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MONEY: THE ART OF KEEPING IT

Abstract:

In 2010, government of Malaysia strived to bring the country to be a high income, inclusive and sustainable nation by year 2020 through its New Economic Model (NEM) introduced in its Economic Transformation Programme (ETP). However this would also hint a sign rising price in many things, hence a higher living cost. Then in 2012 budget, the government announced a salary increment between 7 to 13% to the public sector employees. The citizens for once hope to be able to have a higher purchasing power but this was not the case. Adding to a series of existing events like oil price shock and global financial crisis, Malaysia incurred a new electricity tariff, subsidies cut and the skyrocket housing price. Even with the salary increment, it still does not help to ease out the rising living cost. Having said that, the amount of money to hold will also be affected and the ability to survive in this economy is questionable. Therefore this study attempts to i) determine the long run effect of real income, credit card and interest rate on demand for money in Malaysia, ii) examine the causal relationship between real money demand and chosen independent variables for the period of 2005Q1 to 2013Q4. By using multivariate framework, this study employs money demand function with Gross Domestic Product (GDP), credit card and interest rate as independent variables. Results show that there is a long run relationship between real money balance with GDP, credit card and interest rate. It is also found that relationship between real money balances and GDP is bi-directional.

Keywords:

demand,credit card,real money balance, average lending rate

1 Introduction

A money demand function basically shows the stability of an economy based on the economic variables such as income and interest rate where interest rate simply means opportunity cost of holding money. In order to achieve a sound economy, a stable and reliable relationship between demand for money and its determinants is the foundation to regulate a monetary policy strategies based on intermediate monetary targeting (Manap, 2009). A lot of past researches have been conducted to examine the stability of money demand function in Malaysia. This includes but not restricted to studies done by Semudram (1981), Habibullah and Ghaffar (1987), Habibullah (1989), Ibrahim (1998, 2001), Sriram (1999), Tan (1997), Marashdeh (1997), Mahid (2004), Muthi and Vaithilingam (2008) and Manap (2009). The demand for money simply means how much of assets that one holds in the form of money and as stated by Keynesian theory there are three motives of holding money; transaction, precautionary and speculative; transaction being the far most common motive. This study distincts from others because it includes credit card as alternative of payment in the money demand function in the context of Malaysia. This variable is included to take into account the modernization in financial world.

There is no doubt that being a small and open economy like Malaysia it is prone to external shocks. Whether the impact is direct or indirect, if Malaysian can keep up its pace with the world economy, then it would be in good terms. Based on the data provided by Malaysia Statistics Department between 1980 to 2013 there has been a slow increase in its Gross National Income (GNI) per capita. As at 2013 its GNI per capita is approximately USD$9,600 and for quite some time Malaysia stucks in the middle income trap. Looking at Malaysia's Consumer Price Index (CPI) trend provided by Malaysia's central bank, Bank Negara Malaysia (BNM) from 1980 up until 2000, the index is at 100 or below. Analyzing the monthly CPI index, starting from 2001 until April 2014, it keeps climbing without any drop in the figures with April 2014 recorded at 109.9. A significant increase can be seen from transport where in August 2013 from 105 index reading it jumped to 110.5 the following month. The same scenario occurred to alcoholic beverages and tobacco from 109.6 index reading in September 2013 to 121.7 in October 2013. Other categories like i) food and non alcoholic beverages, ii) housing, water, electricity, gas and water, iii) education and iv) restaurant and hotel also shows moderate to strong increase. Meanwhile the trend for money demand in Malaysia shows a bullish trend since 1980 until present. During the period of 1980 until 2013 demand for money in Malaysia experience increase range from 2 percent to 23 percent. After 1997 which marks the Asian Financial Crisis, the percentage increase in demand for money was never above 10 percent except in 2004, 2006, 2008 and 2011 at 12.3, 14.2, 11.9 and 14.3 percent respectively. The highest percentage increase was in 1993 at 23.2 percent and RM1,454,408.9 million.

In 2010, government of Malaysia strived to bring the country to be a high income, inclusive and sustainable nation by year 2020 through its New Economic Model (NEM) introduced in its Economic Transformation Programme (ETP). However this would also hint a sign of rising price in many things, hence a higher living cost. Then in 2012 budget, the government announced a salary increment between 7 to 13% to the public sector employees. The citizens for once hope to be able to have a higher purchasing power but this was not the case. Adding to a series of existing events like oil price shock and global financial crisis, Malaysia incurred a new electricity tariff, cuts subsidies and the skyrocket housing price. Even with the salary increment, it still does not help to ease out the rising living cost. Having said that, the amount of money to hold will also be affected and the ability to survive in this economy is questionable. Therefore this study attempts to i) determine the long run effect of real income, credit

card and interest rate on demand for money in Malaysia, ii) examine the causal relationship between real money demand and chosen independent variables. This study is also empirically observed quarterly from the period of 2005 until 2013. Using multivariate framework, the model function employed for this study is based on money demand function proposed by Hubbard (2000).

2 Brief literature review

Yang and King (2011) in their study to assess the usage of credit card on reducing demand for money is the US postulated that it has no effect on both money demand and money supply. This contradicts assumption made by Akhand and Milbourne (1986) saying that introduction of credit cards may reduce household money holdings. A significant amount of credit card usage in the US affects household demand for deposit demand (proxy of demand for money) (White, 1976). The usage of credit card as money substitute has negative effect on real money balances (Hubbard, 2000). As pointed by this theory, Viren (1992) found that credit card transactions in Finland have a significant negative effect on money demand. This result is agreed by King (2002) where her study on 4299 respondents resulted in negative relationship between credit card-holder and money demand. She also suggested that the reason people use credit card is to borrow money. On the other hand Tehranchian, Samimi and Yazdandoust (2012) examined the impact of modern technology on demand for money in Iran. They concluded that rising ATMs and credit cards number lead to the increase in demand for money in both short and long runs.

According to Dritsaki and Dritsaki (2012), based on their panel study within 1990 to 2008 period that includes Bulgaria and Romania, there is evident of long-run relationship between real money, real GDP and the nominal short-term rate of interest. This is confirmed by Paudel and Perera (2013) in Sri Langka to examine the role of financial liberalization on money demand, they have came to conclusion that GDP, interest rate and exchange rate have long-run relationship with money demand. Hossain (2012) also detected presence of a long-run equilibrium relationship between real narrow money balances, real income, domestic interest rate and the nominal effective exchange rate of the Australian dollar in a research done in the context of Australia from 1970 until 2009. According to Diagne (2010) that study the stability of the long-run relationship between real money demand, income, and interest rates in Senegal found evidence of a long-run stable relationship between real money demand with income and the deposit rate, but no indication of a co integrating relation with the French Treasury bill. Same result is conveyed by Lee and Chang (2012) between money demand with real broad money, real income and nominal interest rates. Furthermore, there is also a significant relationship between money demand with exchange rate and interest rate payable on denar time deposits up to one month in the long-run, while interest rate is significant only in short-run in Republic of Macedonia (Kjosevski, 2013). Long-run demand for money in Malaysia from 1970 to 2004 was also found to be stable (Nair, Samudram and Vaithilingam, 2008).

In terms of cointegration, money demand with real income, real exchange rate and short-term domestic and foreign interest rates are found to be cointegrated for both individual countries and panel data (Narayan, Narayan and Mishra, 2009). Tang (2007) in his study to re-estimate money demand function for Southeast Asian countries, he found that real GDP, exchange rate and inflation rate are cointegrated with real money balances (M2) for Malaysia, Philippines and Singapore. Referring to Dekle and Pradhan (1999) research on the extent the financial market changes in ASEAN 4 countries, money demand equations are cointegrated for Indonesia, Malaysia, Singapore and Thailand. Besides that, Nair, Samudram and Vaithilingam

(2008) postulated in their study that Malaysian demand for M1, M2, and M3 are cointegrated with real income, interest rate, and inflation rate. This study compares the effect on its determinants with M1, M2 and M3 seperately. In addition, they found that 1997 Asian financial crisis did not have a significant impact on the cointegration relationship between money demand and its determinants. In other study based on Malaysian economy both M1 and M2 are proved to be cointegrated with real GDP and interest rate (Manap, 2009).

The same study by Narayan, Narayan and Mishra (2009) which analyze data from Bangladesh, India, Pakistan, Sri Lanka, and Nepal also shows short-run causality from all variables (real income and real exchange rate) except foreign interest rate to money demand. Adding to that, a panel study on eight transitional economies that examines the money demand namely; Slovenia, Kazakhstan, the Czech Republic, Bulgaria, Poland, Russia, Hungary and Estonia showed a short-run bidirectional causality between money demand (M1 and M2) and real income and short-term nominal interest rate (Narayan, 2010).

3 Methodology

3.1 Model specification

This study attempts to examine the relationship of demand for money with real income, credit card consumption and interest rate in Malaysia. In this study, demand for money is measured in terms of real money balances and income is measured as real income. In Malaysia, consumer price index (CPI) is used to measure price level for macroeconomic analysis hence it used to be deflated in real money balances and income (Manap, 2009). While M3 is used as proxy to demand for money, real Gross Domestic Product (GDP) is used for income, credit card consumption for credit card and average lending rate for interest rate. Based on the model used, real GDP represents level of transaction, credit card consumption represents alternative to money of making payment and average lending rate represents opportunity cost of holding money. Thus, the regressors in the model estimation comprise of real GDP, credit card and interest rate.

$$lnM_t - P_t = \propto + \beta_1 lnGDP_t - \varphi lnCC_t - \lambda IR_t + \varepsilon_t \qquad (1)$$

where β, φ, and λ are the parameters to be estimated while e_t is error term. *M – P* = real money balances (demand for money), GDP = gross domestic product, CC = credit card and IR = interest rate. It is expected that an increase in real GDP raises the real quantity of money demanded, an increase in the credit card consumption reduces the real quantity of money demanded and an increase in average lending rate decreases real quantity of money demanded (Hubbard, 2000).

3.2 Research Hypothesis

The research hypothesis for this study is as follows:

Hypothesis 1

H_0: There is no positive relationship between real GDP with real money balances in Malaysia.

H_1: There is a positive relationship between real GDP with real money balances in Malaysia.

Hypothesis 2
H_0: There is no negative relationship between credit card with real money balances in Malaysia.
H_1: There is a negative relationship between credit card with real money balances in Malaysia.

Hypothesis 3
H_0: There is no negative relationship between interest rate with real money balances in Malaysia.
H_1: There is a negative relationship between interest rate with real money balances in Malaysia.

3.3 Data Description

All data required were gathered quarterly from 2005 to 2013 due to data avaiability. The specific sources are Bank Negara Malaysia (BNM) monthly report, Department of Statistics Malaysia report as well as various issues of Malaysian Economic Report.

3.4 Estimation Procedures

Before estimating the long-run model specification, we have to perform unit root test on all variables. If all variables are found to be non-stationary and integrated of the same order, we may then proceed to cointegration test. If cointegration exists in the long-run regression, we could apply VECM to examine long-run and short-run dynamic causality among the corresponding variables.

3.4.1 Unit Root Test

Unit root test, or also known as stationary test, is used to determine the order of integration of each of the variables. The order of integration is the number of unit root contained in the variables. It means that a stochastic trend, or non-stationary, variable has to be differenced *d* times before attaining stationarity, and it is written as $I(d)$. For example, a series Y_t integrated of order zero is denoted as $Y_t \sim I(0)$, which means that this series is stationary without any differencing while $Y_t \sim I(1)$ illustrates series is stationary after taking first differencing. Generally, times series is integrated of order one, $I(1)$. When variables under investigation are stationary, this means that the variables are free from unit root or random walk process. For this srudy we use Augmented Dicky-Fuller (ADF) and Philips-Perron (PP) unit root tests which are commonly used to obtain the consistency.

3.4.2 Cointegration

When variables under consideration are integrated of same order, says *I*(1), indicating that these variables are stationary at first difference and independent from unit root problem. Given this condition, variables are allowed to undergo cointegration test. The purpose of conducting cointegration test is to examine the existence of long-run equilibrium relationship between variables in the model. If the variables in the model are found to be cointegrated, this suggests that the corresponding variables are tied together as a group thus exist long-run relationship. In order to achieve cointegration, the error term in the model specification is required to be stationary.

In this study researcher applies Johansen-Juselius cointegration test given the model specification is multivariate. Johansen-Juselius cointegration test is vector autoregressive (VAR) based. VAR is a system of equations where each variable in the model is treated as potentially endogenous. Besides that, we have to identify the order of lag length to avoid autocorrelation problem in the error term of each equation.

When residuals generated from each equation are free from autocorrelation problem, we may then implement Johansen-Juselius cointegration test by observing the Trace statistics and Max-Eigen statistics to determine the number of cointegrating vectors (*r*). The null hypothesis is started with zero cointegration vector against at most one. If null hypothesis is rejected, it is followed by null hypothesis of one cointegrating vector against at most two and so on.

3.4.3 Long-run Estimates and Granger Causality

Assume that the model specification in regression equation (1) contains cointegration among the variables, we are then allowed to estimate the long-run relation of the model in vector error-correction model (VECM) framework that proposed by Johansen-Juselius (1990).

In addition to long-run relation, we include short-run dynamic causal interaction among variables in the equation which is termed as Granger causality. In other words, VECM evaluates both long-run and short-run causality in one equation. Hence, VECM could identify which variable is adjusting towards the long-run equilibrium as indicated by lagged error correction term (ECT_{t-1}) in each equation. If *t*-statistics of ECT_{t-1} is significant, thus it provides an evidence of long-run causality. The coefficient on ECT_{t-1} captures the speed of adjustment of variable to eliminate the disequilibrium. The VECM analysis in this study is specified as:

$$\Delta Y_t = \alpha_1 + \sum_{i=1}^{k} \phi_{1i} \Delta Y_{t-i} + \sum_{i=1}^{k} \gamma_{1i} \Delta K_{t-i} + \sum_{i=1}^{k} \delta_{1i} \Delta D_{t-i} + \sum_{i=1}^{k} \psi \Delta L_{t-i} + \lambda_1 ECT_{t-1} + \mu_{1t} \quad (2)$$

$$\Delta K_t = \alpha_2 + \sum_{i=1}^{k} \phi_{2i} \Delta Y_{t-i} + \sum_{i=1}^{k} \gamma_{2i} \Delta K_{t-i} + \sum_{i=1}^{k} \delta_{2i} \Delta D_{t-i} + \sum_{i=1}^{k} \psi \Delta L_{t-i} + \lambda_2 ECT_{t-1} + \mu_{2t} \quad (3)$$

$$\Delta D_t = \alpha_3 + \sum_{i=1}^{k} \phi_{3i} \Delta Y_{t-i} + \sum_{i=1}^{k} \gamma_{3i} \Delta K_{t-i} + \sum_{i=1}^{k} \delta_{3i} \Delta D_{t-i} + \sum_{i-1}^{k} \psi \Delta L_{t-i} + \lambda_3 ECT_{t-1} + \mu_{3t} \quad (4)$$

$$\Delta L_t = \alpha_4 + \sum_{i=1}^{k} \phi_{4i} \Delta Y_{t-i} + \sum_{i=1}^{k} \gamma_{4i} \Delta K_{t=i} + \sum_{i=1}^{k} \delta_{4i} \Delta D_{t-i} + \sum_{i=1}^{k} \psi \Delta L_{t-i} + \lambda_4 ECT_{t-1} + \mu_{4t} \quad (5)$$

Equation (2) evaluates the causation from real GDP, credit card and interest rate to real money balances. Equation (3) tests causation from real money balances, credit card and interest rate to real GDP. Meanwhile, equation (4) investigates the causation from real money balances, real GDP, and interest rate to credit card. Equation (5) examines the causation from real money balances, real money balances, and interest rate to credit card. Researcher employs Chi-square statistics to test the significance of short-run causality among the variables. The optimal lag length is selected on the basis of the lowest value of AIC and SC to render the autocorrelation in the error term.

4 Estimated result and discussion

4.1 Unit root test

Prior to estimate the regression, all variables are examined for unit root test. The unit root test aims to remove stochastic trends in the variables to avoid spurious regression. Using ADF and PP unit root tests where variables are tested at level and

first difference with the inclusion of intercept and trend, the estimated results of unit root tests are presented as in Table 1.

Table 1. Unit root test

Variables	Level		First Difference	
	ADF	PP	ADF	PP
MD	-3.823	-2.738	-4.633***	-4.962***
GDP	-3.376	-2.315	-6.629**	-6.163**
CC	-2.021	-1.638	-5.730***	-5.732***
IR	-1.954	-2.188	-3.496***	-3.491***

*** and ** denote 5% and 1% significance level, respectively. The lag length selection in ADF test is based on Schwarz Info Criterion (SIC) while PP test is based on Newey-West Bandwidth.

The order of lag length in ADF test is selected by Schwarz Info Criteria (SIC) with the maximum lags at 9. The ADF and PP tests are consistent where they cannot reject the null hypothesis of unit root (non-stationary) at level. Thus, we continue to test the variables at first difference and the results show that *t*-statistics reject the null hypothesis at 1 percent and 5 percent. This indicates that the variables achieve stationary after taking first difference and making them integrated of the same order, which is I~(1). Therefore, it allows us to proceed with cointegration test. The order of lag length in ADF test is selected by Schwarz Info Criteria (SIC) with the maximum lags at 9. The ADF and PP tests are consistent where they cannot reject the null hypothesis of unit root (non-stationary) at level. Thus, we continue to test the variables at first difference and the results shows that *t*-statistics reject the null hypothesis at 1 percent and 5 percent. This indicates that the variables achieve stationary after taking first difference and making them integrated of the same order, which is I~(1). Therefore, it allows us to proceed with cointegration test.

4.2 Cointegration test

For this test, researcher employs Johansen-Juselius cointegration test to determine whether the long-run equilibrium exists in this multivariate model. Prior to conducting cointegration test, researcher has to affirm that error terms do not suffer the problem of serial correlation. Therefore, correlogram test is performed on the residuals generated from equation (2) within vector error-correction model (VECM) framework to determine the order of lag length. The results of Ljung-Box *Q*-test show that the *p*-values in all residuals with lag order one are greater than *p*-value=0.05. Thus, we cannot reject the null hypothesis of no autocorrelation. Therefore, lag order one is sufficient to render the error term serially uncorrelated in all residuals.

Table 2 shows the results of Johansen-Juselius cointegration test. This test allows for linear deterministic trend in data by including intercept in cointegration and test vector autoregressive (VAR).

Table 2. Johansen-Juselius cointegration test

Null Hypotheses	Test Statistics		Critical Values (5%)	
	Trace (λ_{trace})	Max-Eigen (λ_{max})	Trace	Max-Eigen
None (r = 0)	48.819**	30.702**	47.856	27.584
At most 1 (r ≤ 1)	18.117	10.966	29.797	21.132
At most 2 (r ≤ 2)	7.152	7.050	15.495	14.265
At most 3 (r ≤ 3)	0.101	0.101	3.841	3.841

** denotes rejection of null hypothesis at 5%.

According to Table 2, trace statistics and max-eigen tests generate same results. Both trace statistics (λ_{trace}) and Max-Eigen test (λ_{max}) rejects the null hypotheses at most one cointegrating vector (r = 0) and favour the alternative hypotheses of one or more cointegrating vector (r ≥ 1). This can be observed from the trace statistics of 48.819, which is above the 5 percent critical value of 47.856. Meanwhile the Max-Eigen statistics indicates 30.702 which is above the 5 percent critical value of 27.584. The test fails to reject the null hypotheses of at most one cointegrating vector at 5 percent significance level. Hence there is only one cointegrating relationship between real money balance and its determinants. Next, it is assumed that there exists a single cointegrating vector given that long-run regression is based on money demand function theory where real money balances is normalized variable.

4.3 Long-run correlation

The long-run cointegrating is estimated in the VECM framework with lag order one. The vector is normalized on M – P. The results of long-run estimates are as follows:

$$M_{t-1} - P_{t-1} = 20.771 + 1.110\ GDP_{t-1}^{***} - 0.172\ CC_{t-1}^{***} + 0.008\ IR_{t-1}$$
$$(-25.201) \qquad (15.121) \qquad (-0.636)$$

The figure in parenthesis is *t*-statistics for each variable. **denotes 1 percent significance level. The results demonstrate that only GDP and CC are statistically significant at 1 percent and the signs of long-run coefficients are consistent with the theory and literature. The GDP positive sign results is in line with results by Hsing (2008), Narayan (2010), Hossain (2012), Dritsaki and Dritsaki (2012), Lee and Chang (2012), Muthi and Vaithilingam (2008) and Manap (2009). While the credit card positive sign is supported by Viren (1992), Tehranchian, Samimi and Yazdandoust (2012). On the other hand the result for IR does not comply with the theory where researcher found positive association with real money balances. As proxied by bank's average lending rate, this means increase in 1% of this rate will raise real money balances by RM0.008. It makes perfect sense where the higher the lending rate less people will borrow money, hence more money to hold which is supported by Muthi and Vaithilingam (2008) that used inter-bank rate as proxy.

4.4 Granger causality test

Having found 2 corresponding variables are cointegrated in the long-run, researcher integrate short-run dynamic interaction among the variables and examine the dynamic adjustment back to the long-run. Each variable is treated as endogenous within the VECM framework. The results of Granger causality test are illustrated in Table 3.

Table 3. Granger causality test

Dependent variable	Independent Variables χ^2-statistics of lagged 1st differenced term [*p*-value]				ECT_{t-1} coefficient (*t*-ratio)
	ΔM-P	ΔGDP	ΔCC	ΔIR	
ΔM-P		0.863	0.006	2.353	-0.285*
	-	[0.352]	[0.936]	[0.125]	(-2.376)
ΔGDP	0.224		7.939	3.270	-0.984**
	[0.636]	-	[0.004]	[0.070]	(-3.687)
ΔCC	0.512	29.971		5.510	2.257
	[0.473]	[0.000]	-	[0018]	(-2.102)
ΔIR	1.146	1.433	0.016		-1.216
	[0.284]	[0.231]	[0.896]	-	(-1.292)

Number in squared brackets denotes *p*-value while the number in parenthesis denotes *t*-statistics. The asterisk ** and * denote statistical significant at the 5% and 10% level, correspondingly.

Referring to Table 3, when ΔM-P serves as dependent variable the error correction term (ECT_{t-1}) is statistically significant at 10 percent. This postulates that M – P tends to converge to its long-run equilibrium path in response to the changes in the regressors. The significance of ECT_{t-1} in M – P equation confirms the existence of long-run equilibrium between M – P and its determinants; GDP, credit card and interest rate. Therefore, GDP, credit card and interest rate Granger-cause M – P in the long-run. Since M – P is our focal variable, the M – P equation is expressed as:

$$\Delta \text{ M} - \text{P} = f(\Delta M) - 0.285\ ECT_{t-1}, \quad (6)$$

$$ECT_{t-1} = \text{M-P}_{t-1} - (1.110\ GDP_{t-1} - 0.172\ CC_{t-1} + 0.008\ IR_{t-1}) \quad (7)$$

where $f(\Delta M)$ denotes the first differenced terms in the equations. The coefficient of ECT_{t-1} demonstrates the speed of M – P adjustment to restore the long-run equilibrium. This implies that if M – P deviates from its determinants, it makes adjustment of 28.5 percent in the next period to correct the current period deviation and restore the equilibrium.

The error correction term in ΔGDP equation is significant at 5 percent. Hence, there exists a long-run causality from M – P, credit card and interest rate to GDP. Therefore, it is concluded that there is a bi-directional causality between M – P and GDP in long-run. Thus, the long-run interaction between M – P and GDP is two-way. On the other hand, the ECT_{t-1} in ΔCC and ΔIR equations are statistically insignificant.

For the short-run dynamics causality, which is represented by chi-square (χ^2) statistics of lagged differenced terms, the results indicates that all coefficients are statistically insignificant. This reflects that each variable is independent and does not have a significant impact on each other in the short-run. Therefore, it implies that the

growth of M – P in the short-run does not affect the growth of GDP, credit card and interest rate and vice versa.

Researcher summarizes the findings that derived from cointegration test and Granger-causality test as follows. First, M – P cointegrats with GDP, credit card and interest rate in Malaysia for period 2005 - 2013. This reveals the validity of long-run association between M – P and its determinants. Other than that, GDP and credit card generates positive and negative effects on M – P respectively while interest rate positive effect. Second, the direction of long-term causality between M – P and GDP is bi-directional. Third, evidences do not advocate short-term causality in either direction. However, one has to be cautious in interpreting these results as cointegration analysis requires a longer time period.

5 Conclusion

This study examines the relationship of real money balances with GDP, credit card and interest rate using quarterly data from 2005 to 2013. Results show that there is a long run relationship between real money balance with GDP, credit card and interest rate. It is also found that relationship between real money balances and GDP is bi-directional. In conclusion, the higher standard of living experienced by Malaysia does affect the demand for money. However, to get more meaningful results, data such as housing price index and other proxies for interest rate might be used for further studies.

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