CHAPTER 4: RESEARCH RESULTS

4.1 Micro factors analysis

4.1.1 Testing of mean and median price as unit of measurement

Table 4.1
Correlation Comparison (Sample): Mean Price and Median Price

Variables	Kuala Lumpur – Mean Price	Kuala Lumpur – Median Price	Perak – Mean Price	Perak – Median Price
LNS	-.335**	-.373**	-.228**	-.286**
LN∆PrMean	.254**	0	.147**	0
LN∆PrMedian	0	.342**	0	.210**
**. Correlation is significant at the 0.01 level (2-tailed).				

The correlation test of housing prices using the mean and median price from the Property Market Report published by the Valuation and Property Services Department, Ministry of Finance, basing on a random sample selected for Kuala Lumpur and Perak are compared and both produced the consistent

signs in supply and price change. The correlation is also significant at the same level of confidence of 0.01.

Hence, the mean price is used for further analysis applications while the median price analysis will not be replicated to avoid duplication.

4.1.2 Descriptive statistics

In all locations, the mean price of a residential house is above RM100,000. Kuala Lumpur registered the highest mean price of RM425,172 reflecting the city status and the affluence in it. The standard deviation of its mean is also big indicating a wide difference between the prices of the low cost type to the price of a luxury detached house. All other standard deviations mean prices for the locations are below, but close to, the mean. The mean prices of Selangor State and Penang Island are also reflective of their strong demand. Although Sabah is considered as less developed than West Malaysia, the mean price is pretty high. This reflects the higher costs of building materials that are being transported over from West Malaysia, just as in the higher prices of other consumer products.

Comparatively, Selangor has the largest mean units in supply while Sabah is rather limited despite the high mean price. Most of the states have a steady supply of houses above 5,500 units. The standard deviations of supply are widely dispersed. This is due the type and the time in each state.

Table 4.2
Descriptive statistics of micro variables

Location	Variable	Mean	Std. Deviation	Skewness	Kurtosis
Penang	Pr	248247	246563	2.52	9.86
	Supply	6723	10682	4.38	22.59
	LNΔPr	0.96	0.37	-0.09	5.54
Perak	Pr	108858	77055	0.62	0.28
	Supply	5817	10676	3.20	9.89
	LNΔPr	0.90	0.51	6.00	133.77
Kuala Lumpur	Pr	425172	623338	3.10	12.86
	Supply	10487	19629	3.95	18.09
	LNΔPr	1.01	0.68	8.16	135.78
Selangor	Pr	256618	248455	1.83	3.40
	Supply	20877	26901	2.28	5.86
	LNΔPr	0.87	4.89	-14.06	308.29
Negeri Sembilan	Pr	129176	102776	6.79	103.63
	Supply	6417	10049	2.73	7.56
	LNΔPr	0.99	0.61	7.43	102.55
Malacca	Pr	147424	93837	1.01	0.78
	Supply	6561	7791	1.82	2.30
	LNΔPr	0.73	2.29	-7.55	98.59
Johor	Pr	154094	104806	1.14	2.15
	Supply	11408	17914	3.23	10.82
	LNΔPr	0.95	0.41	0.67	11.03
Pahang	Pr	150386	117466	4.28	45.68
	Supply	3874	5257	2.10	3.62
	LNΔPr	0.99	0.53	4.10	54.81
Trengganu	Pr	133034	70161	0.75	0.42
	Supply	1571	1080	0.81	0.00
	LNΔPr	1.04	0.22	0.94	3.83
Sabah	Pr	192730	145513	2.17	7.60
	Supply	2183	2484	1.91	3.48
	LNΔPr	0.98	0.44	1.84	27.25

On average during the period of study, the change in mean price actually decreases, except Kuala Lumpur and Trengganu, with Malacca at only 0.73. As this study is not based on repeat sales sample, this result is not precise. For example, a large detached house in central Petaling Jaya, Selangor state is selected as a sample in Q2 which was transacted for, say RM3.0 million and in

Q3 a smaller detached house in Rawang was transacted for, say RM1.0 million. Hence, the log change in mean price is only 0.333.

Both mean price and supply are positive in their skewness and Kurtosis in all states. Perak has lowest skewness and Kurtosis in price while Negeri Sembilan is on the opposite.

4.1.3 Correlation analysis

Before establishing the regression analysis, the correlations of selected micro factors must be established to ensure there is a linear relationship in the factors and also to determine how strong are these relationships vis-à-vis perfection. In this study it was hypothesized that;

1) The supply of residential units will have a significant relationship to the mean prices. In economic terms, supply and prices are expected to correlate with each other.
2) The price change from one quarter to another will lead to a significant correlation. It is postulated that as price moves up or down from one quarter to another, it will move in a linear pattern with the sale price.

Further comparison is tabulated in the next table and the results interpreted accordingly. However, there is no significant correlation between the supply and change of prices. This result was checked across the board for all the selected states under study and was consistent throughout.

Table 4.3
Correlation summary LNPr in each state.

Location	LNS	LN∆Pr
Penang	-.306**	.157**
Perak	-.228**	.147**
Kuala Lumpur	-.335**	.254**
Selangor	-.298**	.063*
Malacca	-.141**	.151**
Negeri Sembilan	-.134**	.258**
Johor	-.183**	.170**
Pahang	-.068*	.275**
Trengganu	-.227**	.174**
Sabah	0.013	.266**

*. Correlation is ignificant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Supply is correlated to the prices of residential houses in eight states at the significant level of 0.01, one state is significant at 0.05 level while Sabah does not have a relationship. The Pearson Correlation for supply to the mean price indicates that Perak, Malacca, Negeri Sembilan, Johor, Pahang and Trengganu have a small effect size. Penang, Kuala Lumpur and Selangor have a medium effect size, according to Cohen's size effect criteria r=0.1 - 0.23 as small and r=0.24 – 0.36 as medium. A Pearson Correlation reading of +1 means a perfect positive linear relationship while a reading of −1 means a perfect negative linear relationship. In other words, positive is increasing while negative is decreasing in the movement of a pair of variables. Usually, the value lies between −1 and 1, indicating the degree of linear dependence between the variables. As it approaches zero there is less of a relationship, but the closer the coefficient is to either −1 or 1, the stronger the correlation between the variables.

Although the overall correlation is significant at 0.01 to .05 level in the study, the Pearson Correlation shows that these are rather weak at below 0.3 for eight states, (Pallant, 2010).

Mean price changes from one quarter to another for the period of Q1 2004 to Q4 2010 are correlated at the significant level of 0.01 for nine states while one state is at the 0.05 level. However, the Pearson Correlation for those that are at the significant level indicates weak linear relationship of .063 for Selangor to a high of only .275 for Pahang (Pallant, 2010).

In conclusion, it has been established from these correlations that a fairly good fit for supply while a weak fit for change in mean price will result from the samples for multiple regression analysis.

4.1.4 Testing of hypotheses

4.1.4.1 Regression analysis

For meaningful comparative study each state is tabulated with relevant data only and those that are self explanatory or less important in explaining the results are skipped. The model summary results in simplified format are tabulated in Table 4.4.

Table 4.4
Regression model summary

	Penang				Perak				Kuala Lumpur				Selangor			
Varaiable	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity
	B	Sig	Beta	VIF	B	Sig	Beta	VIF	B	Sig	Beta	VIF	B	Sig	Beta	VIF
(Constant)	11.49	**			10.55	**			12.41	**			10.214	**		
LNS	0.029		0.038	2.42	0.032	**	0.08	1.33	0.017	*	0.028	1.68	0.174	**	0.31	3.00
LNΔPr	0.359	**	0.136	1.01	0.165	**	0.13	1.01	0.003	**	0.037	1.03	0.003		0.013	1.01
DummST	-0.01		-0.01	2.17	0.4	**	0.28	1.60	-0.181	**	-0.06	2.03	0.084	*	0.033	1.85
DummDT	0.379	**	0.145	2.21	0.895	**	0.58	1.50	0.25	**	0.086	2.00	0.41	**	0.161	1.94
DummSSD	0.31	**	0.115	2.32	0.939	**	0.57	1.52	0	**	0	0.00	1.109	**	0.415	3.16
DummDSD	0.895	**	0.344	2.26	1.479	**	0.83	1.58	1.419	**	0.389	2.02	1.675	**	0.648	2.40
DummDet	1.058	**	0.391	2.61	0.871	**	0.57	1.51	1.458	**	0.453	2.28	1.511	**	0.59	2.25
DummLCH	-0.74	**	-0.25	1.98	0	**	0	0.00	-0.788	**	-0.17	1.57	-0.356	**	-0.14	1.92
DummLCF	-1.2	**	-0.43	2.08	-0.438	**	-0.13	1.11	-1.452	**	-0.46	1.72	-0.981	**	-0.36	1.75
DummFlat	-0.62	**	-0.21	2.08	-0.014		-0	1.05	-1.128	**	-0.38	1.91	-0.554	**	-0.21	1.79
R^2	0.7				0.744				0.872				0.851			
Adjusted R^2	0.697				0.742				0.871				0.85			
F	241.024**				400.537**				864.294**				676.454**			

	Negeri Sembilan				Malacca				Johor				Pahang			
Variable	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity
	B	Sig	Beta	VIF	B	Sig	Beta	VIF	B	Sig	Beta	VIF	B	Sig	Beta	VIF
(Constant)	11.06	**			10.9	**			11.28	**			11.25	**		
LNS	0.058	**	0.131	1.30	0.087	**	0.201		0.042	**	0.078	1.33	0.068	**	0.142	1.25
LNΔPr	0.219	**	0.212	1.01	0.004		0.017	1.67	0.295	**	0.16	1.01	0.294	**	0.225	1.03
DummST	-0.35	**	-0.24	4.04	-0.224	**	-0.13	1.06	-0.252	**	-0.14	4.72	-0.486	**	-0.314	3.44
DummDT	0.184	**	0.109	3.39	0.407	**	0.233	2.76	0.079	**	0.043	4.48	0.049	**	0.029	3.09
DummSSD	0.408	**	0.201	2.74	0.559	**	0.288	2.50	0.191	**	0.096	3.94	0.014	**	0.006	2.04
DummDSD	0.763	**	0.305	2.25	1.099	**	0.481	2.34	0.771	**	0.355	3.57	0.616	**	0.256	2.09
DummDet	0.473	**	0.264	3.08	0.859	**	0.489	1.93	0.164	**	0.087	4.31	-0.049	**	-0.03	3.18
DummLCH	-0.87	**	-0.58	3.83	-0.412	**	-0.25	2.84	-1.183	**	-0.16	1.23	-1.153	**	-0.708	3.22
DummLCF	-1.09	**	-0.39	1.87	-0.895	**	-0.33	2.65	-1.512	**	-0.35	1.68	-1.515	**	-0.377	1.38
DummFlat	-0.69	**	-0.09	1.11	-0.634	**	-0.26	1.68	-0.828	**	-0.17	1.52	0	**	0	0.00
R^2	0.859				0.833				0.75				0.752			
Adjusted R^2	0.857				0.828				0.748				0.749			
F	469.047**				166.113**				363.793**				336.428**			

Table 4.4 (continued)

	Trengganu				Sabah			
Variable	Unstandardized Coefficients		Standardized Coefficients	Collinearity	Unstandardized Coefficients		Standardized Coefficients	Collinearity
	B	Sig	Beta	VIF	B	Sig	Beta	VIF
(Constant)	10.97	**			10.67	**		
LNS	0.096	**	0.152	1.25	0.123	**	0.259	1.37
LNΔPr	0.446	**	0.173	1.01	0.362	**	0.211	1.02
DummST	-0.652	**	-0.468	1.47	-0.114	**	-0.072	2.76
DummDT	-0.012		-0.006	1.26	0.179	**	0.101	2.34
DummSSD	-0.177	**	-0.115	1.43	0.498	**	0.196	1.85
DummDSD	0.319	**	0.113	1.15	0.804	**	0.428	2.26
DummDet	0		0	0.00	0.829	**	0.45	2.52
DummLCH	-1.361	**	-0.956	1.55	-0.583	**	-0.288	2.04
DummLCF	-1.672	**	-0.326	1.05	-0.917	**	-0.344	1.59
DummFlat	0		0	0.00	-0.432	**	-0.179	1.74
R^2	0.868				0.749			
Adjusted R^2	0.866				0.747			
F	508.546**				308.261**			

**. Significant at the 0.01 level (2-tailed).
*. Significant at the 0.05 level (2-tailed).
a. Dependent Variable: LNMeanPr

There is a positive relationship for predictors of supply of residential units at the significant of 0.01 level for Perak, Selangor, Negeri Sembilan, Malacca, Johor, Pahang , Trengaanu and Sabah. Kuala Lumpur is significant at the 0.05 level while there is no relationship for Penang.

There is a positive relationship for predictors of change in mean price at the significant of 0.01 level Penang, Perak, Kuala Lumpur, Negeri Sembilan, Johor, Pahang , Trengaanu and Sabah. However, there is no relationship for Selangor and Malacca.

Collinearity effects on the models are well controlled as all the VIFs are of low value of less than 4 in the above table. However, where collinearity exists,

this is noted in the state occurring and the treatment explained. Actually, there is no fixed rule to determine what value is considered as big for VIF to be in trouble. Some say look for values of 10 or larger, but there is no certain number that spells death. In this study, when collinearity VIF exceeds 4, the factors are re-examined with one of the higher being dropped.

The beta in the unstandardized coefficient column will form the value in the regression equation for each state.

The impact of each dummy or type of residential unit is best described for each state separately to understand the relationship.

4.1.4.2 State by state analysis

Penang.

Seven dummy predictors are having a regression relationship at a significant 0.01 level of confidence in the sample to influence on the dependent variable price, except DummST which is not significant. The hedonic regression may be expressed as;

MeanPr = 11.49 + .029(LNS) + .359(LN∆Pr) - .013(DummST) +
.329(DummDT) + .31(DummSSD) + .895(DummDSD) +
1.058(DummDet) - .735(DummLCH) – 1.195(DummLCF) -
.616(DummFlat)

Hence, for every 1000 units of Double Storey Terrace house transacted in the property market in Penang, it will cause the mean price in the market to move up by RM329, holding all other assumptions constant. Conversely, for every 1000 units of Low Cost House transacted in the market will cause the mean price to drop by RM735. Hence, positive variables increase the value of the property market but negative values erode the market.

It seems that house buyers in Penang prefer to own double storey terrace, single storey semi-detached, double storey detached and detached houses and are willing to pay a higher price for houses with land space. This could be due to the limited land space available. They are perceived as uncomfortable buying low cost house, low cost flat and flat. This could be due to the pride of Penangites to own upper class properties in their island mentality.

Perak.

Six dummy variables have a regression relationship at significant level 0.01, except DummLCH and DummFlat which are not significant.

The first run of regression for Perak including all dummies as independent variables produced two Collinearity VIF >4 in single storey terrace and low cost house. The low cost house was removed in the 2nd regression and there was no further collinearity problem.

Perak is an ex-tin mining state where land acreage is big. Hence, house buyers in Perak prefer to own single storey terrace, double storey terrace, single

storey semi-detached, double storey detached and detached houses. They dislike low cost flat and even flat transaction is not significant in the model. This could be due to the pride of Perakians who are used to open spaces. The supply effect on mean price is small at only 32 per 1000 houses while the price change in mean from one quarter to another has a more positive impact of 165 per RM1000. Double storey terrace, single storey semi-detached, double storey semi-detached and detached have positive coefficients to impact on the mean price.

Kuala Lumpur

All dummy predictors used in Kuala Lumpur are significant at the level of 0.01. The single storey semi-detached type was no longer popular in supply and transactions were just a few over the ten years period in a few districts only.

Double storey semi-detached and detached have high coefficients to impact positively on the mean price. Low cost flat, flat and low cost house have the opposite high coefficients to impact negatively on the mean price. The supply and price change in mean have low positive coefficient effect on mean price. During the past the ten years, with the higher earning power of urbanites and influx of foreigners who enjoy living in city transaction prices of properties have shot up very fast. Double storey semi-detached and detached houses are in the forefront of the regression. As these types of units have land leverage, the result is consistent with the findings of Borassa, Huarin, Hoesli and Sun (2009) in their research using New Zealand data. Also, as the city becomes more affluent,

buyers are shunting away from low cost house and flats. Generally as noted before, low cost flat and flat have the additional problems of poor maintenance.

Selangor

All dummy predictors used in Selangor are significant at the level of 0.01, except DummST which is significant at the .05 level.

Single storey semi-detached, double storey semi-detached and detached have high coefficients to impact positively on the mean price. Low cost flat have the opposite high coefficient while flat and low cost house have mild coefficients to impact negatively on the mean price. The supply and price change in mean have low positive coefficient effect on mean price. In Selangor, buyers have preference of single storey semi-detached, double storey semi-detached and detached houses resulting in the steep slope of the linear regression while they are adversed to low cost flat and flat. The explanation in Kuala Lumpur for such adversed behaviour applies too.

Negeri Sembilan

All dummy predictors used in Negeri Sembilan are significant at the level of 0.01, except DummDT which is significant at the .05 level.

Negeri Sembilan is a small state and the property market transactions have generally being slow going. However, the surprising variable in this model is the negative impact from the single storey terrace house. The double storey

terrace, single storey semi-detached, double storey semi-detached and detached houses have low to moderate coefficients as compared to Selangor. However, the negative variables of low cost house, low cost flat and flat have more or less the same severity of impact as in Selangor.

Malacca

All dummy predictors used in Malacca are significant at the level of 0.01.

Malacca being another small state have very similar characteristics as Negeri Sembilan in her property market transactions. However, the slopes of its regression, both positive and negative are more aggressive.

Johor

All dummy predictors used in Johor are significant at the level of 0.01, except DummDT being not significant.

Johor has quite a wide land acreage and much of the land is used for plantation. It has the highest positive coefficient of .295 for price change in mean as compared to other states. Even though Johore Baru is just across the prosperous island of Singapore, in terms of development, it is still far behind as compared to it or Kuala Lumpur. Even though landed properties of single storey terrace, single storey semi-detached, double storey semi-detached and detached houses are positively contributing to the movement of mean price, the coefficients are not as high as other states. On the contrary, low cost house, low

cost flat and flat are having higher negative coefficients than other states. Perhaps, buyers perceive that with that much land available in Johor they do not need to pay a high price for landed property and they view that flats are unattractive for accommodation.

Pahang

All dummy predictors used in Pahang are significant at the level of 0.01. The number of flat transactions in the districts of Pahang were not frequent and, hence, removed.

Pahang has a hilly terrain on its west with the Titiwangsa Mountain Range and a coastline to its east facing the South China Sea. Its price change in mean is just .001 lower than Johor. Low cost house and low cost flat are having high negative coefficients than other types in the state while there are not enough data for flat to be considered. Due to the nature of hilly terrain with the risk of landslide during the monsoon season, perhaps, buyers perceive that flats are unattractive for accommodation. There are still many villages or “kampongs” with wooden houses and carefree simple lifestyle living suits the residents of Pahang.

Trengganu

The DummDT predictors in Trengganu are not significant in the regression model while DummDet and DummFlat are without sufficient transactions. All other dummy predictors are significant at the 0.01 level.

Trengganu state is north of Pahang with the sharing of Titwangsa Mountain Range to its west and a sea coast to its east. Given the close proximity of these two states with similar geographical landscape and culture, it is not a surprise that both regression results are so close to each other from the constant to the last variable of DummLCF.

Sabah

All dummy predictors in Sabah are significant in the regression model at the 0.01 level.

Sabah, or also known as The Land Beneath The Wind, contains the world's oldest rain forest. During the last ten years its state capital Kota Kinabalu has developed tremendously into a cosmopolitan when it was once like an old shanty town viewed from aerial because of the colony of immigrants occupying the seacoast. It has a high positive coefficient in supply and mean price change. The negative coefficient for types are much gentler than in other states while the positive coefficient are quite high for double storey semi-detached and detached houses. Overall, the property market in Sabah looks quite balanced with the independent variables movement in either directions to impact on the dependent variable of mean price.

Each of the model explains at least 70% of the mean price variation in the hedonic regression. The best models are Kuala Lumpur and Trengganu with 87% and F value of 864 and 509, respectively. These results are consistence

with other researches Xu, (2008), 0.7028 to 0.8544; Bourassa, Hoesli and Peng, (2003), 0.69 to 0.72.

4.1.5 Summary of research results

Table 4.5
Summary of regression hypothesis results using micro variables

Micro Variables : LNMeanPr as the dependant variable.							
State	Parameter	Expected sign	Result	State	Parameter	Expected sign	Result
Penang	LNS	+ve	N	Malacca	LNS	+ve	Y
	LNΔPr	+ve	Y		LNΔPr	+ve	N
	DummST	+ve	N		DummST	+ve	N
	DummDT	+ve	Y		DummDT	+ve	Y
	DummSSD	+ve	Y		DummSSD	+ve	Y
	DummDSD	+ve	Y		DummDSD	+ve	Y
	DummDet	+ve	Y		DummDet	+ve	Y
	DummLCH	-ve	Y		DummLCH	-ve	Y
	DummLCF	-ve	Y		DummLCF	-ve	Y
	DummFlat	-ve	Y		DummFlat	-ve	Y
Perak	LNS	+ve	Y	Johor	LNS	+ve	Y
	LNΔPr	+ve	Y		LNΔPr	+ve	Y
	DummST	+ve	Y		DummST	+ve	N
	DummDT	+ve	Y		DummDT	+ve	Y
	DummSSD	+ve	Y		DummSSD	+ve	Y
	DummDSD	+ve	Y		DummDSD	+ve	Y
	DummDet	+ve	Y		DummDet	+ve	Y
	DummLCH	-ve	N		DummLCH	-ve	Y
	DummLCF	-ve	Y		DummLCF	-ve	Y
	DummFlat	-ve	N		DummFlat	-ve	Y
Kuala Lumpur	LNS	+ve	Y	Pahang	LNS	+ve	Y
	LNΔPr	+ve	Y		LNΔPr	+ve	Y
	DummST	+ve	N		DummST	+ve	N
	DummDT	+ve	Y		DummDT	+ve	Y
	DummSSD	+ve	Y		DummSSD	+ve	Y
	DummDSD	+ve	Y		DummDSD	+ve	Y
	DummDet	+ve	Y		DummDet	+ve	N
	DummLCH	-ve	Y		DummLCH	-ve	Y
	DummLCF	-ve	Y		DummLCF	-ve	Y
	DummFlat	-ve	Y		DummFlat	-ve	N

Table 4.5 (continue)

Selangor	LNS	+ve	Y	Trengganu	LNS	+ve	Y
	LNΔPr	+ve	N		LNΔPr	+ve	Y
	DummST	+ve	Y		DummST	+ve	N
	DummDT	+ve	Y		DummDT	+ve	N
	DummSSD	+ve	Y		DummSSD	+ve	N
	DummDSD	+ve	Y		DummDSD	+ve	Y
	DummDet	+ve	Y		DummDet	+ve	N
	DummLCH	-ve	Y		DummLCH	-ve	Y
	DummLCF	-ve	Y		DummLCF	-ve	Y
	DummFlat	-ve	Y		DummFlat	-ve	N
Negeri Sembilan	LNS	+ve	Y	Sabah	LNS	+ve	Y
	LNΔPr	+ve	Y		LNΔPr	+ve	Y
	DummST	+ve	N		DummST	+ve	N
	DummDT	+ve	Y		DummDT	+ve	Y
	DummSSD	+ve	Y		DummSSD	+ve	Y
	DummDSD	+ve	Y		DummDSD	+ve	Y
	DummDet	+ve	Y		DummDet	+ve	Y
	DummLCH	-ve	Y		DummLCH	-ve	Y
	DummLCF	-ve	Y		DummLCF	-ve	Y
	DummFlat	-ve	Y		DummFlat	-ve	Y

Y = Supported
N = Not supported

The hypothesis H_1 that there is positive and significant relationship between housing price and supply of houses are well supported in nine states, except Penang.

The hypothesis H_2 that there is positive and significant relationship between housing price and change in price from one quarter to another is supported in seven states but not in the other three states.

The hypothesis H_3 that there is positive and significant relationship between housing price and single storey terraced house is not supported in eight states. This could be due to the fact that single storey terraced house is viewed

as inferior in today's affordable society. In fact, there are hardly any new developments for single terrace houses these days.

The hypothesis H_4 that there is positive and significant relationship between housing price and double storey terraced houses are well supported in all states except Trengganu.

The hypothesis H_5 that there is positive and significant relationship between housing price and single storey semi-detached houses are well supported in eight states other than Kuala Lumpur and Trengganu.

The hypothesis H_6 that there is positive and significant relationship between housing price and double storey semi-detached houses are well supported in all ten states.

The hypothesis H_7 that there is positive and significant relationship between housing price and detached houses are well supported in eight states other than Pahang and Trengganu.

The hypothesis H_8 that there is negative and significant relationship between housing price and low cost houses are well supported in nine states other than Perak.

The hypothesis H_9 that there is negative and significant relationship between housing price and low cost flats are well supported in all states.

The hypothesis H_{10} that there is negative and significant relationship between housing price and flats are well supported in seven states other than Perak, Pahang and Trengganu.

4.2 Macro variables analysis

4.2.1 Descriptive statistics

Table 4.6
Descriptive statistics of macro variables

Varaible	Mean	Std. Deviation	Skewness	Kurtosis
HPI	3.89	1.92	0.51	-0.29
LNGDP	11.72	0.10	-0.26	-1.00
LNKLCI	0.99	0.21	-3.91	18.37
BLR	6.24	0.44	-0.26	-1.28
LNCPI	0.97	0.19	-5.22	27.45
LNFDI	1.50	2.76	3.48	15.61

The HPI has a mean of 3.89 with a standard deviation of 1.92. It has a positive skewness of 0.51 but a negative Kurtosis of -0.29. This result shows that the HPI is quite normally distributed. Likewise, the GDP and BLR have low standard deviation, skewness and Kurtosis indicating a normal distribution pattern which is good for the regression. Both the KLCI and CPI have small dispersion from the mean but bias in skewness to the left of the mean with high sharp peakedness of Kurtosis at 18.37 and 27.45, respectively. The Kurtosis reflected that more of the variability is due to a few extreme differences from the mean, rather than a lot of modest differences from the mean. The FDI has a

higher standard of deviation from the normal distribution with a positive skewness on the right tail and also quite a high peakedness of Kurtosis at 15.61.

4.2.2 Correlation analysis

Table 4.7
Correlation Summary of HPI

Variables	LNGDP	LNKLCI	BLR	LNCPI	LNFDI
HPI	.409*	-0.166	0.09	-0.155	-0.218
LNGDP	1	.375*	0.122	.401*	0.131
LNKLCI		1	-0.012	.906**	-0.035
BLR			1	0.108	0.175
LNCPI				1	0.093

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

The above table shows that there is a correlation between HPI and GDP at the significant level of 0.05 (2-tailed) and a large effect size, r>0.37. There is a large correlation effect between GDP with KLCI and CPI at the significant level of 0.05, according to Cohen, (1988) interpretation of The Pearson Correlation (r=.37 or larger).

However, there is a strong correlation between KLCI and CPI, r=0.906, sig.< 0.01. As such, further analysis will be conducted by separating the two variables to check the impact of their influence on the HPI regression.

4.2.3. Testing of hypotheses

4.2.3.1 Regression analysis

Table 4.8
Regression result using macro variables without CPI

Variable	Unstandardized Coefficient B	Sig
Constant	-95.520	**
LNGDP	8.328	**
LNKLCI	-0.896	
LNFDI	-0.220	**
BLR	0.132	
HPI(-1)	0.560	**
** Significant at the 0.01 level		
R-squared	0.588	
Adjusted R-squared	0.490	
F-statistic	5.990	**
Dependent Variable: HPI		
Method: Least Squares		

The regression model summary showed that changes in the dependent HPI can be explained by 58.8% from those predictors of GDP, KLCI, FDI, BLR and the one quarter lag of HPI.

The GDP, FDI and HPI(-1) are at the significant level 0.01 level while KLCI and BLR are not significant. Contrary to the null hypothesis, the KLCI is not significant. This may be due to that fact that during the periods under observation the stock market experienced stability and there was sudden growth from Q3 2006 to Q3 2008 with the index rising from 967.55 to 1,445.03 before declining to

876.75 and picking up again in Q2 2009 to Q4 2010 reaching a new peak of 1,518.91. On the other hand, the HPI was experiencing volatile swings from low of 1.3 in Q2 2006 to a high of 8.2 in Q4 2010. The BLR is not significant and this could be attributed to the fact that interest rates in Malaysia are well and tightly controlled by Bank Negara under its fiscal monetary policy to contain inflation and to maintain a competitive foreign exchange rate regime.

The regression may be represented as;

HPI = -95.520 + 8.328(LNGDP) – 0.896(LNKLCI) + 0.132(BLR) -
.220(LNFDI)

As expected the GDP has a positive significant impact on the HPI with the strongest coefficient of 8.328. This high coefficient for GDP is consistent with the empirical research result of Mulok and Kogid (2008), Low-cost housing in Sabah, Malaysia: A Regression Analysis where they have derived the coefficient as 463.852 at 0.01 significant level. Their value is much higher because they have maintained it in the natural number whereas in this study the natural logarithm was computed where base e approximates 2.718. Pashardes and Savva (2009), have drawn similar conclusion in their research where house prices increase with per capita GDP in Cyprus,

However, the performance of Composite Index for the period moved in opposite direction against the Housing Price Index. This could be due to the fact that after the Asian financial crisis that hit in1997, investors were cautiously

weighing their choices in selecting to invest either-or instead of both in tandem. Likewise, Pashardes and Savva (2009), have a negative -0.08 elasticity in their model of house prices with the Cyprus stock exchange.

After the Asian financial crisis, Malaysia was able to enjoy a low interest rate and relatively stable period from Q1 2004 to Q4 2010. The BLR varied from the high of 6.72% to the low of 5.51% with a calculated average of 6.24%. This was accepted favourably by house buyers and investors resulting in the positive coefficient.

The coefficient of FDI is hard to predict as its movement fluctuate from one quarter to another in relation for the time this variable takes any effect on the HPI. Also, the situation depends on whether it is an inflow of investment funds or net outflow. The expected coefficient was positive since foreign direct investment is meant to create liquidity in the financial market which will also flow through to the property market. However, since this model produced the opposite negative coefficient, the data was re-examined and it was found to fluctuate widely as shown in Table 4.8 below.

Table 4.9
Comparison of Change in FDI with HPI

Year	Quarter	Amount in Million RM	Change in FDI	HPI
2007	Q1	5697	0.73001	4.5
2007	Q2	11463	2.01211	4
2007	Q3	7341	0.64041	5
2007	Q4	4580	0.62389	2.3
2008	Q1	3667	0.80059	4.3
2008	Q2	15765	4.29959	4.3
2008	Q3	302	0.01918	5.1
2008	Q4	4190	13.85780	2.5
2009	Q1	2670	0.63709	0.7
2009	Q2	790	0.29597	2.6
2009	Q3	3618	4.57902	1.5
2009	Q4	-2038	-0.56330	5.6

For further clarity, the data is plotted into a line chart for easy comparison. As can be seen, the data do move in opposite directions.

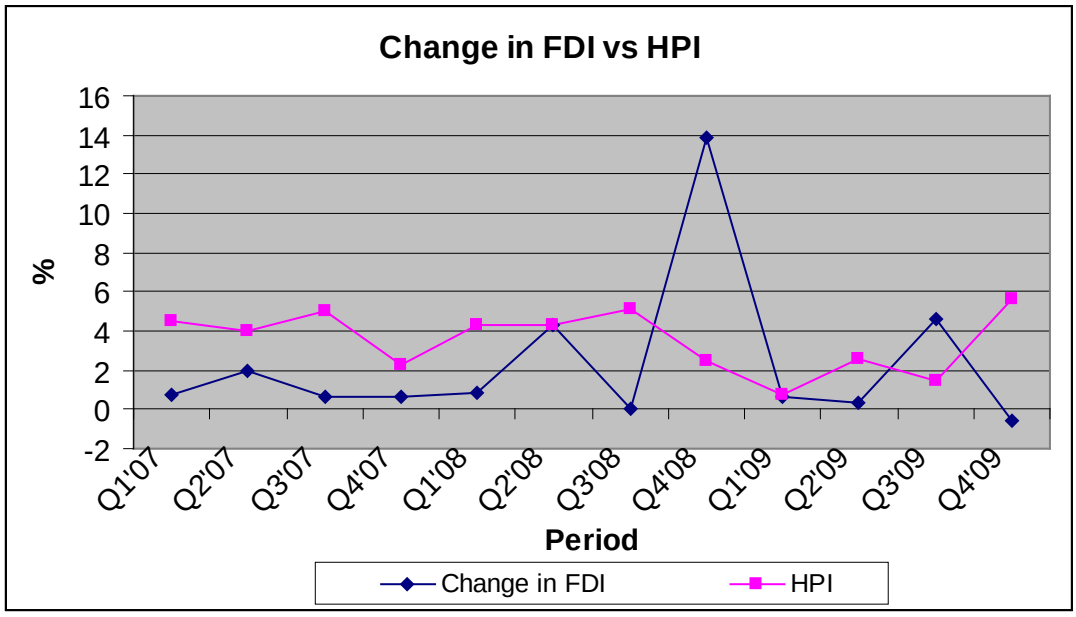

Figure 4.1 Chart Comparison of Change in FDI with HPI

According to BNM's Quarterly Bulletin Fourth Quarter 2008, the spike in Q4 2008 was due to three main points;

1. The net cash basis of gross inflow amounted to RM3.4 billion (Q3 2008: RM2billion reflecting mainly the decline in inter-company loans repayments.
2. Overseas investment by Malaysian companies was lower, recording a net outflow of RM6.6 billion (3Q 08: -RM16 billion), attributed mainly to lower net extension of inter-company loans to subsidiaries abroad.
3. Portfolio investment registered a lower net outflow of RM24.8 billion (Q3 2008: - RM38 billion), reflecting mainly lower net liquidation of debt instruments by foreign investors.

As there is a strong correlation between the KLCI and CPI, a separate regression is computed to check the consistency while substituting each of these variables but maintaining others. The regression result maintained its consistency with the GDP, FDI and HPI(-1) at the significant level of 0.01 and the signs of positive and negative. The CPI, just as the KLCI, is not significant in its regression. The coefficient may be viewed in Table 4.9.

Table 4.10
Regression result using macro variables without LNKLCI

Variable	Unstandardized Coefficient B	Sig
Constant	-98.690	**
LN(GDP)	7.995	**
LNCPI	5.928	
LNFDI	-0.206	**
BLR	0.160	
HPI(-1)	0.564	**
** Significant at the 0.01 level		
R-squared	0.589	
Adjusted R-squared	0.492	
F-statistic	6.029	**
Dependent Variable: HPI		
Method: Least Squares		

In summary, the macro variables regression result is robust with LNGDP, LNFDI and HPI(-1) at the significant level of 0.01 in both models while KLCI, CPI and BLR are not.

4.2.4 Summary of research result

Table 4.11

Summary of regression hypothesis results using macro variables

Macro Variables : HPI as the dependant variable.

Parameter	Expected sign	Result
LNGDP	+ve	Y
LNKLCI	-ve	N
LNCPI	+ve	N
BLR	-ve	N
LNFDI	+ve	Y
HPI(-1)	+ve	Y
Y = Supported N = Not supported		

The hypothesis H_{11} that there is positive and significant relationship between HPI and GDP is supported.

The hypothesis H_{12} that there is negative and significant relationship between HPI and KLCI is not supported.

The hypothesis H_{13} that there is positive and significant relationship between HPI and CPI is not supported.

The hypothesis H_{14} that there is negative and significant relationship between HPI and BLR is not supported.

The hypothesis H_{15} that there is positive and significant relationship between HPI and FDI is supported.

The hypothesis H_{16} that there is positive and significant relationship between HPI and HPI(-1) is supported.