposure to capital market risk, in line with higher levels of wealth and capital market participation in US. Property markets are negatively affected by the respective unemployment rates in UK and Germany (Schatz and Sebastian 2009). Over the last decade, many researchers have been trying to compare asset price movements onto GDP, regardless of the business cycle they are in. Jie et al. (2010) uses Granger causality on the relationship between real estate investment and GDP per capita growth and found that regions where GDP per capita is low have reflected low real estate investment and vice versa. Kuang et al. (2011) found, in contrast, GDP growth has a very marginal effect on the impulse response for all assets. Sterk (2010) presents that great recession and a fall in house prices or a decline in home equity level creating unemployment and distortions in the labour market where house owners and renters with lack of down payment for new house is reluctant to move to new area to seek for jobs elsewhere. The increasing lending amounts shows growth effect has intensify real estate and capital market activities. Zheng et al. (2011) argued that positive co-movement between land prices and business investment are driving force behind the broad impact of land price dynamics on the macroeconomy, and that land is a valuable collateral asset that firms use to finance investment spending. Changes in asset prices affect net wealth and thereby affect the collateral available for borrowing (William 2011).

METHODOLOGY - DATA

This study of interactions between the property market and capital market includes the main determinants factors of both asset markets. The data used in this study are: Malaysia house price index, made up of Malaysia overall house index as well as all the 14 states house index and types of property index (e.g., high-rise house index, detached house index, semi-detached house index, and terrace house index), FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBM KLCI), real GDP per capita (income), Interest Lending Rate (average by Commercial Banks) and CPI (inflation).

Estimation Methodology Procedure: Unit Root Tests

a) Augmented Dickey-Fuller (ADF)

Dickey-Fuller ADF test was initially introduced by David Dickey and Wayner Fuller in 1979. The tests for unit root identify whether an individual series (Yt) is stationary by running an ordinal least square (OLS) regression equation. The ADF test makes a parametric correction for higher-order correlation by assuming that the y series follow an AR (ρ) process and adjusting the test methodology where ρ is the number of lagged changes in Yt necessary to make εt serially uncorrelated. Two types of Dickey-Fuller regressions covered the non-linear trend and linear trend element respectively as shown in equation (i) and (ii)

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta Y_{t-i} + \varepsilon_t \qquad \text{(i)}$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta Y_{t-i} + \varepsilon_t \qquad \text{(ii)}$$

Where t is the time trend variable, Δ is the first-differenced operator, Yt is the logarithm of the variable in period t, ΔYt = Yt – Yt-1, εt is white noise error term, δ and β2 are the constant parameters.

b) **Phillips-Perron (PP)**
More weight was given to the Phillips-Perron unit root test as this test has been shown to be more reliable than the Dickey-Fuller test in the presence of large amounts of heteroscedasticity. The PP unit root test proposed by Phillips and Perron (1988) and has an advantage as it propose a nonparametric method of controlling for higher-order serial correlation in a series. The PP unit root test is performed by conducting the following regressions as shown in (iii) and (iv):

$$Yt = \alpha 0 + \beta Yt\text{-}1 + \eta t \qquad \text{(iii)}$$
$$Yt = \alpha 0 + \alpha 1t + \beta Yt\text{-}1 + \eta t \qquad \text{(iv)}$$

Where α0 is the intercept, β and α1 is the estimator of the equilibrium parameters, and t is the trend term and ηt is white noise error term.

Estimation Methodology Procedure: Johansen Cointegration Analysis
Formally, if two or more non-stationary time series share a common trend, then they are said to be cointegrated. The theoretical framework highlighted are expressed as following: the component of the vector Yt = (y1t,y2t,…,ynt)' are considered to be cointegrated of order d,b, denoted Yt ~ CI (d,b) if (i) all the component Yt are stationary after n difference, or integrated of order d and noted as Yt ~ I(d). (ii) Presence of a vector β = (β1, β2,…, βn) in such that linear combination βYt = β1y1t + β2y2t +…+ βnynt whereby the vector β is named the cointegrating vector. Johansen's (1991) cointegration test is adopted to determine whether the linear combination of the series possesses a long-run equilibrium relationship. The numbers of significant cointegrating vectors in non-stationary time series are tested by using the maximum likelihood-based λtrace and λmax statistics introduced by Johansen (1991) and Juselius (1990). Following a vector autoregressive (VAR) model, it involves the identification of rank of the n X n matrix ∏ in the specification given in (v) by:

$$\Delta Y_t = \delta + \sum_{i=1}^{k-1} \Gamma_i \, \Delta Y_{t-i} + \prod Y_{t-k} + \varepsilon_t \qquad \text{(v)}$$

Where Yt is a column vector of the n variables, Δ is the difference operator, Γ and ∏ are the coefficient matrices, k denotes the lag length and δ is a constant.

Estimation Procedure: VECM and Granger-Causality Based on VECM

As pointed out by Engle and Granger (1987), even though individual time series are non-stationary, linear combinations of them can be, because equilibrium forces tend to keep such series together in the long run. Moreover, if cointegration is detected then the Granger causality must be conducted in VECM to avoid the problem of misspecification (Granger, 1988). Otherwise, the analysis may be conducted as a standard vector autoregressive (VAR) model. VECM is a special case of VAR that imposes cointegration on its variables. This direction of the Granger causality can only be detected through the VECM derived from the long run cointegrating vectors. In addition, to indicate the direction of causality amongst variables, the VECM also allow us to distinguish between short-run and long-run Granger causality.

The Model

Under this section, the empirical model that will be estimated is discussed. The general functions are as below:

$$prop = f\{stock, macro., others\} \qquad \text{(vi)}$$

To evaluate the general functions above in Equations (vi), the following steps were taken. Rephrasing Equation (vi) as:

$$\ln prop_t = \beta_0 + \beta_1 \ln stock_t + \beta_2 \ln macroeconomic\text{var}iables_t + \varepsilon_t \qquad \text{(vii)}$$

Equation (vii) hereby can be detailed as follows:

$$\ln prop_t = \beta_0 + \beta_1 \ln GDPpc + \beta_2 \ln stock_t + \beta 3 \ln CPI + \beta 4 \ln \text{int}_t + \varepsilon_{ijt} \qquad \text{(viii)}$$

Where $prop_t$ is the property market index both at the aggregated (national) and disaggregated level (state).

Thus, due to need to obtain both long-run and dynamic impact, the writer came up with an error correction cum cointegration model as per Equation (ix) model for property market that will be estimated in this study:

$$\ln prop_t = \alpha_0 + \alpha_1 \ln GDPpc_t + \alpha_2 \ln stock_t + \alpha_3 \ln CPI_t + \alpha_4 \ln \text{int}_t + \upsilon_t \qquad \text{(ix)}$$

Thereby specifying: $EC\ t = \upsilon t$

$$EC\ t = \ln prop_t - (\alpha_0 + \alpha_1 \ln GDPpc_t + \alpha_2 \ln stock_t + \alpha_3 \ln CPI_t + \alpha_4 \ln \text{int}_t) \quad \text{(x)}$$

Subsequently:

$$EC\ t-1 = \ln prop_{t-1} - (\alpha_0 + \alpha_1 \ln GDPpc_{t-1} + \alpha_2 \ln stock_{t-1} + \alpha_3 \ln CPI_{t-1} + \alpha_4 \ln \text{int}_{t-1}) \quad \text{(xi)}$$

Thus, the ECM model to be estimated is as below:

$$\Delta \ln prop_t = \beta_0 + \beta_1 EC_{t-1} + \sum_{t=i}^{p} \alpha_i \Delta \ln GDPpc_{t-1} + \sum_{t=i}^{p} \theta_i \Delta \ln stock_{t-1} \quad \text{(xii)}$$

$$+ \sum_{t=i}^{p} \phi i \Delta \ln CPIt-1 + \sum_{t=i}^{p} \delta i \Delta \ln \text{int}\ t-1 + \sum_{t=i}^{p} \lambda i \Delta \ln proptt-1 + \omega it$$

The selected variables for the regressors for the study are as follows: -

- ➢ $\ln GDPpc_t$ is the logarithm of real gross domestic product per capita,
- ➢ $\ln stock_t$ is the logarithm of stock
- ➢ $\ln CPI_t$ is the logarithm of Consumer Price Index
- ➢ $\ln int_t$ is the logarithm of interest rate,
- ➢ $\ln prop_t$ is the logarithm of property
- ➢ ε_{ijt} is the error term.

All variables obtained from various sources, are as per the following Table 2.0:

Table 2.0: Definition of Variables Used in the Study

Variable Name	Brief Description	Sources of Data
GDPpc: Gross Domestic Product per capita	Real GDP per capita (Income)	BANK NEGARA
Int: Average bank lending rate	Interest rates	BANK NEGARA
Stock: Capital market	Stock Market KL composite index	FTSE BM (KL BOURSE)
CPI: Consumer Price Index	(inflation)	BANK NEGARA MALAYSIA
Prop: Residential Property Market – (Locations)	All 14 states and Malaysia housing market index	NAPIC/INSPEN

Variable Name	**Brief Description**	**Sources of Data**
Prop: Residential Property Market – (Types)	Terrace, high rise, semidetached, detached house market index	NATIONAL ROPERTY INFORMATION CENTRE (NAPIC/INSPEN)

EMPIRICAL RESULTS

Results of Unit Root Tests – ADF, PP

Unit root test was conducted on the property and stock market and the macroeconomic variables. The results of Dickey-FullerADF and Philip-Perron (PP) unit root tests describe the stationary properties of the variables. Schwartz Information Criteria (SIC) is used to select the optimal truncation lag length to ensure the errors are white noise. These results indicated that all the series under study are non-stationary in their level form (Table 3.0). In Table 4.0, all the series can reject a unit root in first difference. The test statistics for all the series are significantly different from zero at five % level. The result suggests that all series are I(1) processes. An I(1) series in order to achieve stationary, the series needs to be differenced once.

Table 3.0: Results of Unit Root Test: Level

Variables	ADF – Level	PP – Level	Remarks
High rise	-0.4100	0.1625	Non stationary
Semidee	1.0129	0.9968	Non stationary
Terrace	1.7545	1.9229	Non stationary
Overall	1.1784	1.8514	Non stationary
Interest	-1.0184	-1.1819	Non stationary
Cpi	-1.3456	-1.0072	Non stationary
Gdp pc	-1.2680	-0.9577	Non stationary
Stock	-1.1335	-0.7819	Non stationary
Johor	-1.7890	-1.7677	Non stationary
Kedah	-0.3749	-0.5455	Non stationary
Kelantan	1.3950	0.8411	Non stationary
KL	-0.0020	1.4426	Non stationary
Melaka	0.0688	-1.1968	Non stationary
Negeri	-0.3160	0.0096	Non stationary
Pahang	-0.9512	-1.1412	Non stationary
Penang	-0.3531	-0.0289	Non stationary
Perak	-1.6927	-0.6857	Non stationary
Perlis	-1.1881	-1.0315	Non stationary
Sabah	-0.0920	0.8766	Non stationary
Sarawak	0.1958	0.5907	Non stationary
Selangor	0.3839	0.6521	Non stationary

Note: *** denotes significance at 1% level

Table 4.0: Results of Unit Root Test: 1st Difference

Variables	ADF – 1st Difference	PP – 1st Difference	Remarks
Detached	-6.6793***	-6.6793***	Stationary
High rise	-7.7559***	-12.7742***	Stationary
Semidee	-9.4161***	-9.4794***	Stationary
Terrace	-7.9269***	-7.9269***	Stationary
Overall	-6.8218***	-6.8208***	Stationary
Interest	-53807***	-5.4591***	Stationary
Cpi	-6.5552***	-12.4919***	Stationary
Gdp pc	-4.1182***	-9.4448***	Stationary
Stock	-4.3742***	-4.3058***	Stationary
Johor	-6.6793***	-6.6793***	Stationary
Kedah	-9.9046***	-10.4662***	Stationary
Kelantan	-6.9818***	-10.0783***	Stationary
KL	-7.9608***	-9.6104***	Stationary
Melaka	-11.9885***	-15.3699***	Stationary

Note: *** denotes significance at 1% level

According to Engle and Granger (1987), two non-stationary time series are cointegrated if their combinations are stationary. Cointegration implies that there is a bounded, linear combination of the levels of the two variables.

Johansen Cointegration Test

Moving on from the earlier root test, the cointegration test is conducted to determine the presence of a long run equilibrium relationship. Since all the variables are noted to be I(1), there exists the possibility that they share a long-run equilibrium relationship. No cointegration test is necessary if the variables in the system are found to be I (0) or stationary. Since the results are non-stationary, the cointegration test is therefore necessary. To test this multivariate cointegration test of Johansen was applied.

The result from Table 5.0 seems indicated there is cointegration between the detached property market and the variables. The same thing happened to the high-rise market which has cointegration with the variables at 5% significant level. Terrace house market which recorded full rank is considered not cointegrated at 5% critical value. However, test on Semidetached market, it is observed that at least one cointegrating vector, thus semidee is cointegrated with stock, GDP income, inflation, and interest rates.

The results from Table 6.0 show there is cointegration between all the states' property market and the variables except Malaysia's overall market which shows a full rank situation implying there was no cointegration at 5% level. Therefore, our results clearly suggest that in the long run property prices in Malaysia (even states) are affected by macroeconomic variables.

Table 5.0: Results of Johansen Cointegration Test by Property Types

Null Hypo	Alt Hypo	Max Eigen	Critical Val	Trace	Critical Val
A) Property Type: Detached = f(Stock, GDP percapita, CPI, Interest)					
r=0	r>0	64.51133**	33.87687	111.6223**	69.81889
r≤1	r>1	24.34606	27.58434	47.11101	47.85613
r≤2	r>2	15.40597	21.13162	22.76496	29.79707
r≤3	r>3	6.676510	14.26460	7.358984	15.49471
r≤4	r>4	0.682474	3.841466	0.682474	3.841466
B) Property Type: Terrace = f(Stock, GDP percapita, CPI, Interest)					
r=0	r>0	54.35524**	33.87687	121.6591**	69.81889
r≤1	r>1	35.26000**	27.58434	67.30381**	47.85613
r≤2	r>2	14.88135	21.13162	32.04381**	29.79707
r≤3	r>3	13.17266	14.26460	17.16246**	15.49471
r≤4	r>4	3.989794**	3.841466	3.989794**	3.841466
C)Property Type: High-rise = f(Stock, GDP percapita, CPI, Interest)					
r=0	r>0	51.52317**	33.87687	93.40180**	69.81889
r≤1	r>1	22.66802	27.58434	41.87863	47.85613
r≤2	r>2	15.03675	21.13162	19.21061	29.79707
r≤3	r>3	3.935590	14.26460	4.173858	15.49471
r≤4	r>4	0.238268	3.841466	0.238268	3.841466
D)Property Type: Semidee = f(Stock, GDP percapita, CPI, Interest)					
r=0	r>0	63.12637**	33.87687	127.2125**	69.81889
r≤1	r>1	36.74924**	27.58434	64.08610**	47.85613
r≤2	r>2	22.86885**	21.13162	27.33686	29.79707
r≤3	r>3	4.333764	14.26460	4.468011	15.49471
r≤4	r>4	0.134247	3.841466	0.134247	3.841466
E) Property State : Kuala Lumpur = f(Stock, GDP percapita, CPI, Interest)					
r=0	r>0	57.64060**	33.87687	132.0483**	69.81889
r≤1	r>1	43.45980**	27.58434	74.40769**	47.85613
r≤2	r>2	24.82773**	21.13162	30.94789**	29.79707
r≤3	r>3	6.011675	14.26460	6.120160	15.49471
r≤4	r>4	0.108485	3.841466	0.108485	3.841466
F) Property State : Selangor = f(Stock, GDP percapita, CPI, Interest)					
r=0	r>0	52.20932**	33.87687	117.8190**	69.81889
r≤1	r>1	34.14028**	27.58434	65.60967**	47.85613
r≤2	r>2	22.33697**	21.13162	31.46939**	29.79707
r≤3	r>3	6.370743	14.26460	9.132428	15.49471

r≤4	r>4	2.761686	3.841466	2.761686	3.841466

Note: ** denotes significance 5% probability level Lags: 3, Critical Value at 5%

RELATIONSHIP BASED ON VECM AND GRANGER CAUSALITY

The VECM is adopted to study the relationship of the stock market, GDP income per capita, CPI (inflation) and banks' lending rates in the property market performance. Granger causality test is used to investigate the temporal relationship between the property market and the capital market. In the Granger causality test, the degree of exogeneity can be identified through the lagged error correction term. The testing is whether a particular variable precedes another and not causality in the sense of cause and effect. Figures in brackets "( )" are the probability of significance.

A precondition to Granger causality is to check the cointegrating properties of the variables since the standard test for Granger causality is not valid with the existence of 'cointegration' (Granger 1988). When two variables cointegrated, Granger causality should exist in at least one direction, meaning that cointegration implies causal effects in the sense of Granger (Engle and Granger 1987). With the error correction term obtained from the cointegrating regression, reincludes the long run information into the analysis and makes the direction of Granger causality worth investigated.

The VECM estimates showing the long-run relationship of house type as well as the VEC Granger Causality showing the short run of house type as shown as per Tables 7.0 and Table 8.0

Table 7.0: VECM estimates DEPENDENT: SEMIDEE TYPE (Long run relationship)

Regressor: SEMIDEE	Stock	GDP per capital	CPI inflation	Interest
coefficient	-0.410296	0.125635	2.474068	-1.138763
Standard Error	(0.10120)	(0.30717)	(0.74542)	(0.13478)
t – statistic	[- 4.05420]	[0.40901]	[3.31902]	[- 8.44912]
significance	**		**	**

NOTE: ** denotes significance; standard error in ( ), t-statistics in [ ]; Lags= 3

Table 8.0: Short Run Causality Test VEC Granger Causality/Block Exogeneity Wald Tests DEPENDENT: SEMIDEE type

INDEPENDENT	causal	PROPERTY	PROPERTY	Causal	INDEPENDENT
Stock	-□ 9.5993 (0.022)**	Semidee	Semidee	-/-> 1.954 (0.58)	Stock

GDP percapi	-/-> 3.864 (0.276)	Semidee	Semidee	-/-> 1.419 (0.701	GDP percapi
CPI inflation	-/-> 1.956 (0.581)	Semidee	Semidee	-/-> 3.203 (0.361	CPI inflation
Interests	-/-> 0.922 (0.81)	Semidee	Semidee	-/-> 1.731 (0.630)	Interest

NOTES: Lags 3; Probability in parenthesis ( ) ; Coefficient: Chi-sq ** denotes significance 5% level,: (-/->) and (--□) indicates no Granger cause and Granger cause respectively.

From Table 9.0 the stock and interest are estimated to negatively influence the semidetached property market in the long run. On the other hand, income is estimated to positively influence property market for SEMIDEE. The results suggest that a 1 % increase in stock market, SEMIDEE property price decrease by 0.4%. For CPI, an increase of 1% will increase SEMIDEE price by 2.4%.

Table 9.0: Summary of VECM Long Run Relationship GDP per capita (inflation)

Regressor	Stock		CPI	Interest
Coefficient: JOHOR	-5.343325**	1.940920	15.88162**	-5.844685**
Standard Error	(0.82840)	(2.27313)	(5.29681)	(1.07550)
t – statistic	[- 6.45015]	[0.85385]	[2.99834]	[- 5.43437]
Coefficient: KEDAH	-1.546706**	0.946076	3.911858**	-2.169593**
Standard Error	(0.27783)	(0.78018)	(1.68307)	(0.36953)
t – statistic	[- 5.56708]	[1.21264]	[2.32424]	[- 5.87127]
Coefficient: KELANT	0.661253**	-0.077285	-1.133295**	-0.107845
Standard Error	(0.07353)	(0.23549)	(0.50017)	(0.09965)
t – statistic	[8.99301]	[- 0.32819]	[- 2.26582]	[- 1.08219]
Coefficient: KL	-0.162036	0.031162	1.995765**	-1.127738**
Standard Error	(0.09767)	(0.27127)	(0.65199)	(0.13729)
t – statistic	[- 1.65899]	[0.11487]	[3.06105]	[- 8.21398]
Coefficient: MELAKA	1.00495**	-0.702014	-2.53911**	1.29195**
Standard Error	(0.137050)	(0.396672)	(0.890351)	(0.189418)
t – statistic	[7.33280]	[- 1.7698]	[- 2.85182]	[6.82065]
Coefficient: NEGRI 9	-0.315791**	0.054334	1.688674**	-0.875673**
Standard Error	(0.08088)	(0.23379)	(0.51307)	(0.11201)
t – statistic	[- 3.90446]	[0.23240]	[3.29130]	[- 7.81759]
Coefficient: SELANGO	-6.700098**	5.263482	16.15925**	-2.780650**
Standard Error	(1.17639)	(2.98628)	(5.14069)	(1.24573)
t – statistic	[- 5.69545]	[1.76256]	[3.14340]	[- 2.23215]

Coefficient: TERENGG	7.610502**	-1.156015	-14.96996	8.082161**
Standard Error	(1.33025)	(3.93730)	(8.63370)	(1.78661)
t – statistic	[5.72111]	[- 0.29361]	[- 1.73390]	[4.52373]
Coefficient: DETACHE	-0.522888**	-0.084075	3.226661**	-1.520207**
Standard Error	(0.13722)	(0.40472)	(0.87762)	(0.21124)
t – statistic	[- 3.81064]	[- 0.20774]	[3.67661]	[- 7.19672]
Coefficient: HIGHRISE	5.935941**	-0.036633	-16.76158**	6.144262**
Standard Error	(1.06272)	(3.07583)	(6.96611)	(1.48201)
t – statistic	[5.58563]	[- 0.01191]	[- 2.40616]	[4.14591]
Coefficient: SEMIDEE	-0.410296**	0.125635	2.474068**	-1.138763**
Standard Error	(0.10120)	(0.30717)	(0.74542)	(0.13478)
t – statistic	[- 4.05420]	[0.40901]	[3.31902]	[- 8.44912]

*NOTE: ** denotes significance at 5% level.*

Table 10.0: Brief Summary of Short Run Granger Causality

Dependent	Independent			
	Stock	**GDP percapita**	**CPI (inflation)**	**Interest rates**
Overall Property	NC	NC	NC	I□O,O□I
Terrace	NC	NC	NC	T□I
Highrise	NC	NC	NC	NC
Semi detached	S□SD NC	NC	NC	NC
Detached	NC	G□D	D□C	I□D
Kedah	S □ J	K □ G NC	NC	NC
Johor	K □ S	NC	NC	J□I NC
Kelantan	S □ KL	G □ KL	NC	I □ KL NC
Kuala Lumpur	S □ M, M□S	NC	C□KL, KL□C	NC
Melaka	NC	NC	NC	NC
Negri Sembilan	NC	NC	NC	NC
Pahang	NC	NC	NC	NC
Penang	NC	P □G NC	NC	NC
Perak	S □ P NC	NC	NC	NC
Perlis	NC	NC	NC	NC
Sabah	S□S, S□S	NC	NC	NC
Sarawak	NC	NC	NC	NC
Selangor			NC	
Terengganu			NC	

NOTE: NC = Non Causal **T = Terrace** **□ = unidirectional**
□ = Granger Cause **H = highrise** **□ □ = bidirectional**
S = Stock **SD = SemiDetached**
G = GDP percapita **D = Detached**
C = CPI (inflation) **I = Interest Rates**

CONCLUSIONS

This study has noted to what extent the interactions between property and capital markets exist. By taking the case of Malaysia's robust growth, this study observed that the stock market has contemporaneous cointegration with the property market. The stock and the GDP per capita "Market Interaction Value" (MIV) coefficient showed the highest influence on Penang, Selangor, and Johor residential properties. Inflations and interest rates MIVs also showed their highest influence on the three states. The high effects of those variables onto residential property in those states reflected their urbanised level as expected.

By referring to majority grouping, it is noted that stock (capital market) and interest rates (monetary policy) has negative influence on most of the states' property market, whilst GDP per capita (income) and CPI (inflation) has positive influence on most of the states' property market. Detached house type has a significant long-run relationship with stock, CPI and interest except for GDP per capita. GDP per capita and Interest rates Granger cause Detached whilst detached house market Granger cause CPI inflation.

The stock market is found to be cointegrated with both aggregated and disaggregated property market. One percent increase in stock price is followed by a 6% increase in the highrise-type house market or the increase by 9% of the Penang state house market. Based on VECM, unidirectional and bidirectional Granger causality was detected among the variables. Stock market Granger causes property markets namely in Johor, Kuala Lumpur, Selangor, Perlis and Melaka thus suggesting a substantial wealth effect running from stock to property market in those states whilst property market in Kelantan, Melaka and Selangor state Granger cause stock market indicating presence of credit-price effect. Generally, the property market of all types at all states level is cointegrated with stock (capital market), real GDP per capita (income), CPI (inflation) and interest rates (monetary policy).

Real GDP per capita has positive cointegration with property, however, most are not (t-statistic) significant. The per capita income insignificant involves all states except Kuala Lumpur and Melaka, with low coefficients and covers all property types and states. This may indicate the danger of a rapid rise in house prices and overheating which later not supported by people's income & affordability level. Wage increase has greatly lagged behind property price increase. Anxious overbuilt problems can start with declining demands, rising space vacancies, reduced rental yields and eventual soft landing of the property market.

Despite a 1% increase in CPI inflation, the detached house market increase by 3.22%. Thus, the house price impact is higher than inflation. Some states have positive inflation and it beats the norms that usually inflation is negative to property price (theoretically sharing the similar averse character with interest rates). The inflation coefficient of Penang with property is 19.2, Selangor

16.1 and Johor 15.8; the magnitude which is very much higher than other states may indicate their level of inflation stress. The magnitude of their inflation coefficient on property is very much higher compared to inflation on stock (9.09; 6.7; 5.3), income (2.17; 5.26; 1.9) and interest (9.11; 2.7; 5.8) coefficients respectively. As inflation is significant to all states except Perlis and Pahang, cautious steps are therefore recommended to avoid the danger of inflation traps. Interest rates have a negative relationship with the property market of various types and states except the highrise type. Highrise has a positive relationship may due to the over influence of luxury and high-end type as expensiveness has become secondary.

Interest charges pose a substantial cost to real estate. Interest rates longrun impact is negative to property. The property market may show no spontaneous reactions to Bank Negara interest directives. The interest rate has bidirectional Granger causality with Malaysia's overall property market; this may indicate the high impact of the relationship between monetary policy and property market at the national level. This study observed the great potential lies within property and stock market interaction analysis as a source to enrich the present macroeconomic indicators. The inference effects between asset markets have the capacity to indicate the boom and bust cycles. Given the importance of asset markets to the macro economy and their intense interactions with macroeconomic performance as manifested by the Asian and the global financial crisis, the unique asset markets relationship has a better capacity to reflect economic conditions.

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