CHAPTER 3

RELATIONSHIP BETWEEN STOCK RETURNS AND INFLATION IN MALAYSIA

3.1 Introduction

Several studies have reported the relationship between stock returns and inflation in United States and other industrialized countries based on different assumptions and methodologies, which are either negative or positive. However, only a few papers have addressed the same issue for developing countries. The objective of this chapter is to examine the two main stream of thought, namely Fisher Hypothesis (1930) and Nelson Analysis (1976) in analyzing the relationship between stock returns and inflation in Malaysia.

3.2 The Fisher Hypothesis and Nelson Analysis

3.2.1 The Fisher Hypothesis on Stock Returns and Inflation

The Fisher Hypothesis stated that asset values should be positively related with expected inflation, providing a hedge against rising prices. This belief is generally attributed to Irving Fisher's (1930) work on interest rate, in particular to view that the real and monetary sectors are casually independent. This hypothesis has come to be known as the " Fisher Hypothesis" in the economic literature.

The most common way of measuring Fisher Hypothesis is by the slope coefficient in an Ordinary Least Square (OLS) regression of inflation on nominal interest rate. The Equation can be expressed as follows,

$\pi = a + bi + e_t$. (3.1)

π inflation

i nominal interest rate

e_t prediction error

Value of b slightly less than unity is a common result on United States data. Mishkin (1992) found that b coefficient is around 0.7 in regressions of 3-months ex-post inflation on nominal interest rate (monthly data from 1953 to 1990). Soderlind (1998) finds similar numbers for one-year inflation based on the ex-post data and several surveys of inflation expectation, with an R^2 around 0.7 (semi annual data from 1953 to1995)[1]. Equation (3.1) can also be used as an indicator rule for expected inflation in Equation (3.2), where the distinction does not matter if expectation are rational.

$E(\pi) = a + bi$. (3.2)

$E(\pi)$ expected inflation

i nominal interest rate

There are several versions of Fisher Hypothesis, which could express the relationship between nominal stock returns with inflation, the most common statement of the hypothesis is that the expected nominal stock returns move one-for-one with expected inflation:

$In\ (R^i_{t,\,t+1}) = \alpha_i + \beta_i E_t\,[\pi_{t,\,t+1}] + \varepsilon^i_{t,\,t+1}$ (3.3)

$In\ (R^i_{t,\,t+1})$ the continuously compounded nominal return on asset i

$\pi_{t,\,t+1}$ the continuously compounded rate of inflation

$E_t[.]$ expectation with respect to the information set available to Economic agents at time t

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1 http://swope.hhs.Services/hastef/papers/hastef0159.pdf

α_i the unconditional mean of the real return on asset i

Irving Fisher's (1930) view that the real and monetary sectors of the economy are independent. The price has no real effects and thus is causally unrelated to real variables. However, inflation and output growth can be correlated, via, for example, the money supply process. If these variables are correlated, then inflation will covary with agent's marginal rates of substitution. Nevertheless, inflation will still have no impact on real asset prices.

Within the money-neutral setting, Equation (3.3) could be describe as

$$R_{t,t+1} \equiv (Q_{t+1} + p_{t+1} d_{t+1})/Q_t \qquad (3.4)$$

$$\frac{\dfrac{Q_{t+1}}{P_{t+1}d_{t+1}} + 1}{\dfrac{Q_t}{P_t d_t} \; \dfrac{P_t d_t}{P_{t+1} d_{t+1}}}$$

$R_{t,t+1}$	nominal stock returns
Q_t	nominal stock price
q_t	real stock price
D_t	nominal dividend of stock
(d_t)	real dividend of stock
C_t	nominal aggregate consumption
(c_t)	real aggregate consumption
p_t	price level

Taking logarithms of both sides of equation (3.4), and using the above definition of real and nominal variable, we can write

$$\text{In}\,(R^i_{t,t+1}) = \text{In}\,(P_{t+1}/P_t) + \text{In}\,(d_{t+1}/d_t) + \{\text{In}\,(q_{t+1}/d_{t+1}) - \text{In}\,(q_t/d_t)\} \qquad (3.5)$$

Continuously compounded stock returns can be expressed as the sum of three terms :

(i) the continuously compounded inflation rate

$$\pi_{t,\, t+1} \equiv In\,(P_{t+1}/\,P_t\,) \qquad (3.6)$$

(ii) the logarithm of the real divided growth rate

$$g^d_{t,\, t+1} \equiv In\,(d_{t+1}/\,d_t\,) \qquad (3.7)$$

(iii) the difference in the logarithm of the price-dividend ratios from time t to t –1

$$\Delta\,(\,q_{t+1}\,/\,d_{t+1}\,) \equiv \{\ In\,(d_{t+1}/\,q_{t+1}\ +\ 1\,)\ -In\,(q_t\,/\,d_t\,)\,\} \qquad (3.8)$$

Taking expectation of both sides of equation (3.5), and assuming agents process information rationally,

$$E_t\,[\,In\,(R^i_{t,\,t+1})\,] = E_t\,[\,In\ \pi_{t,\,t+1}\,] + E_t\,[\,In\ g^d_{t,\,t+1}\ \,] + E_t\,[\,\Delta\,(\,q_{t+1}\,/\,d_{t+1}\,)\,] \qquad (3.9)$$

Equation (3.4) provides a general expression for expected stock returns in terms of expected inflation and real variables reflecting fundamentals of the underlying stock. In the Fisher Hypothesis, these real variables – real dividend growth and the difference in real price-dividend ratio, have no causal relation with inflation. Thus, the Fisher Hypothesis holds in this environment.

To see this via a particular example, consider the aforementioned nominal Lucas-type (1978) economy in which money is neutral. The price level serves as a unit of account, so that agents do not have a preference for money or face cash-in-advance constraints. Moreover, although possible correlated, consumption growth and inflation are not causally related. The representative agent's first order condition from this model is given by :

$$E_t [B (U'(c_{t+1})P_t)/(U'(c_t)P_{t-1}) (1+ R^i_{t,t+1})] = 1 \ \forall_i \qquad (3.10)$$

$U(.)$ agent's utility function

B the rate of time preference

For purpose of illustration, assume that the representative agent has preferences with constant relative risk aversion. Under this assumption, it is possible to derive the real price-dividend ratio for a particular asset i :

$$Q_{i,t} / d_{i,t} = \sum_{k=1}^{a} \ E_t [B (B^k(c_{t+k})/ c_t)^{-y} (d_{i,t+k} / d_{i,t})] \qquad (3.11)$$

Where y is the coefficient of relative risk aversion. Since the above real price-dividend ratio depends only on co-movement of real variables, and these variables are not causally related to inflation, the Fisher Hypothesis holds.

If money neutrality is a good approximation of reality, as many researchers believed. (especially in the long time horizons), then why does the Fisher model appear to do so poorly in the data ? That is, complete contrast to the model in equation (3.3), where stock returns and expected inflation are negatively correlated. The answer to this question does not necessarily rely on dropping the assumption that the real and monetary sectors are causally independent.

In particular, by regressing stock returns on expected inflation, the coefficient on inflation on expected inflation will not necessarily equal the

Fisher's Hypothesis value of one. This is because expected inflation may be partly proxying for expectation about future real rates. Specifically,

$$\beta = \text{cov}\ [ln\ (R_{t,\,t+1}),\ E_t(\ \pi_{t,\,t+1}\ )]\ /\ var\ E_t(\ \pi_{t,\,t+1}\ )$$

$$\frac{cov\,(E_t[\ \pi_{t,\,t+1}\ ] + E_t[\,g^d_{t,\,t+1}\ ] + E_t[\,\Delta\,(\,q_{t+1}\,/\,d_{t+1}\,)\,] + \varepsilon_{t+1},\ E_t[\ \pi_{t,\,t+1}\ ]\,)}{var\ E_t[\ \pi_{t,\,t+1}\ ]}$$

$$1 + \frac{cov\,(E_t[\,g^d_{t,\,t+1}\ ] + E_t[\,\Delta\,(\,q_{t+1}\,/\,d_{t+1}\,)\,] + \varepsilon_{t+1},\ E_t[\ \pi_{t,\,t+1}\ ]\,)}{var\ E_t[\ \pi_{t,\,t+1}\ ]}$$

(3.12)

The coefficient equal the hypothesized value of one plus an adjustment factor due to the covariance between expected inflation and expected future value of real variables. In particular, expectations about future dividend growth rates and price-dividend ratios. As described above, these correlations are not necessarily zero in a money-neutral setting.

Several observations are in order. First, if these covariances are sufficiently negative, the negative β coefficients are possible. Thus, previously documented negative β estimates may be consistent with the Fisher Hypothesis, Second, the magnitude of the second term in equation (3.12) depend on the stock's own dividend growth and the change in its price-dividend ratio through time. Since this will, in general, vary across assets, it becomes apparent how cross-sectional variation in the β coefficients can arise.

3.2.2 Nelson Analysis on Stock Returns and Inflation

Beside the above version of explanation of Fisher Hypothesis on stock returns and inflation, the following version relies heavily on Nelson's analysis (1976) in describing the negative relationship between stock returns and expected inflation rather then positively correlated suggested by Irving Fisher (1930). The different between the expected nominal stock returns and the expected inflation is defined as the ex ante real stock returns. Thus ex ante real stock returns can be represented as:

$$r_t = E(R_t / I_{t-1}) - E(\pi_t / I_{t-1}) \tag{3.13}$$

r_t ex ante real stock return
R_t nominal stock returns
π_t inflation
E(R_t) expected nominal stock returns
E(π_t) expected inflation
t-1 information set available at time $_{t-1}$
E mathematical expectations operator

The different between the nominal value and the expected value are the prediction errors, μ_t and ε_t. Thus,

$$R_t = E(R_t / I_{t-1}) + \mu_t \ , \tag{3.14}$$

$$\pi_t = E(\pi_t / I_{t-1}) + \varepsilon_t \tag{3.15}$$

The ex ante real stock returns, r_t in Equation (3.13) can be separated into average and variable parts such that

$$r_t = \bar{r} + \tilde{r}_t \tag{3.16}$$

$\bar{r}$ average stock returns
$\tilde{r}_t$ variable stock returns.

Using equation (3.13)-(3.16), the relationship between the real stock returns and inflation may be expressed as

$$R_t = \bar{r} + \beta\pi_t + n_t \qquad (3.17)$$

Where n_t is equal to $(\tilde{r}_t + \mu_t + \beta\mathcal{E}_t)$ and according to Fisher Hypothesis β is equal to unity in Eq.(3.17).

The properties of the compound disturbance n_t will determine the properties of the least square estimates of r and β. According to Nelson (1976) the correlation between the inflation (π) and each element of the error term (μ and $\mathcal{E}$) is important for the relationship. There will be a positive correlation between the inflation(π) and its prediction errors (ε) in Equation (3.15). Correlation between the inflation and the unanticipated portion of the stock returns (μ) will depend on the correlation between μt and $\mathcal{E}t$. The two will be correlated if stock returns react systematically to new information (represented by εt) about the inflation.

Several reasons have been provided for the negative relationship so commonly found between stock returns and inflation. The errors in the measurement of expected inflation will work to reduce the slope of the regression (β). If the stock market reacted negatively to unanticipated increases in inflation, then the slope estimate could be in fact negative. Nelson (1976) further claimed that a negative slope is also possible if the ex ante stock return is negatively correlated with the expected stock returns.

Besides, Nelson (1976) supported that it is reasonable to assume that much of the information about future inflation available to the market is contained in the past inflation. This could especially be true if investors formulated expectations of future inflation by means of adaptive expectations.

3.3 Data Description

The monthly data of this study covered the period from January 1984 to June 2001, consisted of two basic components which is Composite Index (CI) and Consumer Price Index (CPI). Composite Index (CI) is used to create the stock returns. Stock returns are simply defined as the first difference of the log of the Composite Index. In order to examine the effect of nominal and real stock returns on inflation separately. The second steps is to decompose the stock returns into nominal stock returns which do not take into consideration of inflation; and real stock returns which had minus the inflation from the stock returns.

There are two major sources of information that government officials and media use to detect inflation. Consumer Price Index (CPI) is a measure of price changes in consumer goods and services. It is one of the most often used statistics to identify periods of inflation and deflation. It usually has a significant impact on the movement of stock returns. The second source refer to Producer Price Index (PPI), a family of smaller indexes that measured the average change over time in selling prices by domestic producers of goods and services. The PPI concentrated on three areas, which is Industry-based, Commodity-based and Processing-based companies. Among the two indexes, CPI is the more popular and powerful tool to detect inflation.

For the case study of Malaysia, the inflation for the same time frame is calculated by using the Consumer Price Index (CPI) obtained from Bank Negara Annual Report. Inflation is basically defined as the first difference of the log of CPI. There might be some objections to use the CPI to represent the true erosion in the purchasing power. The price may contain spurious data when the government imposed price controls or high percentage of imported goods were involved in the CPI. However this is the best alternative in constructing the true value of living index.

Table 3.1 contained the monthly average, along with the maximum and minimum values for all three series, which is nominal, real stock returns and inflation for Malaysia and four other Central American countries. The objective of the comparison table is to examine the degree of variation among the three variables in Malaysia, vis-a-vis, Argentina, Chile, Mexico and Venezuela.

Table 3.1 Nominal, Real Stock Returns and Inflation for Malaysia, Argentina, Chile, Mexico and Venezuela from 1984 to 2000.

Countries	Nominal Stock Returns (%)	Real Stock Returns (%)	Inflation (%)
Malaysia			
Mean	0.76	0.74	0.23
Maximum	34.23	34.18	1.51
Minimum	–34.88	–34.18	1.53
Argentina			
Mean	9.02	0.74	8.28
Maximum	130.54	88.88	108.73
Minimum	–49.55	–97.53	–0.54
Chile			
Mean	1.64	0.43	1.21
Maximum	19.96	18.81	7.88
Minimum	–30.71	–30.81	–0.80
Mexico			
Mean	3.39	0.37	3.01
Maximum	35.80	30.82	14.40
Minimum	–53.49	–67.25	0.00
Venezuela			
Mean	3.48	0.48	2.99
Maximum	37.70	36.18	19.28
Minimum	–29.51	–43.40	–1.95

Source : Department of Statistic of Malaysia and www.elsivier.com/locate/econbase

In Malaysia, both nominal and real stock returns varied between positive thirty-four percent (+34%) to negative thirty-four per cent (–34%) and the Mean for the two indexes is about point seven percent (0.7%). Meanwhile for Argentina the nominal stock returns fluctuated from positive one hundred and thirty percent (+130%) to negative forty nine percent (–49%); real stock returns varied from positive eighty eight percent (+88%) and negative ninety seven percent (–97%). Similar trends were found in Mexico, Venezuela and Chile in the same time period. The variation between the maximum and minimum value for all four countries is high as compared with Malaysia.

Among the four countries, Argentina experienced the highest inflation, which reached one hundred and eight percent (108%) as compared with

Malaysia's inflation ranging from positive one point five percent (+1.5%) to negative one point five percent (−1.5%).

In short, Table 3.1 suggests that both nominal, real stock returns and inflation in Malaysia does not vary much as compared with those high inflation countries in Central America. Figure 3.2 and Figure 3.3 further show the nominal and real stock returns in Malaysia with line chart. Both charts show similar trend, indicating inflation is not playing a significant role in the formation of nominal and real stock returns.

Figure 3.2

Nominal Stock Returns in Malaysia : Elliott Wave Theory

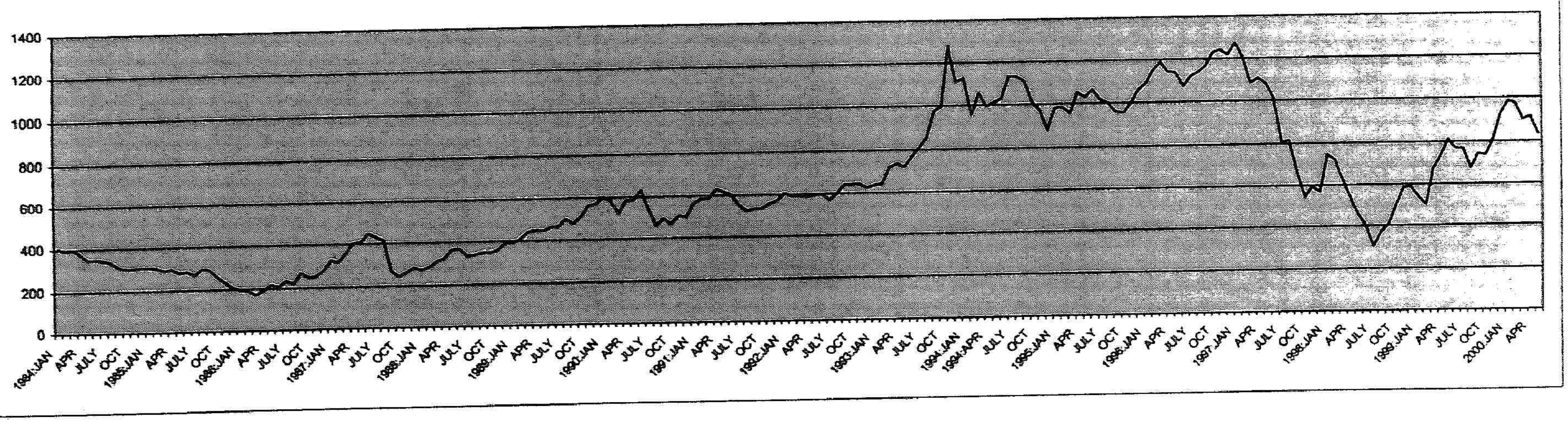
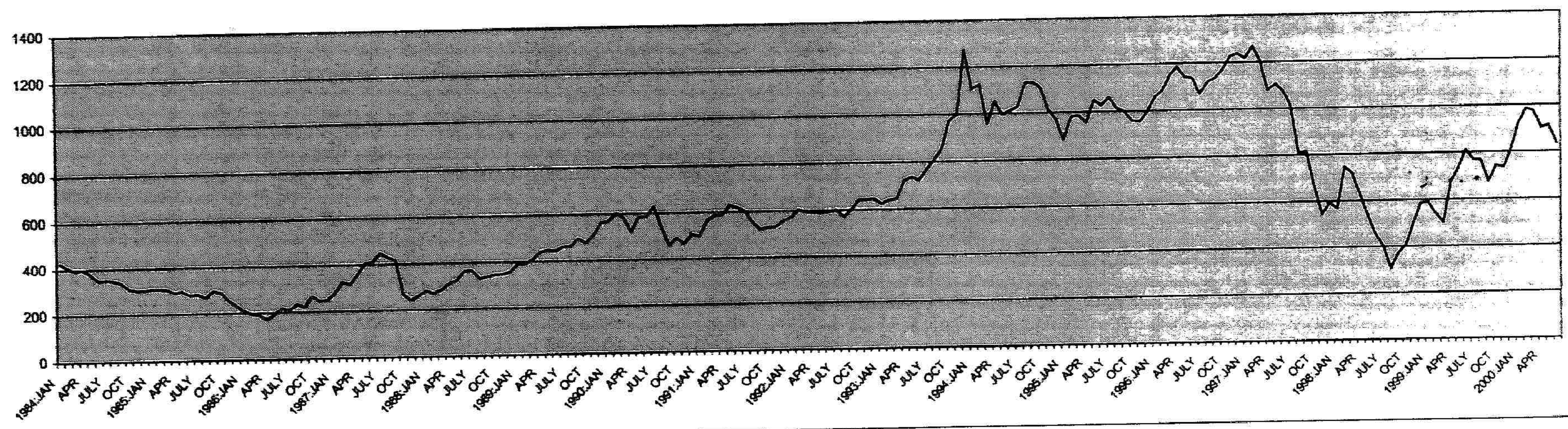


Figure 3.3

Real Stock Returns in Malaysia : Elliott Wave Theory



3.3.1 Stationarity of Data

Any time series data can be thought of as being generated by a stochastic or random process. Empirical work based on time series data such as stock returns and inflation assumes that the underlying time series is stationary. Broadly speaking, a stochastic process is said to be stationary if its mean and variance are constant over time. The value of covariance between two time periods depends only on the distance or lag between the two time periods and not on the actual time at which the covariance is computed.

To explain this statement, let R_t be a stochastic time series with these properties:

Mean	: $E(R_t) = \mu$	(3.18)
Variance	: $\text{var}(R_t) = E(R_t - \mu) = \sigma$	(3.19)
Covariance	: $Y_k = \text{E}[(R_t - \mu) - (R_{t+k}\mu)]$	(3.20)

Where the covariance at lag k, is the covariance between the value of R_t and R_{t+k}, that is the between two R value k period apart. If $k = 0$ we obtain R_0, which is simply the variance of R ($= \sigma$). Suppose we shift the origin of R_t to R_{t+m}, now if R_{t+m} is to be stationary, the mean, variance and autocovariances of R_{t+m} must be the same as those of R_t. In short, if a time series is stationary, its means, variance and autocorvariance remain the same no matter what time we measure them[2].

For theoretical and practical reason, the Dickey Fuller (DF) test is applied on the time-series data of this study to examine the stationarity of data.

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2 Gujarati, D.M., *Basic Econometrics*, Singapore: McGraw-Hill Inc,1995, pp. 718-723.

In the literature of the Tau Test is known as The Dickey-Fuller Test (DF), in honor of its discoverers. The easiest way to introduce this test is to consider the following model:

$$R_t = \rho R_{t-1} + \mu \quad (3.21)$$

R_t stock return on time t

R_{t-1} stock return on time t-1

Under the null hypothesis of $\rho = 1$, the conventionally computed t-statistic is known as the ι (tau) statistic. If the computed absolute value of the ι statistic exceed the DF or Mackinnon DF absolute critical ι values, then we do not reject the hypothesis that the given time series is stationary. If, on the other hand, it is less than the critical value, the time series is nonstationary and exhibits a unit root.

For the case study of Malaysia, Table 3.4 exhibits the computed ι value and the critical value for nominal, real stock returns and inflation, to examine the stationary of the variables for econometric study.

Table 3.4 Critical ι and Computed ι statistic for Inflation, Nominal and Real Stock Returns

Variables	Critical ι value	Computed ι statistic	Status
Inflation	3.4653 (1%) 2.8764 (5%) 2.5746 (10%)	7.5349	Statistically stationary
Nominal Stock Returns	3.4653 (1%) 2.8764 (5%) 2.5746 (10%)	8.0138	Statistically stationary
Real Stock Returns	3.4653 (1%) 2.8764 (5%) 2.5747 (10%)	8.0218	Statistically stationary

The inflation of 1%, 5% and 10% critical t statistics as computed by MacKinnon are −3.4653, −2.8764 and −2.5746 respectively. Since the computed t value is −7.534990, which in absolute term is bigger than the 1%, 5% and 10% critical value as exhibits in Table 3.4. In another words, we do not reject the hypothesis that the given time series is stationary. The same applied to nominal and real stock returns where both the computed t values are bigger than the 1%, 5% and 10% critical t statistic. Thus, it could sum up that all three variables in Table 3.4 are statistically stationary as for the purpose of econometric study.

3.4 Empirical Results between Stock Returns and Inflation

Table 3.5 simplified the relationship between stock returns and inflation in Malaysia. These relationships are tested for both the monthly data of nominal and real stock returns against inflation from 1984 to 2001.

Table 3.5 Nominal Stock Returns against Inflation in Malaysia (1984-2001)

R_t	$= 0.1772 + 2.5725\ \pi_t$	(3.22)
t	$=(0.2329)\quad(1.4816)$ ***	
$S.E$	$= (0.7606)\quad(1.7362)$	
R^2	$= 0.01113,\ \bar{R}^2 = 0.0060,\ D.W{=}1.8163,$	
R_t	$= 0.5476 + 1.0501\ \pi_{t-1}$	(3.23)
t	$= (0.7124)\quad(0.5999)$	
$S.E$	$= (0.7686)\quad(1.7503)$	
R^2	$= 0.0018,\ \bar{R}^2 = 0.0032,\ D.W{=}1.8125,$	
R_t	$= 0.9654 + 1.4583\ \pi_{t-1} - 2.1042\ \pi_{t-2}$	(3.24)
t	$= (1.1314)\quad(0.8110)\qquad(1.1966)$	
$S.E$	$= (0.8532)\quad(1.7980)\qquad(1.7583)$	
R^2	$= 0.0099,\ \bar{R}^2 = 0.0003,\ D.W{=}1.8048$	
R_t	$= 0.7385 + 1.8367\ \pi_{t-1} - 2.4548\ \pi_{t-2} + 0.8307\ \pi_{t-3}$	(3.25)
t	$=(0.7946)\quad(0.9434)\qquad(-1.3409)\qquad(0.4694)$	
$S.E$	$= (0.9295)(1.9468)\qquad(1.8307)\qquad(1.7696)$	
R^2	$= 0.0130,\ \bar{R}^2 = 0.0025,\ D.W{=}1.7853$	

Notes :

R_t	nominal stock returns
t	*t* statistic
$S.E$	standard error
R^2	*R* square
$\bar{R}^2$	adjusted *R* square
D.W	Durbin Watson test
*	Significant at 1 %
**	Significant at 5%
***	Significant at 10%

In Table 3.5, Equation (3.22) investigated whether stock returns act as a hedge against inflation by includes a contemporaneous inflation. Based on Fisher Hypothesis (1930), a positive coefficient on the inflation rate is expected. Equation (3.23) is conducted which include one period past rate of inflation instead of the contemporaneous inflation. A positive (but an unknown size) inflation rate coefficient is expected in the same test. The value of the coefficient in this relationship will depend on the correlation between past inflation and the contemporaneous inflation. Since the correlation is positive as suggested by Irving Fisher (1930), thus the coefficient on both the contemporaneous and past should be positive.

Equations (3.24) and (3.25) applied two to three lags of the inflation against the nominal stock returns. Negative coefficient on this lagged inflation would be difficult to reconcile with the Fisher Hypothesis since past inflation contains no surprises. Nelson (1976) further claimed that the value of the coefficients on the past inflation should be positive since it depends upon the correlation between current and past inflation, and given that correlation between error term and inflation is positive. To be more precise, the timing of the price index measurement, their public announcement and the actual flow of the information suggest that the leads and lags along with the current inflation may convey some information regarding stock returns. Both Nelson and Jaffe and Mandelker (1976) in their studies and empirical results found negative coefficients on stock returns and past inflation.

The test between current nominal stock returns and inflation indicated a direct and positive relationship in Equation (3.22). The coefficient on inflation is greater than unity and significant at the 10% level. This indicate that 1% rise in the inflation implied a rise in the stock returns by 2.57% .The positive relationship provided evidence for the Fisher Hypothesis for risky assets. In other words, the results implied that Malaysia's stock returns are a good (if not a perfect) hedge against inflation.

Replacing the current rate of inflation with one period past inflation in Equation (3.23), once again a direct and positive relationship is found but insignificant at the 5% and 10% level. Thus, no relationship is found between the current stock returns and past inflation. Adding more lags of inflation in Equation (3.24) and (3.25) indicated no significant relationship between the two variables. In all four Equations from (3.22) to (3.25), the adjusted R^2 is less than 5% implying that along with inflation other factors may be affecting the stock returns.

Table 3.6 Real Stock Returns against Inflation in Malaysia (1984-2001)

r_t	$= 0.1902 + 2.7057\,\pi_t$	(3.26)
t	$= (0.2494)\ (1.5214)$ ***	
$S.E$	$= (0.7626)\ (1.7784)$	
R^2	$= 0.0118,\ \overline{R}^2 = 0.0067,\ D.W = 1.8223,$	
r_t	$= 0.5030 + 1.2534\,\pi_{t-1}$	(3.27)
t	$= (0.6546)\ (0.7163)$	
$S.E$	$= (0.7684)\ (1.7498)$	
R^2	$= 0.0026,\ \overline{R}^2 = 0.0025,\ D.W = 1.8135,$	
r_t	$= 0.9266 + 1.6436\,\pi_{t-1} - 2.1222\,\pi_{t-2}$	(3.28)
t	$= (1.0861)\ (0.9143)\ (-1.2071)$	
$S.E$	$= (0.8530)\ (1.7977)\ (1.7580)$	
R^2	$= 0.0108,\ \overline{R}^2 = 0.0006,\ D.W = 1.8054$	
r_t	$= 0.6983 + 2.0120\,\pi_{t-1} - 2.4682\,\pi_{t-2} + 0.8447\,\pi_{t-3}$	(3.29)
t	$= (0.7514)\ (1.0336)\ (-1.3484)\ (0.4774)$	
$S.E$	$= (0.9293)\ (1.9465)\ (1.8304)\ (1.7693)$	
R^2	$= 0.0139,\ \overline{R}^2 = 0.0016,\ D.W = 1.7855$	

Notes :

r_t	real stock returns
t	*t* statistic
$S.E$	standard error
R^2	*R* square
$\overline{R}^2$	adjusted R square
D.W	Durbin Watson test
*	Significant at 1 %
**	Significant at 5%
***	Significant at 10%

Table 3.6 indicated the relationship between real stock returns and inflation. According to Fisher Hypothesis (1930), by replacing the nominal stock returns with the real stock returns, the coefficient on current and past inflation should be insignificant. On the other hand, Lintner's theory (1975) suggested a negative relationship between real stock returns and inflation. Also, Nelson (1976) supported that it is reasonable to assume that much of the

information about future inflation rates available to the market is contained in the past inflation. This could especially be true if investors formulated expectations of future inflation by means of adaptive expectations. Adaptive expectations are expectations adjusted by the fraction of past forecasting errors. Both Nelson, Jaffe and Mandelker (1976) claimed that it is of some importance to consider a test of stock returns on past inflation rates.

The regression between current real stock returns and current inflation in Equation (3.26) showed a positive and direct relationship. The coefficient on the inflation is positive and significant only at the 10% level. The R^2 is also small (1.18%) suggesting that the real stock returns are also affected by factors other than inflation. These empirical results are against Fisher Hypothesis (1930), where real stock returns and inflation are not correlated and Nelson's analysis (1976) claimed that the relationship should be negatively related.

Replacing the current inflation with one period past inflation in Equation (3.27), once again a direct relationship is found but insignificant at both the 5% and 10% level. The coefficient on the lagged inflation in Equation (3.27) is positive but insignificant. The weak positive relationship in Equation (3.26) provides evidence against the Fisher Hypothesis (1930).

Adding more lags of inflation does not add much to the relationship, the coefficients are found to be jointly insignificant under all circumstances from Equation (3.27) to Equation (3.29). The R^2 for each test is again low.

These results supported the Fisher Hypothesis (1930), which claimed no significant relationship between real stock returns and inflation.

3.5 Conclusion

The empirical results in Section 3.4 show that inflation is a weak variable that influences the stock returns. It is believed that there are other factors that influence the stock returns.

The most often cited risk factor is market risk or a change in the overall market conditions. International asset pricing studies feature an ongoing discussion about relevant market benchmarks, especially regarding emerging markets. The most commonly used asset pricing model is Capital Asset Pricing Model (CAPM), where the excess return on the market portfolio is the risk premium, and the beta for each security is measured against the market portfolio.

The short-term interest rate is the opportunity cost for investors in equity market. As such this suggests a negative relationship between stock return and nominal interest rates. As interest rates increase, investors are more inclined to invest in a safer asset offering a certain return. Higher interest rates also make firms less inclined to invest and to finance investments by borrowing.

Asset prices are another factor that might influence stock returns. This factor reflected the expectations about future earnings of firms, which are likely to be influenced by current real activity in the national and international economies. An increasing growth rate will boost expectations about higher demand and higher earnings in the future. Thus, this formed a positive relationship between real economic activity and stock returns. The particular impact of expanding real activity must be evaluated in the context of other economic and political factors, e.g. government policy.

Meanwhile, the consumption tendency of households indicated a negative relationship between expected output and stock returns. During recessions, stock prices are low and the required stock returns is high in order to encourage investors to sacrifice current consumption when the marginal utility of consumption is high. The opposite is true during booms, when stock prices are high and expected returns are low.

Exchange rate changes also affected other macroeconomic variables that in turn have a positive or negative effect on stock returns. For example, since the interest rate changes are inversely related to stock returns, we could expect that a depreciating currency, followed by an increased interest rate, would have a negative relationship with stock returns.

There are other proxies for risk factors like per capital GDP, GDP growth, the size of trade sector, market capitalization relative to GDP, size of public sector, politic risk indices and indebtedness of the country. The major drawback of these variables is the infrequency with which they are published.

The variables including GDP or risk indices are available only on a quarterly, which makes the data irrelevant for most of the study.

In short, the empirical results for the case study of Malaysia is not denying the role of inflation in determining the stock returns. Although there is a significant positive relationship between current nominal stock returns and inflation, the overall results for stock returns and inflation is relatively weak. By replacing the current inflation with lead and lags inflation, none of the equations in Table 3.3 and 3.4 indicated any significant relationship between stock returns and inflation.