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# Stock Returns and Inflation with Supply and Demand Shocks: Evidence from Malaysia

*(Pulangan Saham dan Inflasi dengan Kejutan Penawaran dan Permintaan: Kes di Malaysia)*

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*ABSTRACT*

*The study provides evidence on the validity of the Fisher hypothesis, linking inflation and stock returns using Malaysian data over a period of 27-year from 1980 to 2006. The puzzling negative relationship between stock returns and inflation in industrialized economies is well documented. However, similar studies in different economies such as the developing or the emerging markets are limited. Emerging markets have gained importance and interests from international investors as financial assets and these markets have been identified as a means of international diversification which is capable of offering good returns. With this motivation, understanding factors that may influence stock returns in these markets is crucial. We improve the testing power of current studies by conducting a test that includes the role of demand and supply shocks to inflation. In doing so, we utilize the Autoregressive Distributed Lag (ARDL) bounds test that is capable of testing for the existence of a long-run relationship between the variables irrespective of whether the time series are I(0) or I(1). Inconsistent with the Fisher hypothesis, we find no long-run relationship between inflation and stock return. However, when money supply and industrial production are incorporated in the model, we find that stock returns, industrial production and money supply are the "long run forcing" variables for the inflation. The finding that inflation is not significant in explaining stock returns may suggest that the investment perception in the Malaysian financial markets is quite different from that found in other markets. Unlike the later, the former which does not support the Fisher hypothesis is thus less likely to be sensitive to inflationary variables. Overall the study provides evidence on the importance of sources of inflation (i.e. demand and supply shocks) on stock returns-inflation relationship in Malaysian market.*

*Keywords: stock returns; inflation; money supply; demand and supply shocks; ARDL bounds test*

*ABSTRAK*

*Kajian ini bertujuan membuktikan kesahan hipotesis Fisher dengan mengkaji hubungan antara inflasi dengan pulangan saham ke atas data negara Malaysia bagi tempoh 27 tahun iaitu dari tahun 1980 hingga 2006. Hubungan negatif antara pulangan saham dengan inflasi masih menjadi tanda tanya walaupun telah banyak kajian dibuat terutamanya menggunakan data dari negara maju. Keperluan kajian yang mengkaji hubungan antara kedua-dua pemboleh ubah tersebut ke atas negara membangun atau pasaran baru semakin relevan berikutan bilangan kajian yang terhad ditambah pula dengan meningkatnya jumlah pelaburan dalam aset kewangan seperti saham dan saham amanah untuk tujuan pempelbagaian portfolio antarabangsa dalam pasaran kewangan negara tersebut. Justeru, pemahaman dan pengetahuan mengenai faktor yang boleh mempengaruhi pulangan saham bagi negara membangun ini sangat penting terutama sekali kepada pelabur. Selain mengkaji hubungan antara pulangan saham dengan inflasi, kajian ini diperkembangkan dengan mengambil kira sumber inflasi iatu kesan kejutan dalam permintaan dan penawaran terhadap hubungan antara pulangan saham dengan inflasi. Kaedah lat teragih autoregresif digunakan bagi menguji hubungan jangka panjang antara pemboleh ubah. Hasil kajian mendapati tidak wujud hubungan jangka panjang antara pulangan saham dengan inflasi, justeru tidak menyokong kesahan hipotesis Fisher. Walau bagaimanapun apabila diambil kira kesan kejutan dalam penawaran dan permintaan, didapati pulangan saham, pengeluaran perindustrian dan penawaran wang menjadi faktor pendorong jangka panjang kepada inflasi. Hasil kajian yang diperolehi mencadangkan bahawa persepsi pelaburan dalam pasaran kewangan di Malaysia adalah kurang sensitif terhadap inflasi berbanding dengan persepsi pelaburan dalam pasaran kewangan negara lain yang menyokong hipotesis tersebut. Di samping itu, hasil kajian ini juga memberikan bukti betapa pentingnya kesan sumber inflasi, iaitu kejutan dalam penawaran dan permintaan terhadap hubungan antara pulangan saham dengan inflasi dalam pasaran kewangan Malaysia.*

*Kata kunci: pulangan saham; inflasi; kejutan dalam penawaran dan permintaan dengan kaedah lat teragih autoregresif*

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## INTRODUCTION

The Fisher (1930) hypothesis, when it applies to stock prices, stated that nominal asset return should move one for one with expected inflation. Hence, asset values such as stocks should be positively related with expected inflation, providing a hedge against rising prices. If the implied positive relationship between stock prices and inflation does not hold, stock investors will be vulnerable to inflation. The relationship between inflation and stock returns is of interest because it sheds light on the processes that generate stock returns. Investors would like to know whether or not stocks are good hedges against inflation risk and also if past inflation rates can be used to predict future stock returns.

Many studies have examined the relation between inflation and stock returns. However, contrary to the view implied by the Fisher effect, many researchers find negative relation between common stock returns and inflation especially for the industrialized countries. For the United States, empirical researches as early as Lintner (1975) and as recently as McCown (2001) find that the relation between stock returns and inflation are negative. Similarly, the negative relation is also documented for the United Kingdom (see for example, Mandelker and Tandon (1987) and Kaul (1987)). This negative relationship to some extent can be attributed to one common feature of all of these studies, that is, they focus on short horizons. Several other studies (see for example, Boudoukh & Richardson (1993) and Solnik & Solnik (1997) which concentrate on long horizons have provided evidence supporting the Fisher hypothesis as they find positive relationship between the two variables. Such supporting evidence nonetheless is still far from conclusive given the fact that other long run tests (for example Khil & Lee 2000) on developed economies have also found negative relation between inflation and stock return. Meanwhile, for open semi-mature, medium-sized economy such as Greece, Hondroyiannis and Papapetrou (2006) find that stock returns are also not related to inflation in long term. Observations on the past evidence so far lead us to presume that the empirical findings especially in the long run are inconclusive such that the inflation-stock return puzzle remains.

Several attempts have been made to explain the observed relation between inflation and stock returns. Danthine & Donaldson (1986) and Marshall (1992) among others have provided equilibrium model to explain the negative relation between inflation and stock returns by suggesting the importance of sources of inflation on such relation. They suggest that when inflation is caused primarily by real (output) shocks, the relation is more likely to be negative, whereas when it is caused primarily by monetary shocks the relation is more likely to be positive. Consistent with these propositions, Hess and Lee (1999), Khil and Lee (2000) and Du (2006) among others provide evidence that the relation depends upon the interaction between supply and demand disturbances of inflation. In separate studies (all use US data except study by Khil and Lee which includes also nine Pacific Basin countries including Malaysia), they point out that supply disturbances are primarily due to real output shocks whereas demand disturbances are mainly due to monetary shocks.

In the same spirit, the present study attempts to examine the relation between stock return and inflation and the roles of supply and demand shocks in explaining the observed relation for Malaysia. The rapid growth of Malaysian financial market has provided impetus to study the factors that influence its stock return. But more importantly, being a country in the Asian region where monetary authorities and policies tend to be more prone to political influence and outside exogenous real shocks than in the developed economies (Khil & Lee 2000), Malaysia itself is a major motivation to look at the role played by real and monetary shocks in driving inflation-stock return. This study extends that by Khil and Lee in two aspects; firstly it covers longer period with most recent data (January 1980 to December 2006) and secondly, it tests the long run and short run by employing the ARDL bounds test. Since most investors hold stocks over long holding periods, long term relationship is therefore important to understand the manner in which stock prices move with inflation over longer horizons (Kim & In 2005). Meanwhile, an important advantage of ARDL bounds test lies in the fact that it can be applied irrespective of whether the time series used are I(0) or I(1). This feature avoids the pre-testing problems associated with standard cointegration analysis generally used in previous studies which requires the classification of the variables into I(1) and I(0). Empirically, the ARDL has been tested in other studies on time series data among others by Ang (2007) and Atkins and Coe (2002).

The rest of the paper is organized as follows. Section 2 discusses the literature review followed by data and methodology in section 3. Section 4 interprets the results and the final section provides the conclusions and implications.

## LITERATURE REVIEW

The relation between inflation and stock returns have been empircally tested rather extensively. However, most of the studies particularly those in the US demonstrate a negative relationship which accordingly is not consistent with the view of Fisher hypothesis. These include studies by Fama (1981), Geske and Roll (1983), Chen et al. (1986), Kaul (1987), Boudokh and Richardson (1993), McCown (2001) which in general find evidence that stock returns are negatively affected by both expected and unexpected inflation.

Fama (1981) and Geske and Roll (1983) offer an explanation for the negative relationship between stock

returns and inflation by linking the monetary aggregates to the observed relations between stock returns and inflation. While Fama explains the negative relation by arguing that money demand is procyclical and money supply is exogenously determined, Geske and Roll focus on countercyclical monetary response that reinforces the negative real activity-inflation relation. Kaul (1987, 1990) and others support Fama's conclusion with evidence that the stock return-inflation relation depends on the money supply function. Black et al. (2000) who focus on the information content of money supply on inflation find that monetary aggregates strongly provide information content for the price index.

More recently, McCown (2001) examines the relation between expected inflation and real returns on stocks for six industrialized countries; Denmark, Sweden, German, UK, US and France during the pre-World War 11 period. McCown finds that the correlations between realized inflation rates and real stock returns are statistically significant. However, he argues that the problem with such analysis is that the same price level data is used to compute the real returns as are used to compute the inflation rates. Therefore, at least one component of the real returns is perfectly negatively correlated with the inflation rates, and it is no surprise that the real returns show the negative correlations. He subsequently applies some measure of expected inflation and uses four different methods. First, under the dubious assumption that investors possess perfect foresight, expected inflation will be equal to realized inflation. The second method uses once-lagged inflation as the forecast. The third utilizes contemporaneous nominal interest rates as a proxy for expected inflation. The fourth adopts the method devised by Boudoukh and Richardson (1993) where real returns are regressed against realized inflation, and two lags of inflation rates and nominal interest rates are used as instrumental variables. The findings show that the four methods come to the same general conclusion of a negative relation between real stock returns and expected inflation exception for the UK stocks when using the contemporaneous nominal interest rate as a proxy for expected inflation.

Most of previous studies have focused on short run relationship between stock returns and inflation. Studies on long term relationships are either lacking or do not impose any relevant long term equilibrium constraints in the analysis. Several other studies have examined this issue both in the short and long run (see among others Boudoukh and Richardson (1993) and Boudoukh et al. (1994)). Boudoukh and Richardson use annual data on inflation, stock returns and interest rates over the period of 1802-1990 for the US and the UK markets. In the study, 1-year stock returns are regressed on the 1-year inflation rates and 5-year stock returns are regressed on the 5 year inflation rates. The results reveal a negative relationship between the inflation rate and stock returns in the short term but a positive relationship in the long run. Similar findings are documented by Boudoukh et al. in a cross-sectional relationship between expected inflation and the industry stock returns that are sorted into 22 sectors. They find that the direction of the relationship between expected inflation and the industry group is linked to cyclical movements in industry output and specifically, stock returns of cyclical industries co-vary positively.

All the above studies focus on the developed countries, especially the UK and the US. Evidence for other markets is still scant but is quite comprehensively provided by Erb Campbell and Viskanta (1995). Their study explores the relationship between inflation rate and both time series and cross section of expected stock returns in 41 developed and emerging equity markets. The results on each of the individual countries confirm the negative time series relationship between realized inflation and realized asset returns. The fact that the negative relationship is maintained even when longer horizon returns are examined suggests that international equity returns fail to serve as an inflation hedge, even if the equities are held over long horizons. Similarly, negative relationship is also found for the Egyptian stock market. Focusing on long run and short run study, Omran and Pointon (2001) examine the impact of the inflation rate on the performance of the Egyptian stock market, in terms of market activity and liquidity. Employing cointegration analysis through error correction mechanisms, the study documents a significant long run and short run relationship between the variables, implying that the inflation rate has had an impact upon the Egyptian stock market performance generally. Specifically, the result reveals an expected behavior for the stock market responds to the decrease in the inflation rate. Also, the results regarding overall performance seem to be consistent with the literature review which asserts that there is an inverse relationship between the inflation rate and both stock returns and prices.

Other studies that examine the issue for developing countries and emerging markets in the Pacific Basin region produce results that are inconclusive. Kwon et al. (1997) examine the effect of macroeconomic variables which includes inflation on stock market returns for Korea. Their study shows that inflation as well as expected inflation has no significant power to explain stock returns in Korea. They argue that the most important implication derived from the findings is that the investment perception in the Korean financial markets is quite different from the perception found in the US and Japanese markets which are quite sensitive to inflationary variables such as change in unexpected inflation and expected inflation. In contrast, Lee (1998) who examines the impact of inflation on stock returns for four Pacific Basin countries; Hong Kong, Singapore, South Korea and Taiwan, find negative relationship but for Taiwan the relationship is not significant. The negative relationship is also found by Adrangi et al. (1999) who investigate the issue for two major emerging markets; Korea and Mexico. Their study

shows that the negative relationship between the real stock returns and unexpected inflation persists after purging inflation of the effects of the real economic activity. In line with proxy hypothesis by Fama (1981) their study includes the output variable as well. Based on the results of the Johansen and Juselius cointegration tests, they verify that the long run equilibrium between stock prices and general price levels is weak. However, in both economies, stock prices and general price levels seem to show a strong long-run equilibrium with the real economic activity.

Several other studies such as Hess and Lee (1999), Khil and Lee (2000) and Du (2006) have focused on demand and supply shocks of inflation in their attempt to explain the observed inflation-stock return relation. They suggest that when inflation is caused primarily by supply shock reflected by real (output) shocks, the relation is more likely to be negative, whereas when it is caused primarily by demand shocks mainly due to monetary shocks, the relation is more likely to be positive. Based on data from the US, the UK, Japan and Germany, Hess and Lee show that in the postwar period, supply shocks are relatively more important than they are in the prewar period, thus stock return-inflation relations are negative in postwar period and positive in the prewar period. Such findings are supported by Du (2006) who examines similar issue for the US. Slightly different from Hess and Lee, Du incorporates possible structural break based on a change in the monetary policy regime. In another study which covers the US and ten Pacific-rim countries including Malaysia, Khil and Lee provide evidence that stock return-inflation relations for the sample period of 1970-1997 can be explained by the interaction between real and monetary disturbances except for Malaysia and Indonesia. Their study is based on the impulse response and variance decomposition analysis. They offer two possible reasons for such anomalous results for Malaysia and Indonesia, which are: the short sample period of the two countries precludes the two oil shocks of 1973 and 1979 which may have contributed to the importance of the real shocks and, in recent years both countries have been net oil exporters while other countries are net oil importers.

From most of the empirical studies discussed above, it can be concluded that, contrary to the Fisher effect (1930), the significant negative relationship between rate of inflation and stock returns is well documented for developed economies especially in the short run. However, for other economies such as the emerging markets, the findings are inconclusive. In the meantime, it is equally important to recognize that the relationship between inflation and stock returns may vary over time depending on the relative importance of the demand or supply disturbances. Therefore, examining the influences of these disturbances on inflation-stock return relation by employing other more appropriate techniques such as the ARDL using Malaysian most recent data is expected to provide better understanding on the relation.

## DATA

This study uses monthly data spanning a period of 27 years from January 1980 to December 2006. Data on the Kuala Lumpur Stock Exchange Composite Index (KLCI), which is used to proxy stock prices, consumer price index (CPI) to compute inflation, industrial production (IP) as a proxy for real economic activity and to measure the real shocks, and money supply (M1) as measures of monetary or demand shocks are obtained from DataStream. All data are converted into log except for CPI and IP. Logged data for the KLCI and M1 will be denoted by LNKLCI and LNM1, respectively.

Various proxies of inflation rates have been used in examining the relationship between inflation and stock returns which includes realized and expected inflation. McCown (2001) argues that the problem with using realized inflation in the study is that the same price level data are used to compute the real returns as are used to compute the inflation rates. To address this issue, McCown uses both methods to examine the relationship between the two variables and apply four methods to compute the expected inflation; the realized inflation, the once-lagged inflation, the contemporaneous nominal interest rates and the method devised by Boudoukh and Richardson (1993). For the last method, real returns are regressed against realized inflation and two lags of inflation rates and nominal interest rates are used as instrumental variables. Following McCown, this study adopts a similar proxy of inflation.

## METHODOLOGY

Fisher (1930) hypothesizes that the real and monetary sectors of the economy are unrelated, resulting in a nominal return that varies directly with the expected inflation rate:

$$r_t = rR_t + \beta(\pi_t \mid \Omega_t) + e_t \quad (1)$$

where $r_t$ is the nominal stock return, $rR_t$ is the real return and $\Omega_t$ is the expected inflation rate. $\Omega_t$ is the information set used by investors to forecast inflation. Fisher argues that $\beta$ should equal one, so that nominal stock return ($r_t$) move one-for-one with expected inflation ($\pi_t$) and real returns ($rR_t$) are unrelated to expected inflation. In brief, Fisher hypothesis implies that asset values should be positively related with expected inflation, providing a hedge against rising prices.

## THE ARDL BOUNDS TEST

We employ the ARDL bounds test proposed by Pesaran, Shin and Smith (2001) and Pesaran and Shin (1996) to test the relationship between stock return ($r_t$) and inflation ($\pi_t$). The advantages of this method is that it handles

integer or fractional order of integration and does not impose restrictive assumption that all the variables under study must be integrated of the same order, thus avoid testing the order of integration of variables. This proved to be an important element as some variables may have fractional order of integration (Pesaran & Shin 1996). The following error correction version of the ARDL (p, q) model will be estimated in order to test the cointegration relationship between inflation and stock returns.

$$\Delta r_t = c_0 + \alpha_1 r_{t-1} + \alpha_2 x_{t-1} + \sum_{j=1}^{p-1} \phi_i \Delta r_{t-i} + \sum_{i=1}^{q-1} \psi_i \Delta x_{t-i} + \phi \Delta x_t + \zeta_t \quad (2)$$

where $\Delta$ is the first difference operator, $r_t$ = stock return ($LNKLCI_t$); $x_t$ = expected inflation ($CPI_t$) and $\zeta$ is white noise error term. Meanwhile, p and q denote the autoregressive lag orders of the variables LNKLCI and CPI, respectively. In practice there is no reason why the lag lengths on the first differences variables need to be the same. The ARDL allows for the possibility of different lag lengths for each variable.

There are two steps in testing the cointegration relationship between stock return and inflation. First we estimate the above equation by ordinary least square (OLS) technique and then calculate the *F*-statistic for null hypothesis $\alpha_1 = \alpha_2 = 0$ against the alternative that $\alpha_1 \neq \alpha_2 \neq 0$. In the absence of the long-run level relationship between stock prices ($LNKLCI_t$) and inflation ($CPI_t$), the joint null hypothesis holds. Under the alternative of interest, there is a stable long-run level relationship between stock price and inflation.

Following the bounds test, we accept the null hypothesis at a particular significance level when our sample test statistic is below the associated lower critical value. The null hypothesis is then accepted regardless of whether the underlying orders of integration of the variables are $I(0)$ or $I(1)$. We reject the null in favor of the alternative hypothesis that there exist a long-run relationship between LNKLCI and CPI when our test sample statistic exceeds the relevant upper critical value. Again, the null hypothesis is rejected regardless of whether the underlying orders of integration of the variables are $I(0)$ or $I(1)$. In the later case, we proceed with the second step that is to calculate the long run response of stock price ($LNKLCI_t$) and inflation ($CPI_t$) using ARDL estimation method. When the sample test statistic falls in-between these two bounds we interpret the results as being inconclusive at this particular significance level. Test for presence of autocorrelated errors, heteroskedasticity and ARCH effect will be carried out and the best order of the ARDL model to be used is the Schwarz Bayesian Criterion.

In line with Du (2006) and others who have documented a strong evidence that the stock returns and inflation relation depends upon the interaction between supply and demand disturbances, we extend equation (2) to include industrial production and money supply variables;

$$\Delta r_t = c_0 + \alpha_1 r_{t-1} + \alpha_2 x_{t-1} + \sum_{j=1}^{p-1} \phi_i \Delta r_{t-i} + \sum_{i=1}^{q-1} \psi_i \Delta x_{t-i} + \phi \Delta x_t + \zeta_t \quad (3)$$

where $\Delta$ is the first difference operator, $r_t$ = stock return ($LNKLCI_t$); $x_t$ = expected inflation ($CPI_t$), industrial production ($IP_t$) and money supply ($LNM1_t$), $\zeta$ is white noise error term whereas p, q denote the autoregressive lag orders of the variables LNKLCI and *x*, respectively.

## EMPIRICAL RESULTS

The Augmented Dickey-Fuller (ADF) unit root test is used to assess the order of integration of the variables. The ADF test the null of a unit root against the alternative of stationary. The results provided in Table 1 show that none of the variables are integrated at an order higher than one based on both the Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC), thus allowing for the legitimate use of the ARDL bounds techniques.

TABLE 1. ADF Unit Root Test

| Variable | Levels | | First difference | |
|---|---|---|---|---|
| | AIC | SIC | AIC | SIC |
| LNKLCI | –1.616 | –1.885 | –6.723** | –10.46** |
| CPI | –0.348 | –2.935* | –3.805** | –14.654** |
| LNM1 | –0.408 | –0.383 | –3.783** | –2.929* |
| IP | –1.030 | –1.070 | –4.506** | –4.878** |

*,** denotes 5% and 1% significance level respectively

Using the ARDL methodology as suggested by (Pesaran & Shin, 1996, 1995), first we examine the relationship between stock return and inflation.

$$\Delta LNKLCI_t = \alpha_0 + \sum_{i=1}^{4} \alpha_i \Delta LNKLCI_{t-i} + \sum_{i=1}^{4} \beta_i \Delta CPI_{t-i} + \delta_1 LNKLCI_{t-1} + \delta_2 CPI_{t-1} + \mu_t \quad (4)$$

Following Pesaran and Shin (1996) in testing the existence of long-run relationship between KLCI and CPI and identifying the "long-run forcing" variables, we use ARDL methods by running the following equations:

$$\Delta LNKLCI_t = \alpha_0 + \sum_{i=1}^{4} \alpha_i \Delta LNKLCI_{t-i} + \sum_{i=1}^{4} \beta_i \Delta CPI_{t-i} + \delta_1 LNKLCI_{t-1} + \delta_2 CPI_{t-1} + \mu_t \quad (4a)$$

$$\Delta CPI_t = \alpha_0 + \sum_{i=1}^{4} \alpha_i \Delta LNKLCI_{t-i} + \sum_{i=1}^{4} \beta_i \Delta CPI_{t-i} + \delta_1 LNKLCI_{t-1} + \delta_2 CPI_{t-1} + \mu_t \quad (4b)$$

We concentrate on the F-statistic value as shown in Table 2. TheF-statistic of equation (4a) for variable addition test of $H_0$: $\delta_1 = \delta_2 = 0$, denoted by F(LNKLCI | CPI) = 2.444 and for equation (4b) for variable addition test of $H_0$: $\delta_1 = \delta_2 = 0$, denoted by F(CPI | LNKLCI) = 2.342. The results show that the values fall below the lower bounds of the F-statistics Tables (4.934 – 5.764) produced by Pesaran and Shin (1996). Therefore we accept the null hypotheses of no cointegration and the findings suggest that there is no long run relationship between KLCI and CPI. Such findings are inconsistent with the Fisher hypothesis when only two variables; the inflation and stock returns are considered.

TABLE 2. F-Statistics for testing the existence of long run relationship (Equations 4a and 4b)

| ARDL model (dependent variable) | F-Statistics |
|---|---|
| ΔLNKLCI | 2.444 |
| ΔCPI | 2.342 |

Note: The lower and upper bounds for critical values of F(4,308) at 95% confident interval are 4.934 and 5.764, respectively.

Next, we also examine the relationship between stock return, inflation, industrial production and money supply to incorporate the demand and supply shocks in the inflation-stock price relationship and repeat the above procedure for Equation (5), using similar definition for the F-statistics.

$$\Delta LNKLCI_t = \alpha_0 + \sum_{i=1}^{4} \alpha_i \Delta LNKLCI_{t-i} + \sum_{i=1}^{4} \beta_i \Delta CPI_{t-i} + \sum_{i=1}^{4} \gamma_i \Delta IP_{t-i} + \sum_{i=1}^{4} \theta_i \Delta LNM1_{t-i} + \delta_1 LNKLCI_{t-1} + \delta_2 CPI_{t-1} + \delta_3 IP_{t-1} + \delta_4 LNM1_{t-1} + \mu_t \quad (5)$$

Three other variants of Equation (5) are produced in a manner similar to Equations 4a and 4b with dependent variables ΔCPI, ΔIP, and ΔLNM1.

From the results that are presented in Table 3, we observe that F(LNKLCI | CPI, IP, LNM1) = 3.070, F(CPI | LNKLCI, IP, LNM1) = 4.913, F(IP | CPI, LNKLCI, LNM1) = 2.715 and F(LNM1 | CPI, IP, LNKLCI) = 3.765. The lower and upper bound at 95% confident interval from Pesaran and Shin (1996) is 3.219 – 4.378. Given that the F-statistics F(LNKLCI | CPI, IP, LNM1) and F(IP | CPI, LNKLCI, LNM1) are below the lower bounds, we cannot reject the null hypotheses of no cointegration. The findings suggest that there is no long run relationship between the variables when KLCI and IP is the dependent variable. Meanwhile, as the F(LNM1 | CPI, IP, LNKLCI) is clearly within the bounds, the test for relationship between LNKLCI, CPI, IP and LNM1 is inconclusive. Only the value for F(CPI | LNKLCI, IP, LNM1) falls above the upper bound and therefore we can reject the null hypotheses of no cointegration and conclude that there exists a long run relationship between the variables when CPI is the dependent variable irrespective of the order of integration. The result suggest that KLCI, IP and M1 are the "long run forcing" variables for the CPI.

TABLE 3. F-Statistics for testing the existence of long run relationship (Equation 5)

| ARDL model (dependent variable) | F-Statistics |
|---|---|
| ΔLNKLCI | 3.070 |
| ΔCPI | 4.913 |
| ΔIP | 2.715 |
| ΔLNM1 | 3.765 |

Note: The lower and upper bounds for critical values of F(4,298) at 95% confident interval are 3.219 and 4.378, respectively.

The next step after identifying the existence of the long run relationship is to specify the Error Correction Model (ECM). For Equation 5, the order using the Akaike criterion is ARDL(4,4,0,2) while the Schwarz is ARDL(3,0,0,0). Because the point estimates of the parameters are almost similar, we choose Schwarz order and the estimation is given in Table 4.

The result from Table 4 shows that the error correction coefficient has the right sign (negative), that is –0.12123, highly significant and exhibit a moderate speed of convergence. The Durbin-Watson statistics is

TABLE 4. Error Correction Representation for the Selected ARDL Model ARDL(3,0,0,0) selected based on Schwarz Bayesian Criterion

| Dependent variable | Coefficient | DW-statistics |
|---|---|---|
| ΔCPI | –0.12123 (4.8028)** | 1.9665 |

Notes: Figure in the parentheses is t-statistic. ** significant at 1%.

almost equal to 2, suggesting no autocorrelation problems.

The results show that, even after we included additional variables namely the money supply and industrial production on the inflation-stock return relationship, still we find inflation is not significant in explaining stock returns. However, with the inclusion of the two variables, the results show that stock returns, industrial production and money supply are the "long run forcing" variables for the inflation. The finding that inflation is not significant in explaining stock returns is consistent with the Kwon et al. (1997) for Korean markets, hence may suggest that the investment perception in the Malaysian financial markets is quite different from that found in other markets and the stock returns in Malaysia is thus less likely to be sensitive to inflationary variables. Overall the study provides evidence on the importance of sources of inflation (i.e., demand and supply shocks) on stock returns-inflation relationship in Malaysian market.

## CONCLUSIONS

This paper examines the validity of the Fisher hypothesis by testing the relationship between inflation and stock returns for an emerging market, Malaysia. Following Danthine & Donaldson (1986) and Marshall (1992) and others who document strong evidence of the importance of demand and supply shocks in stock returns-inflation relationship, this study incorporates the issue by including industrial production and money supply. This study employs the ARDL bounds test and the findings reveal no long-run relationship between inflation and stock returns under bivariate framework. When money supply and industrial production are incorporated in the model, the results are; (1) no relationship between the variables when stock returns and industrial production are the dependent variables, (2) inconclusive evidence when money supply is the dependent variable, but (3), evidence of long-run relationship when inflation is the dependent variable. The findings suggest that stock returns, industrial production and money supply are the "long run forcing" variables for the inflation (CPI) and simultaneously support the findings of Black et. al (2000) who demonstrate that monetary aggregates strongly provide information content for the price index. Inconsistent with the Fisher hypothesis but consistent with results in Korea (Kwon et al. 1997), our study shows that inflation have no significant power to explain stock returns and thereby suggests that the investment perception in the Malaysian financial markets is quite different from the perception found in other markets that support the Fisher hypothesis. Overall the study provides supporting evidence on the importance of sources of inflation (i.e., demand and supply shocks) on stock returns-inflation relationship in Malaysian market (Danthine & Donaldson 1986; Marshall 1992).

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