Do Stocks Hedge Inflation? Vietnamese and Thai Evidence

Introduction

Economists and market participants often expect that nominal stock returns are positively and (and even on a one-for-one basis) correlated with (expected or actual) inflation (Lintner, 1975; Groenewold, et al., 1997). In its *ex ante* form, this expectation is a generalization of the well-known Fisher hypothesis (Fisher, 1896; Fisher, 1930). It is motivated by assuming that in the long-run firms can increase their output prices in order to pass on the inflation to the customer (Mishkin, 1992; Boudoukh and Richardson, 1993). Since stocks are claims on physical assets, or "real" assets, financial economists argue that its nominal returns must also co-vary positively with actual (*ex post*) inflation, suggesting that it is also possible to hedge against unexpected inflation (Sharpe, 2002). Despite these wide spread beliefs, the inflation hedging capabilities of common stocks remains an actively debated issue (Fisher and Webb, 1992; Roache and Attie, 2009). For developed countries, most empirical studies document a significantly negative relationship between (real and nominal) stock returns and (actual, expected and unexpected) inflation (see, e.g., Lintner (1975); Bodie (1976); Fama and Schwert (1977); Gultekin (1983b)). Obviously, these findings indicate a serious violation of the (extended) Fisher hypothesis. For developing countries the evidence is mixed. A large number of studies provides evidence of a significant and positive stock return-inflation relationship (see, e.g., Choudhry (2001); Spyrou (2004); Alagidede (2009); Alagidede and Panagiotidis (2010)). On the contrary, others find a significantly negative one (see, e.g., Chatrath, et al. (1997); Zhao (1999); Omran and Pointon (2001)). Hence it seems that the Fisher hypothesis only holds in a number of cases, which is an empirical issue.

In this paper, we investigate the inflation-hedging properties of stocks for two emerging stock markets: Vietnam and Thailand. Whereas the Vietnamese stock market is young and less developed,[1] the stock market of Thailand can be considered as one of the oldest and most developed stock exchanges in ASEAN.[2] Spyrou (2004) argues that the inflation hedging ability may substantially differ because of differences in market liquidity and investor sophistication (i.e. less informed and less rational investors). Furthermore, empirical studies show that the real stock return-inflation relationship is time-varying (Lee, 2003), e.g., the relation was found to be positive in the pre-war period, but negative in the post-war period for the U.S. data (Kaul, 1987; 1990). Therefore, in this paper we also examine the hedging capability of stocks for these two countries taking into account structural changes during the sample period.

We first examine the *ex post* relationship between nominal returns and inflation. In the second step, we use an *ex ante* model to investigate the relation between nominal stock returns and both expected and unexpected inflation rates. The *ex ante* model can provide a more straightforward way to test the Fisher hypothesis (see, e.g., Nelson (1976); Boudoukh and Richardson (1993)). By doing this, we also can separate the hedging ability of stocks against both expected and unexpected inflation. Next, we

---

[1] E.g., the main stock exchange of Vietnam, Hochiminh stock exchange (HOSE), was established in July 2000. Over 2000-2012, the market capitalization reached USD 39.8 billion from about USD 50 million, while the number of listed firms increased up to 300 firms from 2 firms. Only three types of securities are listed on the exchange (common stocks, investment certificates and bonds). In 2012, e.g., the total turnover is about USD 10.3 billion (1USD = 21,000 VND) and 13.9 billion of shares. In addition, the number of trading accounts raised up to 1.2 million from 2.9 thousands, in which the total number of trading accounts of foreign investors until 2011 is about 15.5 thousand. Sources: the published article by Tran Dac Sinh, Board chairman of Hochiminh Stock Exchange (HOSE), on the *Vietnam Investment Review* online dated on 24/01/2013, and the annual report in 2011 by Vietnam Securities Depository, and the authors' calculation based on information from the website of HOSE at http://www.hsx.vn.

[2] E.g., the stock exchange of Thailand (SET) started formal operations in July 1962. SET is nowadays viewed as one of the largest among the emerging markets in ASEAN (see, e.g., Jirasakuldech, et al. (2008)). As of December 2012, the total market capitalization is about USD 398.8 billion with 558 listed firms. There are seven types of securities traded on the exchange (common stocks, preferred stocks, warrants, derivative warrants, ETFs, depository receipts and unit trusts). In 2012, the total turnover is about USD 263.8 billion and 1,418.4 billion of shares. Note: In all calculation, 1USD = 30 THB. Sources: the annual report in 2011 by SET, and the authors' calculation based on information from the website of SET at http://www.set.or.th.

separate the samples into sub-samples for analyzing the temporal stability of stock return-inflation relations.

Although the inflation-hedging ability of common stocks has extensively been examined for emerging stock markets, it has not yet been investigated for the rapidly growing Vietnamese stock market. An empirical research on this issue can reveal the extent to which stocks in Vietnam can protect the wealth of investors against inflation. Also, the inflation-hedging characteristics of the Vietnamese stock market can partly show the extent to which the stock market acts as a barometer of the economy (i.e., how effectively it reflects changes in macroeconomic factors). This research therefore really has important implications for both investors and policymakers. For Thailand, a few empirical papers are available (e.g., Khil and Lee (2000); Al-Khazali and Pyun (2004); Spyrou (2004)) covering various sample periods, of which the longest one is only up to the year 2000. Given economic and political changes of the country during recent years (e.g., changes in the monetary policy framework by the Bank of Thailand in 2000, the tsunami in 2005, political turmoil in 2006, and the 2008-2009 global economic crisis), the findings of these studies may be outdated. Our study with longer time series data (i.e., extended until 2011), is an extension to the literature, and hence does have a value added. In addition, since previous studies did not explicitly test the one-to-one relationship between nominal stock returns and inflation (actual, expected and unexpected) as predicted by the Fisher theory, this study also aims to fill the gap of the literature.

As a final motivation, we examine the stock-inflation relationship making a difference in the source of the inflation. According to theoretical equilibrium models, the stock return-inflation relationship is positive if inflation is caused by monetary sources and negative if inflation is due to non-monetary sources (see, e.g., Danthine and Donaldson (1986); Marshall (1992)). Relatively applicable for the premises of these theoretical

analyses, the literature indicates that while monetary factors seem to play a significant role in inflation in Vietnam, they may have a little impact on inflation in Thailand. Including both countries in this study, therefore, can provide a good empirical check across countries for these theoretical works. Second, Vietnam and Thailand tend to suffer from both aggregate real shocks and monetary shocks whose interaction, as argued by Hess and Lee (1999), will determine the nature of stock return-inflation relation. As such, examining the roles that aggregate real and monetary shocks play in driving the relationship in these two countries would be interesting. Thirdly, since seeking for a global diversification of wealth nowadays becomes a common practice for investors, understanding the hedging characteristics of peer emerging stock markets such as Thailand and Vietnam may benefit not only domestic investors but also international institutional investors.

The remainder of the paper is structured as follows. Section 2 presents the methodology. In section 3, we review the existing literature. Next, we develop hypotheses (section 4). Section 5 describes the data and their descriptive statistics. The empirical results are discussed in section 6. Finally, we conclude.

I. Methodology

A. The Fisher hypothesis

Fisher (1896); (1930) states that the expected nominal interest rate is equivalent to the sum of the expected real interest rate and the expected inflation rate, and also that the real and monetary sectors of the economy are largely independent. Therefore, the expected inflation rate should be fully reflected into the expected nominal interest rate.

The theory is generalized to nominal returns on any asset, which should move one-for-one with expected inflation (Fama and Schwert, 1977). Formally, the proposition can be represented by

$$[1 + E_{t-1}(R_t)] = [1 + E_{t-1}(r_t)][1 + E_{t-1}(\pi_t)], \quad (1)$$

where E_{t-1} is the conditional expectation operator at time $t - 1$; R_t denotes the nominal return on an asset from time $t - 1$ to t; r_t is the appropriate equilibrium real return on the asset from time $t - 1$ to t and π_t represents the inflation rate from time $t - 1$ to t.

Equation (1) can be equivalently reformulated as

$$E_{t-1}(R_t) = E_{t-1}(r_t) + E_{t-1}(\pi_t) + E_{t-1}(r_t)E_{t-1}(\pi_t). \quad (2)$$

In (2), the cross-product term $E_{t-1}(r_t)E_{t-1}(\pi_t)$ is usually negligible. Hence, the representation of (2) is routinely as

$$E_{t-1}(R_{it}) = E_{t-1}(r_{it}) + E_{t-1}(\pi_t). \quad (3)$$

B. Empirical model

We investigate the *ex post* relationship between the nominal asset return and inflation using the following regression:

$$R_t = \varphi + \omega\pi_t + \epsilon_t, \quad (4)$$

where φ and ω are coefficients and ϵ_t is the error term.

Following Fama and Schwert (1977), we also estimate the following *ex ante* model in the second step:

$$R_t = \alpha + \beta E_{t-1}(\pi_t) + \gamma U E_{t-1}(\pi_t) + n_t, \quad (5)$$

where n_t is the error term, and $UE_{t-1}(\pi_t)$ denotes the unexpected component of inflation given information available at time $t-1$.

Since both explanatory variables are assumed to be orthogonal, consistent estimates of β and γ can be obtained as long as expected inflation is observable. In equation (5), Fama and Schwert (1977) indicate three cases for the hedging potential of an asset:

(a) If the tests indicate that $\beta = 1.0$, the asset is said to be *a complete hedge against expected inflation*: there exists a one-to-one relationship between the nominal return on the asset and the expected inflation rate, and also the expected real return on the asset varies independently to the expected inflation rate.

(b) If the tests show that $\gamma = 1.0$, the asset is *a complete hedge against unexpected inflation*.

(c) If the tests point out that $\beta = \gamma = 1.0$, the asset is considered as *a complete hedge against inflation*: the nominal return on asset has a one-to-one relationship with both the expected and unexpected inflation rate, and the *ex post* real return on the asset varies independently to the *ex post* inflation rate.

It should be noted that the approach by Fama and Schwert (1977) requires a suitable measurement for the expected and unexpected inflation rates. Since the use of the treasury bill rate as a proxy for expected inflation by Fama and Schwert (1977) cannot be reliably applied due to lack of openly traded short-term risk-free monetary instruments in Vietnam and Thailand, another expected inflation measurement must be used. Comparing the performance of four main methods to forecast inflation, i.e., time series-based models, a Phillips curve-based model, a term structure-based model, and survey-based measures such as surveys by Livingston, SPF or Michigan, Ang, et al. (2007) show that surveys outperform the other ones and that ARIMA models perform decently out-of-sample. Given the unavailability of survey-based measures for the country, we therefore use an ARIMA model (Box and Jenkins, 1970) to estimate the expected and

unexpected inflation for this study. This approach is also commonly employed by other studies, e.g., Gultekin (1983b); Wahlroos and Berglund (1986); Li, et al. (2010).

We estimate all regressions by OLS (Ordinary Least Squares), since our focus is to examine the short-run influence of inflation on the asset returns, and not the feedback from returns to inflation. We use the Newey-West corrected covariance matrix when computing the test statistics in order to account for heteroskedasticity and residual autocorrelation (Newey and West, 1987).

II. Literature survey

A. Stock returns and inflation

As opposed to the traditional beliefs and the generalized Fisher hypothesis (1930), the empirical work of Lintner (1975) shows a possible negative relation between nominal/real stock returns and inflation (expected and unexpected). He claims that the stock market might not even be a partial hedge against inflation. Since then a lot of research has been conducted using different sample periods, return horizons and stock price indices for many countries. The relationship between stock returns and expected inflation is empirically investigated as follows. Under the Fisher hypothesis, the regression coefficient of nominal returns on expected inflation should be statistically indistinguishable from 1.0, implying a one-for-one comovement between nominal stock returns and expected inflation. Equivalently, since the Fisher hypothesis also implies that real returns are independent of expected inflation, leaving expected inflation fully reflected in the nominal returns, the regression coefficient of real stock returns on expected inflation should be equal to 0. Since the list of empirical papers testing the Fisher hypothesis on stock returns is unexhausted, this section only aims to review most relevant studies.

When regressing the nominal returns on the New York Stock Exchange Index on actual inflation, Jaffe and Mandelker (1976) find a significantly negative relationship for the monthly data over January 1953-December 1971, but no statistical relation for the annual data over 1875-1970. Moreover, using the nominal one-month interest rate as a proxy for expected inflation, the study documents a significantly negative relationship between the monthly nominal stock returns and both expected and unexpected inflation rates. Nelson (1976) also documents a negative relationship between nominal stock returns (using the Scholes Index for 1953-1972 and the Standard and Poor's 500 Index for 1973-1974) and inflation rates (actual, expected and unexpected), in which past rates of inflation are used as predictors for expected inflation. Similarly, regressing the nominal returns (monthly, quarterly and semi-annual horizons) on the New York Stock Exchange Index over 1953-1972 on both expected and unexpected inflation, Fama and Schwert (1977) find significantly negative coefficients on both components of inflation. However, as opposed to the findings for the U.S. data, Firth (1979) finds a significantly positive relationship between the nominal returns (monthly and annually data) and actual inflation for the U.K over 1955-1976. Furthermore, for the whole sample period and most of sub-periods, the relationship is greater than unity, partially supporting the Fisher hypothesis. Employing the Fama and Schwert (1977) framework to examine the relationship between the nominal monthly stock returns on actual inflation, expected and unexpected inflation for 26 countries around the world over 1947-1979,[3] Gultekin (1983b) finds that most of the regression coefficients are either significantly negative or insignificantly positive, in which the negative coefficients are predominant. The U.K. represents a unique case of the sample in which it is positively correlated with actual and unepxected inflation, but negatively related to expected inflation. While the results for the U.K. confirm the previous findings by Firth (1979),

---

[3] Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Switzerland, Sweden, the U.K and the U.S. Quarterly returns are used in some countries due to the unavailability of monthly data.

Cozier and Rahman (1988) corroborate the results for Canada. Besides, a negative relation between the real stock returns and expected inflation is also popularly documented for developed countries. E.g., Solnik (1983), using interest rates as a proxy for the expected inflation, finds a significantly negative relationship between the real monthly stock returns and expected inflation for 9 OECD countries including the U.S., Japan, the U.K, Switzerland, France, Germany, Netherlands, Belgium and Canada over 1971-1980. These findings show that stock return-inflation relation in these developed countries is as puzzling as the findings in the U.S. (Gultekin, 1983b).

Notwithstanding with the obvious violation of the Fisher hypothesis, i.e., a significantly negative relationship between stock returns (nominal and real) and inflation (actual, expected and unexpected) is dominantly found for developed countries, empirical studies for developing countries result in mixed evidence. E.g., Choudhry (2001) regresses the monthly nominal stock returns on actual inflation for high inflation countries over 1981-1998, i.e., Argentina, Chile, Mexico and Venezuela. While the regression coefficient is significantly positive and indistinguishable from unity for Argentina and Chile consistent with the Fisher hypothesis, it is positive but insignificant for the other two countries. Subsequently, investigating the stock return-inflation relation for Brazil, another high-inflation country, Choudhry and Pimentel (2010) also find a significantly positive relation between monthly nominal stock returns and the actual inflation. Although the relationship is positive as predicted by the Fisher hypothesis, it is not on a one-to-one basis. The findings hold for both the general index returns and individual stock returns. Yet, regressing the monthly nominal returns on actual inflation using the data of 10 emerging stock markets[4] over 1989-2000, Spyrou (2004) observes a negative relationship for Chile, Thailand, Hong Kong and Turkey, but positive for the other countries. Nevertheless, the relation is statistically significant at the conventional levels only for Thailand, Argentina, Malaysia, and the Philippines.

---

[4] Chile, Mexico, Brazil, Argentina, Thailand, Korea, Malaysia, Hong Kong, Philippines and Turkey.

Furthermore, the relationship between real stock returns and inflation is also widely documented for developing countries. E.g., Chatrath, et al. (1997) document a negative relationship between monthly real stock returns and actual inflation, as well as unexpected inflation for India. Using data from a group of Pacific-rim countries over 1970s-1997,[5] Khil and Lee (2000) find a significantly negative relationship between quarterly real stock returns and actual inflation for Indonesia and Singapore. For other countries, including Hong Kong, South Korea, the Philippines, Taiwan and Thailand, the relation is also negative but not statistically significant. These results are later corroborated by Al-Khazali and Pyun (2004) finding that the monthly real stock returns are negatively related to actual, expected and unexpected inflation for Hong Kong, Indonesia, South-Korea, the Philippines, Singapore and Thailand over 1980s-1999. Similar findings are also evidenced by other studies, e.g., Zhao (1999) for monthly returns in China, Floros (2008) and Hondroyiannis and Papapetrou (2006) for Greek data, etc.

Since the Fisher hypothesis should hold at all horizons (Boudoukh and Richardson, 1993), Boudoukh and Richardson (1993) compare the regression results between 1-year and 5-year nominal stock returns on actual and expected inflation for the U.S. and the U.K. over the period 1802-1990. While coefficients are consistently significantly positve for the 5-year horizon, that is not the case for the 1-year one, in which the regression coefficients for the former are always significantly greater *vis-à-vis* for the latter. They claim that the Fisher hypothesis may hold in long horizons (e.g., 5-year horizon for this case), as opposed to the puzzling results in the short horizons (e.g., monthly, quarterly and even annually horizons). These findings are also corroborated by Wong and Wu (2003) for a sample of G7-countries and eight Asian countries[6] with various data

---

[5] Data for Indonesia, Malaysia and Taiwan are from 1980s.
[6] Canada, France, Germany, Italy, Japan, the U.K., the U.S., Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand. The data periods for the U.K. and the U.S. are different from Boudoukh and Richardson (1993).

periods. Using data from African countries, namely, Egypt, Kenya, Morocco, Nigeria, South, Africa and Tunisia, Alagidede and Panagiotidis (2010) document a positive relationship between monthly nominal stock returns and the actual inflation all countries except Egypt, in which the relation is statistically significant only for Kenya and Nigeria. Moreover, the Fisher hypothesis is rejected for Nigeria, but not for Kenya. Extending to the longer horizons, the study consistently finds a significantly one-to-one relationship between nominal returns and the actual inflation for Kenya and Nigeria at the 1-year horizon and Tunisia at 5-year horizon, supporting the Fisher hypothesis. Several studies examine the extent to which stock prices and inflation rates are moved together over the long-run. Among others, Kim and Ryoo (2011) find a positive long-run relationship between real stock prices and actual inflation rates for U.S. data in 1950s. Engsted and Tanggaard (2002) find similar results for the U.S. and Denmark. In contrast, Najand and Noronha (1998) and Crosby (2001) document a negative relation between real stocks prices and actual inflation rates for Japan and Australia, respectively. Some studies found no relationship between the nominal stock prices and actual inflation, e.g., Ely and Robinson (1997) for the international data; Floros (2008) and Hondroyiannis and Papapetrou (2006) for Greek data.

B.   Driving forces behind the relationship between stock returns and inflation

In the literature, several factors that may affect the stock returns-inflation relationship have been pointed at. Fama (1981) explains the negative relation between real stock returns and expected inflation with the proxy hypothesis. Assuming that output is exogenous to money demand (i.e., largely invariant money demand with respect to real shocks), Fama assumes that current stock prices and the anticipated output are positively correlated and that the anticipated output has a negative link with the

expected inflation. Consequently, real stock returns are (spuriously) negatively associated with expected inflation. Geske and Roll (1983) and Kaul (1987), extending the proxy hypothesis, propose that monetary responses from monetary policy (i.e., money supply processes) may also influence the stock returns-expected inflation relationship. That is, a counter-cyclical monetary response (e.g., easing money supply against a negative output shock) reinforces the negative relationship, whereas a pro-cyclical monetary response (e.g., tightening money supply against a negative output shock) results in the neutral or positive relation.

On the other hand, theoretical analyses based on equilibrium models show that the relation between real stock returns and expected inflation could be either positive or negative depending on the causes of inflation. Particularly, the relationship is negative if inflation arises from non-monetary sources (e.g., a real output shock) (Danthine and Donaldson, 1986), while it may be positive when inflation sources are related to monetary factors (Stulz, 1986; Lee, 1989; Marshall, 1992; Bakshi and Chen, 1996).

Regarding the effects of unexpected inflation on stock returns, theoretical considerations indicate that common stocks might be either helped or hurt by unexpected inflation, e.g., Kessel and Alchian (1960) with the net debtor-creditor hypothesis or Lintner (1975) with tax effects. This leaves the real stock returns-unexpected inflation relationship undetermined. However, grounded on equilibrium models, several studies, e.g., Hess and Lee (1999) and Lee (2003), empirically document that supply shocks, presumed mainly due to real output shocks, cause a negative real stock return-unexpected inflation relationship, while demand shocks (e.g., monetary and fiscal policy shocks) establish a positive real stock return-unexpected inflation relation.

III.   Hypothesis development

It is now widely accepted that there is no direct causal relation between real stock returns and inflation, and that the underlying relationship merely reflects other more fundamental relations in the economy (Lee, et al., 2000; Lee, 2003). In this section, we show a number of relevant facts that may anticipate our findings regarding the literature.

Firstly, while Fama (1981) attributes the negative link between stock returns and expected inflation to the negative inflation-anticipated output association, Spyrou (2004) finds a positive long-run relationship between inflation and output for many emerging countries where real stock returns are positively correlated to actual inflation. Spyrou (2004) argues that, unlike for developed countries, the prediction by the macroeconomic theories of the Phillip curve may indeed hold for emerging countries. Furthermore, since many emerging economies have experienced decades of inflation, market participants do not necessarily interpret the higher current inflation as a signal of lower future output. As a supporting evidence, several empirical studies find that stocks in emerging countries do provide a good hedge against inflation, especially in high and persistent inflation ones (see, e.g., Choudhry (2001)). Vietnam seems to be a good example of these arguments in the sense that high and persistent inflation cohabit with the strong economic performance,[7] and if this is the case we would expect that stocks in Vietnam can provide a good hedge against expected inflation.

Secondly, the main sources of inflation seem to be different between Vietnam and Thailand. Several studies find that monetary shocks are one of the significant

---

[7] Particularly, Vietnam has, on the one hand, shown a strong economic performance since the early 1990s, i.e. approximately 7.4% per annum economic growth rate, especially in recent years it had one of the highest growth rates in East Asia (Camen, 2006). On the other hand, it has commonly suffered from high inflation for years, e.g., the hyperinflation in 1980s-1990s was up to above 300% per annum, or it was recently about 8.3%, 23.1%, 5.9%, and 11.8% in the years 2007, 2008, 2009, and 2010, respectively (Vu, 2012).

determinants of inflation in Vietnam, e.g., Camen (2006), Nguyen, et al. (2012) and Vu (2012), which shows the large contribution of monetary factors to inflation. In contrast, given the monetary policy adopted by the Bank of Thailand (BOT), this does not seem to be the case for inflation in Thailand. Specifically, before the 1997 Asian financial crisis, the BOT followed a fixed exchange rate regime, in which Thai Baht was pegged to a currency basket (in which the USD accounts for 80%), while it has switched to the inflation targeting framework since the year of 2000 (See, e.g., Waiquamdee (2001); Chantanahom, et al. (2004)). Under these regimes, especially the fixed exchange rate regime, monetary factors (money supply) may have contributed little to inflation in Thailand. This conjecture is reinforced by a number of empirical studies showing that the money supply is not a significant (or relatively weak) determinant of inflation in Thailand, e.g., Mohanty and Klau (2001); Spyrou (2004). Therefore, we would expect that, according to theoretical analyses based on equilibrium models, stocks in Vietnam provide a better hedge against expected inflation than those in Thailand.

Thirdly, Vietnam and Thailand, like other developing countries, tend to suffer from exogenous real shocks, e.g., oil shocks, due to the net importer position of natural resources and other production materials. Also, sharing institutional similarities with other Asian countries, the monetary authorities of Vietnam and Thailand are still highly dependent on the government and tend to be more prone to political influences in implementing their policies, creating strong fluctuations of aggregate monetary shocks in the economy (Khil and Lee, 2000). Indeed, a number of empirical studies indicate that determinants of inflation in these two countries are due to both aggregate supply and demand shocks (See, e.g., Loungani and Swagel (2001); Mohanty and Klau (2001); Nguyen, et al. (2012); Vu (2012)).

Taking all these facts into account, we would expect that the nature of the real stock returns-inflation (expected and unexpected) relationship, and hence the inflation-

hedging ability of stocks in Thailand and Vietnam, can be either positive or negative. It can also be different between both markets due to macroeconomic and institutional differences. Moreover, since the interaction between driving forces may change over time, the relationship could also be time-varying.

IV.   Data and summary statistics

A.   Data

Nelson (1976) and Gultekin (1983b), among others, point out a few technical issues with the use of monthly Consumer Price Index (CPI) as a measurement of inflation regarding to the timing of CPI measurement, their public announcement and the actual rate of information flow to the market.[8] Hence, we follow a number of previous studies, e.g., Bodie (1976); Fama and Schwert (1977); Cohn and Lessard (1981) and use quarterly data aggregated from monthly data to avoid the inherent technical issues of monthly CPI data.

Monthly time series data are obtained from various sources. The stock price index of Vietnam (VN-INDEX) over the July 2000-December 2011 period is provided by the Hochiminh stock exchange (HOSE), while the stock price index of Thailand (SET-INDEX) over the period February 1987-December 2011 is collected from Datastream. The CPI of both countries is obtained from Datastream. Since economic and financial time series are usually found to show unit root nonstationarity (see, e.g., Nelson and Plosser (1982); Phillips (1987); Fuller (1995)), we transform the stock price index and CPI into returns

---

[8] Particularly, CPI is not the end-of-the-month measurement, but various measurements of components over the month instead. Its public announcement is usually made later than the measured month or even often with long delays, for which these announcements may convey little additional information to the market beyond what the market participants directly observed or obtained from other sources. These suggest that lagged and lead inflation rates may convey more information, which should be taken into account by regressing the returns on the individual lags and leads in the inflation rates as well as other distributed lag and lead models to capture their importance.

and inflation rates, respectively using log changes. Both stock returns and inflation rates are stationary using the ADF and KPSS test statistics.[9]

B. Summary statistics

In Table 1, panel A and panel B we report summary statistics and autocorrelation up to lag 4th for all variables for both Vietnam over (2000-2011) and Thailand over (1987-2011). As can be seen from panel A, both countries have similar average positive stock returns, while the average inflation rate is higher for Vietnam. The higher standard deviation for Vietnamese stocks returns indicates the higher risk of its stock market. Using the D'Agostino, et al. (1990) normality test, we cannot reject the normality of the returns for any of the countries.[10]

The autocorrelation coefficients in panel B show a quick decay after the first lag for all variables. Noticeably, the inflation rate exhibits a high and statistically significant lag-four-coefficient (serial correlation) at the 5% level for Thailand. The inflation rate series shows a significant autocorrelation coefficient at the 1% level at the first lag for Vietnam, the coefficient is moreover rather large (0.55). However, only the first and second lag is significant in the AR model. Given these results, we use AR(4) and AR(2) models to decompose the actual inflation rates of Thailand and Vietnam respectively into expected and unexpected inflation rates. Both the portmanteau test (Ljung and Box, 1978) and the Bartlett's cumulative periodogram-based (B) test (Bartlett, 1995) fail

---

[9] Stationarity of all variables is checked by both the Augmented Dickey-Fuller unit root test (ADF) (Dickey and Fuller, 1979) and the KPSS stationarity test (Kwiatkowski, et al., 1992), since the use of the KPSS test where the null hypothesis is stationary time series can circumvent the problem of low power of the unit root ADF test (Plasmans, 2006). Optimal lag length selection for these tests is based on the Akaike Information Criterion (AIC) (Akaike, 1974). In fact, we also checked with the Schwartz (Bayesian) Information Criterion (BIC, SC, SBC) by Brennan and Schwartz (1978) and this did not change our conclusion that all the time series are stationary. Results are available upon request.

[10] Stock returns: for Thailand [Skewness (p-value = 0.41), Kurtosis (p-value = 0.11), the joint-test of normality (p-value = 0.19)], for Vietnam [Skewness (p-value = 0.77), Kurtosis (p-value = 0.10), the joint-test of normality (p-value = 0.23)]. Inflation rates: for Thailand [Skewness (p-value = 0.06), Kurtosis (p-value = 0.00), the joint-test of normality (p-value = 0.00)], for Vietnam [Skewness (p-value = 0.00); Kurtosis (p-value = 0.04); the joint-test of normality (p-value = 0.00)].

.

to find any remaining significant residual serial correlation, indicating the correct specification of the filter.

Table 1. Summary statistics for the whole sample

Panel A of this table reports the summary statistics, while panel B reports autocorrelation up to the 4th lag for all variables in both countries. In the table, R denotes the stock returns; π is the actual inflation rates; $E(\pi)$ is the expected inflation rates; $UE(\pi)$ is the unexpected inflation. All returns at time t are calculated by changes in log of the index from time (t-1) to t. Inflation rates at time t are defined as changes in log of the Consumer Prices Index from time (t-1) to t. Inflation rates at time t are defined as changes in log of the Consumer Prices Index from time (t-1) to t. The summary statistics are expressed in percentage unit. Returns and inflation rates are calculated by log changes of the stock prices index and CPI, respectively, from time (t-1) to t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by Autoregressive (AR) model, where expected inflation rates are the linear prediction of the AR model and unexpected inflation rates are the residuals of the AR model: Vietnam $(\pi_t = 0.01 + 0.74\pi_{t-1} - 0.35\pi_{t-2})$ and Thailand $(\pi_t = 0.0068 + 0.2526\pi_{t-4})$. *** and ** indicate the significance at the 1% and 5% levels, respectively.

	Thailand (1987Q1-2011Q4)				Vietnam (2000Q2-2011Q4)			
Panel A. Summary statistics (%)								
	R	π	E(π)	UE(π)	R	π	E(π)	UE(π)
Mean	3.01	0.91	0.91	0.00	3.24	2.10	2.17	0.00
Median	2.82	0.90	0.90	0.05	1.26	1.42	1.94	-0.18
Min	-54.99	-4.13	-0.37	-5.15	-71.61	-1.63	-0.92	-3.08
Max	60.14	4.98	1.93	3.85	61.93	8.80	6.16	4.61
Std	18.67	1.16	0.30	1.14	26.33	2.18	1.37	1.73
Skewness	-0.19	-0.46	-0.46	-0.67	-0.10	1.26	0.57	0.37
Kurtosis	3.75	7.04	7.01	7.52	4.01	4.54	3.47	2.75
N	100	100	96	96	46	46	44	44
Panel B. Autocorrelation								
Lags	R	π			R	π		
1	-0.14	0.09			0.10	0.55***		
2	0.07	-0.14			0.03	0.06		
3	0.01	-0.04			-0.01	-0.07		
4	0.05	0.25**			-0.04	0.07		

V. Empirical results

A. Regression results for the whole sample

Table 2 presents the regression results of stock returns on actual inflation rates for Thailand and Vietnam. The results show a negative but not statistically significant relationship between stock returns and actual inflation for both countries. Although not statistically significant, the negative coefficients are consistent with previous studies

(e.g., Khil and Lee (2000); Wongbangpo and Sharma (2002); Spyrou (2004)). Furthermore, given the large standard errors, both coefficients are not statistically different from neither one nor zero as can be seen from the table. We hence cannot reject the fact that stock returns may move in one-to-one correspondence with *ex post* inflation, i.e., stock markets in both country may possibly provide a complete hedge against the *ex post* inflation.

Table 2. Regression results of stocks returns on actual inflation rates for Thailand and Vietnam.

The table reports the regression results of stock returns on actual inflation rates at the contemporaneous term [equation (4)], as presented below for convenience, for both countries. In the table, R denotes the stock returns; π is the actual inflation rate; N is the number of observations, $\bar{R}^2$ is the adjusted R-squared; F is the F-test. All returns at time t are calculated by changes in log of the index from time (t-1) to t. Inflation rates at time t are defined as changes in log of the Consumer Prices Index from time (t-1) to t, while stock returns at time t are defined as changes in log of stock prices index from time (t-1) to t. The t-values for testing the hypothesis $H_0: \omega = 1$ are shown in the brackets next to the coefficients, and the robust t-values for testing the hypothesis $H_0: \varphi = 0$ or $H_0: \omega = 0$ are reported in the parentheses below the coefficients. (***), (**) and (*) indicate the significance at the 1%, 5% and 10% levels, respectively.

$$R_t = \varphi + \omega \pi_t + \epsilon_t \quad (4)$$

	φ	ω	N	$\bar{R}^2$	F
Panel A. Thailand					
R	0.03	-0.31 [-0.64]	100	0.00	0.02
	(1.13)	(-0.15)			
Panel B. Vietnam					
R	0.08	-2.16 [-1.49]	46	0.01	1.04
	(1.43)	(-1.02)			

Table 3 reports regression results for stock returns on expected and unexpected inflation rates for both Vietnam and Thailand. As can be seen from the table, results for both countries share a similar pattern, i.e., the coefficients on both expected and unexpected inflation are negative. These findings are again corroborated by previous studies (e.g., Wong and Wu (2003); Al-Khazali and Pyun (2004)). Nevertheless, owing to the relatively large standard errors, none of these coefficients is significantly different from zero or one. In other words, the results cannot reject the Fisher hypothesis of a one-to-one relationship between stock returns and the *ex-ante* inflation for both

countries. Moreover, both coefficients on expected and unexpected inflation are found to be statistically jointly indistinguishable from zero and unity using an F-test ($H_0: \beta = \gamma = 0$; $H_0: \beta = \gamma = 1$).

Table 3. Regression results of stocks returns on both expected and unexpected inflation rates for Thailand and Vietnam.

The table reports the regression results of stock returns on both expected and unexpected inflation rates at the contemporaneous term [equation (5)], as presented below for convenience, for both countries. In the table, R denotes the stock returns; π is the actual inflation rate; N is the number of observations, $\bar{R}^2$ is the adjusted R-squared; F is the F-test. All returns at time t are calculated by changes in log of the index from time (t-1) to t. All returns at time t are calculated by changes in log of the stock prices index from time (t-1) to t. Inflation rates at time t are defined as changes in log of the Consumer Prices Index from time (t-1) to t, while stock returns at time t are defined as changes in log of stock prices index from time (t-1) to t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by Autoregressive (AR) model, where expected inflation rates are the linear prediction of the AR model and unexpected inflation rates are the residuals of the AR model: Vietnam ($\pi_t = 0.01 + 0.74\pi_{t-1} - 0.35\pi_{t-2}$) and Thailand ($\pi_t = 0.0068 + 0.2526\pi_{t-4}$). The t-values for testing the hypothesis $H_0: \omega = 1$ or $H_0: \beta = 1$ or $H_0: \gamma = 1$ are shown in the brackets next to the coefficients, and the robust t-values for testing the hypothesis $H_0: \varphi = 0$ or $H_0: \omega = 0$ or $H_0: \alpha = 0$ or $H_0: \beta = 0$ or $H_0: \gamma = 0$ are reported in the parentheses below the coefficients. (***), (**) and (*) indicate significance at the 1%, 5% and 10% level, respectively.

$$R_t = \alpha + \beta E(\pi_t) + \gamma UE(\pi_t) + n_t \quad (5)$$

	α	β	γ	N	$\bar{R}^2$	F
Panel A : Thailand						
R	0.04	-1.67 [-0.46]	-0.30 [-0.61]	96	0.00	0.05
	(0.72)	(-0.29)	(-0.14)			
F-value for testing the null hypothesis that $\beta = \gamma = 1$: 0.26, and that $\beta = \gamma = 0$: 0.05						
Panel B : Vietnam						
R	0.04	-1.13 [-0.89]	-2.23 [-1.22]	44	0.03	0.37
	(0.64)	(-0.47)	(-0.84)			
F-value for testing the null hypothesis that $\beta = \gamma = 1$: 0.86, and that $\beta = \gamma = 0$: 0.37						

B.   Time-varying analyses

It is well known that structural changes such as economic shocks, market crises and various institutional reforms may cause instability in the stock return-inflation relationship. In order to study potential time variation, we choose break points based on exogenous changes that may have impacted the stock return-inflation relations.

In this study, we divide the sample for Thailand into four sub-periods given the significant changes of the Thai economy as follows. The first sub-period, before the 1997 Asian financial crisis, is from Q1 1987 till Q2 1997. During this period, Thailand achieved strong economic growth and was recognized as one of the world's fastest growing economies (see, e.g., Endo (2000) and Morrison (2003)). The booming of the export-driven economy, together with strong capital inflows, accelerated the increase in stock prices over time.[11] However, Thailand also had a commendable record on inflation due to several reasons. Under the fixed exchange rate regime (i.e., 1 USD = 25 Baht), inflation was effectively anchored at a level comparable with low inflation rates in the U.S. over this period. In addition, domestic demand was kept in line with production capacity thanks to countercyclical monetary policy and a cautious fiscal stance. Finally, Thai government was also very successful in controlling firms' production costs by maintaining a moderate increase in labour costs, liberalizing trade, and so on (see, e.g., Waiquamdee (2001); Buddhari and Chensavasdijai (2003)). The second sub-period is from 1997:Q3 till 2003:Q3. This sub-period is marked by the 1997 Asian financial crisis in which the Thai economy was receiving financial assistance from and therefore under the tight control of IMF. Next, we separate the effects of natural and political shocks to Thai economy from Q4 2003 till Q4 2008. This sub-period experienced the outbreak avian flu in 2003, especially the tsunami in 2005 and the rises in rice and oil prices, etc. (see, e.g., Unit and Britain (2005)). In addition, this period also witnessed the severe instability of Thai politics, i.e., one coup by military forces and about 3 political demonstrations by oppositional parties were made, and especially, four prime ministers alternatively came into office in 2008. Given these shocks, many policies, both fiscal and monetary, were implemented to stimulate economic growth. E.g., after the tsunami, the government spent about 0.77 billion of USD to reconstruct the tsunami-affected areas, reduced and

---

[11] SET index increased up to the highest level about 1 600 points in 1993 from 207 points in 1986 before dropping back to 831 points in 1996 before the 1997 Asian financial crisis. See also, e.g., Narayan and Narayan (2012).

exempted tax for victims from the disaster and disbursed about 1 billion of USD at low interest rates. In 2008, another 3.3 billion-USD stimulus package referred to as "Thai Kem-Kaeng" was launched to stabilize the economy. This package comprises low interest loans and subsidies, e.g., free education programmes, create jobs, provide low-interest loans to farmers, lower water and electricity charges, free rides on some of Bangkok's public buses and free third-class train rides nationwide (see, also, e.g., Unit and Britain (2005)). Hence, during this period, inflation in Thailand may be mainly due to domestic demand, especially from the public sector (see, e.g., Jongwanich and Park (2011)).

Equation (4) incorporated with n dummies takes the following form:

$$R_t = \varphi_{n+1} + \sum_{i=1}^{n}(\varphi_i - \varphi_{n+1})D_{it} + \omega_{n+1}\pi_t + \sum_{i=1}^{n}(\omega_i - \omega_{n+1})D_{it}\pi_t + \varepsilon_t, \tag{6}$$

where D_{it} is a dummy variable for the ith sub-period, the subscript of the coefficients refers to the respective sub-period and ε_t is the error term.

Equation (5) incorporated with n dummies reads

$$R_t = \alpha_{n+1} + \sum_{i=1}^{n}(\alpha_i - \alpha_{n+1})D_{it} + \beta_{n+1}E_{t-1}(\pi_t) + \sum_{i=1}^{n}(\beta_i - \beta_{n+1})D_{it}E_{t-1}(\pi_t) + \gamma_{n+1}UE_{t-1}(\pi_t)$$
$$+ \sum_{i=1}^{n}(\gamma_i - \gamma_{n+1})D_{it}UE_{t-1}(\pi_t) + \xi_t, \tag{7}$$

where ξ_t is the error term.

Table 4. Summary statistics for sub-samples for Thailand

This table reports summary statistics for sub-samples for Thailand. In the table, R are the stock returns; π is the actual inflation rate; $E(\pi)$ is the expected inflation rate and $UE(\pi)$ is the unexpected inflation rate. The summary statistics are expressed in percentages. Returns and inflation rates are calculated as the log changes of the stock price index and CPI, respectively, from time (t-1) to t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by Autoregressive (AR) model estimation, where expected inflation rates are the linear prediction of the AR model and unexpected inflation rates are the residuals of the AR model ($\pi_t = 0.0068 + 0.2526\pi_{t-4}$).

Panel A. Sub-period 1 (1987Q1-1997Q2)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	4.51	5.13	-36.53	60.14	19.90	7.09	3.32	42
π	1.18	1.28	-0.84	2.94	0.84	-36.34	2.83	42
$E(\pi)$	0.97	1.01	0.46	1.42	0.22	-37.71	2.64	38
$UE(\pi)$	0.23	0.32	-1.51	1.84	0.78	-29.59	2.54	38
Panel B. Sub-period 2 (1997Q3-2003Q3)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	0.34	4.25	-54.99	36.75	22.43	-0.55	2.90	25
π	0.62	0.47	-0.94	3.68	1.04	1.22	4.92	25
$E(\pi)$	0.86	0.85	0.44	1.61	0.27	0.90	4.25	25
$UE(\pi)$	-0.24	-0.27	-1.99	2.65	1.05	0.78	4.05	25
Panel C. Sub-period 3 (2003Q4-2008Q4)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	0.43	1.84	-26.24	37.27	13.61	0.23	4.65	21
π	0.75	1.12	-4.13	4.98	1.86	-0.50	4.55	21
$E(\pi)$	0.88	0.85	0.54	1.43	0.22	0.52	2.73	21
$UE(\pi)$	-0.13	0.36	-5.15	3.85	1.82	-0.68	4.79	21
Panel D. Sub-period 4 (2009Q1-2011Q4)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	7.85	4.72	-12.09	35.82	12.76	0.70	3.14	12
π	0.83	0.76	-0.08	1.84	0.60	0.18	1.78	12
$E(\pi)$	0.82	0.87	-0.37	1.93	0.56	-0.36	3.80	12
$UE(\pi)$	0.01	0.14	-0.88	0.92	0.61	-0.09	1.70	12

Focusing on Thailand, Table 4 illustrates some of the main characteristics of stock returns and inflation over the four sub-periods under study. The first sub-period has an average inflation of 1.18%, while the mean inflation is below 1% for the other three sub-periods (i.e., varying from 0.62% to 0.83%). In terms of standard deviation of inflation, the last sub-period has the lowest one at 0.6%, followed by the first sub-period with 0.84%, and the second sub-period is the next at 1.04%. The third sub-period possesses the highest standard deviation of 1.86%. That the average inflation is approximate equal over the last three sub-periods can be attributed to the implementation of inflation

targeting by the Bank of Thailand (BOT) since 2000. In general, Thai inflation has not been exceptionally high. The average inflation rates only show minor differences over the various sub-periods. As for stock returns, of all the sub-periods the second one indicates the lowest average returns at 0.34% with the highest standard deviation of 22.43%, obviously owning to its coverage of the 1997 Asian financial crisis period. The third sub-period has the next lowest average returns of 0.43% with a standard deviation of 13.61%, followed by the first sub-period where the average returns gains 4.51% and the standard deviation stays at 19.9%. The highest average stock returns reaches at 7.85% with a standard deviation of 12.76% in the last sub-period.

As for Vietnam, we indeed identify three possible break points for Vietnam's stock market. Specifically, in March 2002, the stock market switched from three trading days a week to daily trading, thereby significantly increasing market liquidity. Another possible switching point is around the beginning of 2006 when several important institutional reforms took place. E.g., foreign investors were allowed to hold up to 49% ownership of Vietnamese listed non-financial firms. Moreover, this year was also marked with the introduction of new security regulation remedying the shortcomings of the existing legal framework and facilitating market development. In addition, in the same year, the Hanoi stock exchange was officially opened for trading.[12] The joint effects of these facts significantly affect the stock market in terms of its liquidity and market capitalization. On the other hand, the sample period also experienced several salient macroeconomic features that relate to the inflation fluctuations. First, inflation was negative over 2000-2001 (See, e.g., Vu (2012)), and in 2002 stayed at one of the modest rates since the 1990s, meanwhile the economy had just recovered from the Asian financial crisis. Second, during 2004-2005, the accelerated economic expansion and the sharp growth in credit and broad money put pressure on inflation due to excess demand. At about the

---

[12] Hanoi stock exchange was established in March 2005, but started trading in April 2006.

same time, droughts, the breakout of avian flu and other external shocks such as rising in rice and oil prices resulted in supply shocks to the economy. Finally, the year of 2008 witnessed solid inflation-curbing efforts of the government following an alarming inflation rate due to the "overheated" economy in 2007 and the dramatic surge in oil and commodity prices. The tight monetary policy and the reducing import to cut the current account deficit were employed (see, e.g., Nguyen, et al. (2012)). The measures implemented by the government in concert with the world financial crisis in 2008-2009 caused significant supply shocks to the economy during these years. Given these facts, we assume that the drivers of inflation in Vietnam have highly fluctuated over our sample. Our conjecture seems to be corroborated by Vu (2012), who finds that demand shocks were the main determinants of the inflation in the period 2004Q1-2008Q3, while supply shocks were more important in the period 2008Q1-2010Q4.

Taking these structural changes into account, we incorporate two dummies defined by two break points, i.e., March 2002 and January 2006, to check the stability of the stock return-inflation relationship in Vietnam.

Table 5 presents the summary statistics for the sub-samples for Vietnam. Notice that the difference in the average *ex post* quarterly inflation rates is fairly large, varying from 0.57% in the first sub-period to 2.94% in the last. The averages disguise the presence of deflationary periods and the maximum of 8.8% was reached in the third sub-sample. Overall, we can consider the first sub-period as one with extremely low inflation, the second one as a period characterized by medium inflation and the third period as a high inflation level period. Also, note that the standard deviation of inflation also goes the same direction as its mean, i.e., while the first sub-period has a smallest value of 1.04%, the second and third sub-period shows a medium and highest level of 1.40% and 2.48%, respectively. On the other hand, comparing stock returns characteristics over three sub-periods reveals a few remarkable points. The first sub-period displays the largest

average returns of 9.69% but also highest standard deviation of 45.61%, while the second sub-period shows the medium average returns of 2.86% and the lowest standard deviation of 16.89%. In the last sub-period, the mean of returns is at the lowest level at 1.6% and the standard deviation stay at the medium level at 24.98%. Moreover, the range of returns in the first sub-period is very high, from -71.61% to 61.93%, which may be due to the high illiquidity of the stock market in this sub-period.

Table 5. Summary statistics for sub-samples for Vietnam

This table reports the summary statistics for sub-samples for Vietnam. In the table, R are the stock returns; π is the actual inflation rate; $E(\pi)$ is the expected inflation rate and $UE(\pi)$ is the unexpected inflation rate. The summary statistics are expressed in percentage. Returns and inflation rates are calculated as the log changes of the stock prices index and CPI, respectively, from time (t-1) to t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by Autoregressive (AR) model, where expected inflation rates are the linear prediction of the AR model and unexpected inflation rates are the residuals of the AR model ($\pi_t = 0.01 + 0.74\pi_{t-1} - 0.35\pi_{t-2}$).

Panel A. Sub-period 1 (2000Q2-2002Q1)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	9.69	17.28	-71.61	61.93	45.61	-0.61	2.50	7
π	0.57	0.34	-0.66	2.47	1.04	0.75	2.66	7
$E(\pi)$	1.48	1.77	0.83	2.14	0.61	-0.25	1.28	5
$UE(\pi)$	-0.89	-0.87	-2.24	0.63	1.08	0.21	2.02	5
Panel B. Sub-period 2 (2002Q2-2005Q4)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	2.86	0.95	-23.17	50.8	16.89	1.40	5.56	15
π	1.47	1.31	-0.37	4.81	1.40	0.88	3.46	15
$E(\pi)$	1.91	1.48	0.19	4.41	1.13	0.74	2.89	15
$UE(\pi)$	-0.44	-0.40	-3.08	2.42	1.57	0.13	2.50	15
Panel C. Sub-period 3 (2006Q1-2011Q4)								
Variable (%)	Mean	Median	Min	Max	Std	Skewness	Kurtosis	N
R	1.60	1.23	-58.42	49.32	24.98	-0.04	3.30	24
π	2.94	2.20	-1.63	8.80	2.48	0.83	3.25	24
$E(\pi)$	2.48	2.14	-0.92	6.16	1.55	0.18	3.13	24
$UE(\pi)$	0.46	0.30	-2.86	4.61	1.83	0.20	2.50	24

Table 6 shows a summary of the regression results for equations (4) and (5) incorporated with three dummies for the four sub-periods for Thailand, i.e., equations (8) and (9), respectively.[13] Moreover, a summary of all results for Thailand can also be found in Table 8.

Results from equation (8) show that the relation between *ex post* stock returns and inflation is consistently negative for all sub-periods, except the 3rd sub-period. The regression coefficient for the 3rd sub-period turns to be significantly positive at the 10% level. Although the coefficient is greater than one (2.54), it is not statistically indistinguishable from unity. This does not exclude the *ex post* hedging ability of stocks against inflation in this sub-period, i.e., the stock market might be able to provide a complete hedge against the *ex post* inflation. Also notice that a one-to-one relation between stock returns and *ex post* inflation is rejected at the 10% level for the last sub-period.

Regarding results from equation (9), the regression coefficients on both expected and unexpected inflation are negative for the 1st sub-period, but only that on expected inflation is statistically significant different from zero at the 5% level. These findings are similar to those by Al-Khazali and Pyun (2004). Furthermore, the coefficient is substantially large (-31.12) and is statistically distinguishable from unity at the 5% level. We therefore can sufficiently reject the Fisher hypothesis, given the results for this sub-period. A number of reasons may explain the "super-perverse hedge" against expected inflation of stocks in this sub-period. First, the negative link between anticipated output and inflation as assumed in the proxy hypothesis by Fama (1981) may be reinforced by the countercyclical monetary and fiscal policies during economic expansions, according to Geske and Roll (1983) and Kaul (1987), as in this sub-period. Another reason could be that since the main causes of inflation over this sub-period are from non-monetary

---

[13] The *F*-tests for the stability of coefficients over sub-periods are rejected at the 10% level for both equations.

factors (i.e., supply shocks), stocks are negatively related to expected inflation with respect to the equilibrium model-based theoretical analyses. Recall that in this period the Bank of Thailand conducted a fixed exchange rate regime in which shocks to aggregate demand are mainly absorbed by current account adjustments, therefore only slightly influencing inflation (see, e.g., Chantanahom, et al. (2004)). This leaves the fluctuations in inflation to be explained mainly by supply shocks.

As for the other three sub-periods, due to the large standard errors not any of the coefficients on expected inflation is statistically significant different from either zero or one. Only the coefficient on unexpected inflation for the 3rd sub-period is significantly positive at the 5% level, while the other coefficients are not statistically significant different from zero at the conventional levels. Moreover, in the last sub-period the coefficient on unexpected inflation is statistically distinguishable from unity at the 10% level, rejecting a complete hedge against news on inflation of stocks.

That stock returns are not significantly related to expected inflation for the last three sub-periods could be attributed to the successful adoption of the inflation targeting framework by the Bank of Thailand since 2000 (see, e.g., Siregar and Goo (2010)). The effectively anchoring of inflationary expectations by the private sector may significantly reduce the motives to hedge against expected inflation, leaving unexpected inflation as a main concern to hedge for stock investors.

We can observe that especially in the first sub-period where the inflation is the highest, we find that the Fisher hypothesis is strongly rejected and that stocks provide a "super perverse hedge" against *ex ante* inflation.

Table 6. Time-varying analysis for both regressions on actual inflation and on both expected and unexpected inflation for Thailand.

The table reports the regression results of stock returns on actual, expected and unexpected inflation rates at the contemporaneous term [equations (4) and (5)] with dummies for sub-periods for Thailand, as presented below for convenience. There are four sub-periods, so three dummies are employed: D_{1t} is a dummy variable for the 1st sub-period [1987Q1-1997Q2] ($D_{1t} = 1$ if the 1st sub-period and $D_{1t} = 0$, otherwise); D_{2t} is a dummy variable for the 2nd sub-period [1997Q3-2003Q3] ($D_{2t} = 1$ if the 2nd sub-period and $D_{2t} = 0$, otherwise); D_{3t} is a dummy variable for the 3rd sub-period [2003Q4-2008Q4] ($D_{3t} = 1$ if the 3rd sub-period and $D_{3t} = 0$, otherwise); The 4th sub-period [2009Q1-2011Q4] is the base case. The subscript of the coefficients refers to the respective sub-period. In the table, R denotes the stock returns; π is the actual inflation rates; N is the number of observations, $\bar{R}^2$ is the adjusted R-squared; F is the F-test. All returns at time t are calculated by changes in logs of the index from time (t-1) to t. Inflation rates at time t are defined as changes in logs of the Consumer Price Index from time (t-1) to t. Inflation rates at time t are defined as changes in logs of the Consumer Price Index from time (t-1) to t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by an Autoregressive (AR)(4) model, where expected inflation rates are a linear prediction of the AR model and unexpected inflation rates are the residuals of this AR model: ($\pi_t = 0.0068 + 0.2526\pi_{t-4}$). The t-values for testing the hypothesis $H_0: \omega = 1$ or $H_0: \beta = 1$ or $H_0: \gamma = 1$ are shown in the brackets next to the coefficients, and the robust t-values for testing the hypothesis $H_0: \varphi = 0$ or $H_0: \omega = 0$ or $H_0: \alpha = 0$ or $H_0: \beta = 0$ or $H_0: \gamma = 0$ are reported in the parentheses below the coefficients. (***), (**) and (*) indicate significance at the 1%, 5% and 10% levels, respectively.

$$R_t = \varphi_4 + (\varphi_1 - \varphi_4)D_{1t} + (\varphi_2 - \varphi_4)D_{2t} + (\varphi_3 - \varphi_4)D_{3t} + \omega_4\pi_t + (\omega_1 - \omega_4)D_{1t}\pi_t + (\omega_2 - \omega_4)D_{2t}\pi_t + (\omega_3 - \omega_4)D_{3t}\pi_t + \varrho_t \qquad (8)$$

$$R_t = \alpha_4 + (\alpha_1 - \alpha_4)D_{1t} + (\alpha_2 - \alpha_4)D_{2t} + + (\alpha_3 - \alpha_4)D_{3t} + \beta_4 E_{t-1}(\pi_t) + (\beta_1 - \beta_4)D_{1t}E_{t-1}(\pi_t) + (\beta_2 - \beta_4)D_{2t}E_{t-1}(\pi_t) + (\beta_3 - \beta_4)D_{3t}E_{t-1}(\pi_t) + \gamma_4 UE_{t-1}(\pi_t)$$
$$+ (\gamma_1 - \gamma_4)D_{1t}UE_{t-1}(\pi_t) + (\gamma_2 - \gamma_4)D_{2t}UE_{t-1}(\pi_t) + (\gamma_3 - \gamma_4)D_{3t}UE_{t-1}(\pi_t) + \tau_t \qquad (9)$$

Equation	(8)		(9)
ω_1	-3.43 [-1.40] (-1.08)	β_1	-31.12 [-2.32]** (-2.25)**
ω_2	-5.58 [-1.40] (-1.19)	β_2	7.34 [0.72] (0.84)
ω_3	2.54 [1.11] (1.84)*	β_3	-4.83 [-0.66] (-0.55)
ω_4	-3.27 [-1.67]* (-1.28)	β_4	2.67 [0.40] (0.63)
φ_1	0.09 (0.00)	γ_1	-0.29 [-0.35] (-0.1)
φ_2	0.05 (0.41)	γ_2	-5.83 [-1.63] (-1.39)
φ_3	-0.01 (-1.98)**	γ_3	2.74 [1.28] (2.01)**
φ_4	0.11 (2.70)***	γ_4	-7.59 [-1.83]* (-1.62)
		α_1	0.35 (2.35)**
		α_2	-0.07 (-0.84)
		α_3	0.05 (0.62)
		α_4	0.06 (0.93)
N	100		96
$\bar{R}^2$	0.06		0.03
F	1.28		1.81*
F-test for dummy coefficients are 0	2.39*	$E(\pi_t)$ $UE(\pi_t)$	2.26* 2.15*

Table 7. Time-varying analysis for both regressions on actual inflation and on both expected and unexpected inflation for Vietnam.

The table reports the regression results of stock returns on actual, expected and unexpected inflation rates at the contemporaneous term [equations (4) and (5)] with dummies for sub-periods for Vietnam, as presented below for convenience. There are three sub-periods, so two dummies are employed: D_{1t} is a dummy variable for the 1st sub-period [2000Q2-2002Q1] ($D_{1t} = 1$ if the 1st sub-period and $D_{1t} = 0$, otherwise); D_{2t} is a dummy variable for the 2nd sub-period [2002Q2-2005Q4] ($D_{2t} = 1$ if the 2nd sub-period and $D_{2t} = 0$, otherwise); The 3rd sub-period [2006Q1-2011Q4] is the base case. The subscript of the coefficients refers to the respective sub-period. In the table, R denotes the stock returns; π is the actual inflation rates; N is the number of observations, $\bar{R}^2$ is the adjusted R-squared; F is the F-test. All returns at time t are calculated by changes in logs of the index from time (t-1) to t. Inflation rates at time t are defined as changes in logs of the Consumer Price Index from time (t-1) to t. Inflation rates at time t are defined as changes in logs of the Consumer Prices Index from time (t-1) to t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by an Autoregressive (AR) model, where expected inflation rates are a linear prediction of this AR model and unexpected inflation rates are the residuals of the AR model: Vietnam ($\pi_t = 0.01 + 0.74\pi_{t-1} - 0.35\pi_{t-2}$). The t-values for testing the hypothesis $H_0: \omega = 1$ or $H_0: \beta = 1$ or $H_0: \gamma = 1$ are shown in the brackets next to the coefficients, and the robust t-values for testing the hypothesis $H_0: \varphi = 0$ or $H_0: \omega = 0$ or $H_0: \alpha = 0$ or $H_0: \beta = 0$ or $H_0: \gamma = 0$ are reported in the parentheses below the coefficients. (***), (**) and (*) indicate significance at the 1%, 5% and 10% levels, respectively.

$$R_t = \varphi_3 + (\varphi_1 - \varphi_3)D_{1t} + (\varphi_2 - \varphi_3)D_{2t} + \omega_3\pi_t + (\omega_1 - \omega_3)D_{1t}\pi_t + (\omega_2 - \omega_3)D_{2t}\pi_t + \zeta_t \qquad (10)$$

$$R_t = \alpha_3 + (\alpha_1 - \alpha_3)D_{1t} + (\alpha_2 - \alpha_3)D_{2t} + \beta_3 E_{t-1}(\pi_t) + (\beta_1 - \beta_3)D_{1t}E_{t-1}(\pi_t) + (\beta_2 - \beta_3)D_{2t}E_{t-1}(\pi_t)$$
$$\qquad (11)$$
$$+ \gamma_3 UE_{t-1}(\pi_t) + (\gamma_1 - \gamma_3)D_{1t}UE_{t-1}(\pi_t) + (\gamma_2 - \gamma_3)D_{2t}UE_{t-1}(\pi_t) + \varsigma_t$$

Equation	(10)			(11)	
ω_1	-14.28	[-3.46]***	β_1	7.89	[0.32]
		(-3.23)***			(0.36)
ω_2	6.06	[1.65]	β_2	4.60	[1.77]*
		(1.97)**			(2.26)**
ω_3	-3.11	[-1.83]*	β_3	-1.73	[-0.90]
		(-1.38)			(-0.57)
φ_1	0.18		γ_1	-26.97	[-3.26]***
		(1.58)			(-3.15)***
φ_2	-0.06		γ_2	6.43	[1.44]
		(-1.88)*			(1.70)*
φ_3	0.11		γ_3	-4.12	[-1.90]*
		(1.44)			(-1.53)
			α_1	-0.36	
					(-1.07)
			α_2	-0.03	
					(-0.98)
			α_3	0.08	
					(0.78)
N	46			44	
$\bar{R}^2$	0.02			0.04	
F	4.98***			4.12***	
F-test for dummy coefficients are 0	7.49***		$E(\pi_t)$	1.56	
			$UE(\pi_t)$	6.66***	

Table 7 shows a summary of the regression results of equations (4) and (5) incorporated with two dummies[14] for the three sub-periods for Vietnam, i.e., equations (10) and (11), respectively.[15] In addition, a summary of all results for Vietnam can also be found in Table 9.

Although stock returns show a negative (but not statistically significant) relation to *ex post* inflation for the whole sample (see Table 2), the relationship, as can be seen from the results of equation (10), becomes positive and significantly different from zero at the 5% level for the 2nd sub-period. Even though relatively large, the coefficient is statistically indistinguishable from unity in that sub-period, implying that stocks can possibly provide a complete hedge against *ex post* inflation over this sub-period. The negative stock return-*ex post* inflation relation remains for the other two sub-periods but is statistically significant only for the 1st sub-period, in which its one-for-one correspondence is rejected at the 1% and 10% levels for the 1st sub-period and last sub-period, respectively. Given the relatively large and negative coefficient for the 1st sub-period (-14.28), stocks seem to show a "super-perverse hedge" against the *ex post* inflation over the period.

Regarding the results for equation (11), the coefficient on expected inflation is negative just for the last sub-period, while it is positive for the first two. Yet, only the coefficient for the 2nd sub-period is statistically significant different from both zero and one at the 5% and 10% levels, respectively; moreover its size is relatively large (4.60). These results do not just reject the Fisher hypothesis, i.e. a one-to-one relation between stock returns and expected inflation, but also indicate a more-than-complete hedge against *ex ante* inflation of the stock market in this period. We may attribute this large coefficient to a number of possibilities. There may exist a time-varying stock risk premium in Vietnam, a

---

[14] Even though we are free to choose the base case in estimation, we also estimate these specifications using the 1st sub-period with the least number of observations as the base case to check the stability of our results. Yet, we do find that the estimated results are the same between the two cases.
[15] The *F*-tests for the stability of coefficients over sub-periods are strongly rejected at the 1% for both equations.

possibility that was raised by Gultekin (1983a) for the U.S. stock market and Lee, et al. (2000) for the German stock market. That is, investors simply require a higher real return for taking the same risk. Another possibility is due to the "speculative bubble" of the stock market of Vietnam, which was recognized by public opinion[16] and documented by Ha (2010). Due to the market mania[17] over about 2003-2006,[18] nominal stock prices were rapidly increasing. Rational investors might anticipate such market reactions, and the expected real stock returns would increase faster than the rise in expected inflation. Stocks then become a "super hedge" against expected inflation (see Lee, et al. (2000)). Finally, this could be, according to Kaul (1987), due to the pro-cyclical monetary policy by the State Bank of Vietnam (SBV) during the period 2004-2005 as we mentioned above.

Turning now to the relationship with unexpected inflation, the coefficient is consistently negative for the first and last sub-periods, but is positive for the 2nd one. However, while the coefficients for the first two sub-periods are significantly different from zero at the 1% and 10% levels respectively, that is not the case for the coefficient for the last sub-period. One of the most striking results is that the coefficient for the first sub-period is very large (-26.97) and statistically distinguishable from one, which again shows a "super-perverse hedge" against the unexpected inflation over this period. The coefficient for the 2nd sub-period, although large (6.43), is statistically indistinguishable from one, which cannot reject that stock market may provide a complete hedge against unexpected inflation. Conversely, the coefficient for the last sub-period is statistically

---

[16] See, e.g., *Vietnamese shares: The fall of Ho Chi Minh city* – The Economist (http://www.economist.com/node/10976054), or *Vietnam market slump may offer bargains – The New York Times* (http://www.nytimes.com/2008/04/07/business/worldbusiness/07iht-rtrinvest08.1.11720286.html).
[17] See, e.g., *Vietnam's Stock Exchange Takes Off: How do you say Bubble in Vietnamese?* (http://www.dailyreckoning.com.au/vietnam/2007/02/23/).
[18] The market index (VNINDEX) over 5 years (2003-2007) was 166, 239, 307, 751, and 927 points, respectively, in which the highest level reached at about 1, 150 points in March 2007.

different from one at the 10% level, leading to the rejection of one-for-one correspondence between stock returns and news in inflation in this sub-period.

Interestingly, we can observe that in the 2nd period where the inflation is moderate, the stock market can provide a good hedge against both *ex ante* and unexpected inflation. These findings seem to reconcile with the stylized fact that sustained inflation has a deteriorating consequence on the long-run real activity of an economy, whereas inflation at low-to-moderate rates has positive influences for economic growth, and hence for stock returns (see, e.g., De Alessi (1964); (1975)). This is especially logical for Vietnam, a high inflation but also high economic growth country, as discussed above.

Besides, it should be noted that given the limited number of observations and unrepresentative characteristics (e.g., illiquid stock market and deflationary duration) of the 1st sub-period, the empirical findings from this sub-period should be interpreted with caution and should not influence on our general conclusions.

C.   Positioning empirical results in the literature.

A summary of all our empirical results is shown in Table 8 and Table 9. Several points can be observed from these two tables. First, our empirical results based on the full sample are consistent with the previous empirical studies in the sense that we find a negative (although not statistically significant) relationship between stock returns and inflation (*ex post*, *ex ante* and unexpected). Still, we fail to reject the Fisher hypothesis as well as the conventional expectation that nominal stock returns are positively and (and even on a one-to-one basis) correlated with (expected or actual) inflation (Lintner, 1975; Groenewold, et al., 1997).

The relationship between stock returns and inflation (*ex post*, *ex ante* and unexpected) for both countries does show a time-varying nature. In line with the hypothesis by Hess and Lee (1999) and Lee (2003) we observe that the association of stock returns with

actual inflation in terms of both magnitude and sign is mainly driven by its link with unexpected inflation that is negative due to real output shocks and positive owning to monetary demand shocks. In fact, the changing in sign of the stock return-unexpected inflation relation over sub-periods clearly depends on the main causes of inflation. For example, for Thailand the negative sign of the coefficients on unexpected inflation for the 2nd and last sub-periods tends to correspond with the relative importance of supply shocks on inflation due to the 1997 Asian financial crisis and the world financial crisis in 2008-2009. On the other hand, the significantly positive sign of the coefficient for the 3rd sub-period (2003Q4-2008Q4) coincides with the relative importance of demand shocks on inflation, which may be due to the effects of loose fiscal and monetary stances by the Thai government to stimulate economic growth over this sub-period as we mentioned above. Similarly, for Vietnam the change in the coefficient sign on unexpected inflation from positive for the 2nd sub-period (2002Q2-2005Q4) to negative (but not significant) for the 3rd sub-period (2006Q1-2011Q4) also shows the fluctuations of main inflation determinants in the economy. That is, demand shocks are the main causes for inflation in the former sub-period, while supply shocks are more important factors for inflation in the latter (see, Vu (2012)). These findings are highly consistent with our expectation.

A comparison of results for both countries reveals that differences in macroeconomic and institutional features between the two countries do influence on the stock return-expected inflation relationship. More specifically, the implementation of monetary fashion by the Bank of Thailand (BOT) resulted in the large contribution of non-monetary sources (e.g., real factor shocks) into inflation of the country, which in turn reduces (or even destroys) the hedging capability of its stock market. As can be seen from Table 8, not a single sub-period for Thailand with a statistically significantly positive (but negative instead) relationship between stock returns and *ex ante* inflation is observed. As for Vietnam, shown in Table 9, the stock market does provide a good hedge (even a "super hedge") against *ex ante* inflation in the second sub-period

(2002Q2-2005Q4), which is in accordance with other empirical studies for high inflation emerging countries (e.g., Choudhry (2001)). These results again support our previous conjecture above according to theoretical analyses based on equilibrium models further reinforced by the typical economic characteristics of Vietnam (i.e., high and persistent inflation cohabiting with a strong economic performance).

Overall, the empirical results seem to support our hypotheses, in which they tend to be highly consistent with the literature.

Table 8. Summary of all results for Thailand

Inflation	Whole sample 1987Q1-2011Q4		Sub-period 1 1987Q1-1997Q2		Sub-period 2 1997Q3-2003Q3		Sub-period 3 2003Q4-2008Q4		Sub-period 4 2009Q1-2011Q4	
	Coeff.	t-test	Coeff.	t-test	Coeff.	t-test	Coeff.	t-test	Coeff.	t-test
Ex post	-0.31	$\omega = 1$: Not reject $\omega = 0$: Not reject	-3.43	$\omega = 1$: Not reject $\omega = 0$: Not reject	-5.58	$\omega = 1$: Not reject $\omega = 0$: Not reject	2.54	$\omega = 1$: Not reject $\omega = 0$: **Reject**[*]	-3.27	$\omega = 1$: **Reject**[*] $\omega = 0$: Not reject
Ex ante	-1.67	$\beta = 1$: Not reject $\beta = 0$: Not reject	-31.12	$\beta = 1$: **Reject**[**] $\beta = 0$: **Reject**[**]	7.34	$\beta = 1$: Not reject $\beta = 0$: Not reject	-4.83	$\beta = 1$: Not reject $\beta = 0$: Not reject	2.67	$\beta = 1$: Not reject $\beta = 0$: Not reject
Unexpected inflation	-0.30	$\gamma = 1$: Not reject $\gamma = 0$: Not reject	-0.29	$\gamma = 1$: Not reject $\gamma = 0$: Not reject	-5.83	$\gamma = 1$: Not reject $\gamma = 0$: Not reject	2.74	$\gamma = 1$: Not reject $\gamma = 0$: **Reject**[**]	-7.59	$\gamma = 1$: **Reject**[*] $\gamma = 0$: Not reject

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 9. Summary of all results for Vietnam

Inflation	Whole sample 2000Q2-2011Q4		Sub-period 1 2000Q2-2002Q1		Sub-period 2 2002Q2-2005Q4		Sub-period 3 2006Q1-2011Q4	
	Coeff.	t-test	Coeff.	t-test	Coeff.	t-test	Coeff.	t-test
Ex post	-2.16	$\omega = 1$: Not reject $\omega = 0$: Not reject	-14.28	$\omega = 1$: **Reject**[***] $\omega = 0$: **Reject**[***]	6.06	$\omega = 1$: Not reject $\omega = 0$: **Reject**[**]	-3.11	$\omega = 1$: **Reject**[*] $\omega = 0$: Not reject
Ex ante	-1.13	$\beta = 1$: Not reject $\beta = 0$: Not reject	7.89	$\beta = 1$: Not reject $\beta = 0$: Not reject	4.60	$\beta = 1$: **Reject**[*] $\beta = 0$: **Reject**[**]	-1.73	$\beta = 1$: Not reject $\beta = 0$: Not reject
Unexpected	-2.23	$\gamma = 1$: Not reject $\gamma = 0$: Not reject	-26.97	$\gamma = 1$: **Reject**[***] $\gamma = 0$: **Reject**[***]	6.43	$\gamma = 1$: Not reject $\gamma = 0$: **Reject**[*]	-4.12	$\gamma = 1$: **Reject**[*] $\gamma = 0$: Not reject

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

VI.   Conclusions

This paper examines the inflation-hedging properties of stocks in Thailand and Vietnam. For the whole samples, we find, consistent with previous empirical research, that nominal stock returns are negatively (although not statistically significantly) correlated to *ex post* inflation rates in both countries. We fail to reject the fact that common stocks may provide a complete hedge against *ex post* inflation due to relatively large standard errors of the coefficients. Estimating an *ex ante* model, we find that nominal stock returns are insignificantly negatively related to both expected and unexpected inflation. We also cannot reject either the Fisher hypothesis of a one-to-one relationship between stock returns and the *ex-ante* inflation or a complete hedge against surprises in inflation of stocks.

Conducting time-varying analyses, some interesting points are revealed. We find for both countries that the relationship between nominal stock returns and inflation (*ex post*, *ex ante* and unexpected) is time-varying, in which the *ex post* relation, consistent with the literature (e.g., Hess and Lee (1999) and Lee (2003)), is driven by that between nominal stock returns and unexpected inflation. Moreover, the stock return-unexpected inflation association is negative in sub-periods where real supply shocks tend to be dominant sources of inflation, and is positive in ones where monetary demand shocks are more relative importance. Also, we find that differences in macroeconomic and institutional features between the two countries do influence the stock return-expected inflation relationship. Particularly, our findings also seem to partially support the prediction by theoretical works based on equilibrium models (e.g., Danthine and Donaldson (1986); Marshall (1992)), i.e. stocks are only able to hedge against *ex ante* inflation that is due to monetary sources but not non-monetary sources. In addition, our results also support previous empirical studies that in high inflation with strong

economic performance countries stock market can provide a good hedge against *ex post* or *ex ante* inflation (e.g., Choudhry (2001); Spyrou (2004)).

Taken all together, the present study has several implications. This study reinforces the argument raised by the literature that a direct relationship between real stock returns and inflation may not exist, instead this relation simply reflects fundamental relations in the economy. Therefore, the extent to which common stocks can provide a hedge against inflation may be time-varying and economy-varying, which depends on the background of each country. In other words, this extent may be influenced by many factors such as institutional and economic characteristics, the conduct of monetary and fiscal policies by authorities, and the stock market's characteristics itself.

In general, investors in both Thailand and Vietnam can invest in common stocks to protect their wealth against surprises in inflation in periods where demand shocks are the main determinants of inflation. Furthermore, the Vietnam stock market can also preserve (even more than complete) the wealth of investors against inflation (*ex post*, *ex ante* and surprises in inflation) in periods when inflation is moderate. In addition, that the stock market of Vietnam does react to fluctuations in inflation partially shows that it is functioning properly in the economy (i.e., a barometer of the economy); hence, the Vietnamese authorities should go forward with their plan to quickly promote the development of the stock market. Finally, this study shows that a thorough investigation into the nature of inflation (e.g., chronic/temporary inflation or main causes of inflation) is of great importance for investors before they invest in common stocks as a hedge against inflation.

VII.   References

Akaike, H., 1974. A new look at the statistical model identification. Automatic Control, IEEE Transactions on 19, 716-723.

Al-Khazali, O.M., and Pyun, C.S., 2004. Stock prices and inflation: new evidence from the Pacific-Basin countries. Review of Quantitative Finance and Accounting 22, 123-140.

Alagidede, P., 2009. Relationship between stock returns and inflation. Applied Economics Letters 16, 1403-1408.

Alagidede, P., and Panagiotidis, T., 2010. Can common stocks provide a hedge against inflation? Evidence from African countries. Review of Financial Economics 19, 91-100.

Ang, A., Bekaert, G., and Wei, M., 2007. Do macro variables, asset markets, or surveys forecast inflation better? Journal of Monetary Economics 54, 1163-1212.

Bakshi, G.S., and Chen, Z., 1996. Inflation, asset prices, and the term structure of interest rates in monetary economics. Review of Financial Studies 9, 241-275.

Bartlett, M. S., 1995. An introduction to stochastic processes: with special reference to methods and applications. Cambridge: Cambridge University Press.

Bodie, Z., 1976. Common stocks as a hedge against inflation. The Journal of Finance 31, 459-470.

Boudoukh, J., and Richardson, M., 1993. Stock returns and inflation: A long-horizon perspective. The American Economic Review 83, 1346-1355.

Box, G. E. P., and Jenkins, G. M. , 1970. Time Series Analysis, Forecasting and Control. Holden Day, San Francisco.

Brennan, M.J., and Schwartz, E.S., 1978. Corporate income taxes, valuation, and the problem of optimal capital structure. Journal of Business 103-114.

Buddhari, A., and Chensavasdijai, V., 2003. Inflation dynamics and its implications for monetary policy. Bank of Thailand Discussion Paper 9, 2003.

Camen, U., 2006. Monetary policy in Vietnam: the case of a transition country. Bank for International Settlements Press & Communications CH 4002 Basel, Switzerland 232.

Chantanahom, P., Poonpatpibul, C., and Vongsinsirikul, P., 2004. Exploring Inflation in Thailand: Through Sectoral Price Setting Behavior and Underlying Trend. Bank of Thailand.

Chatrath, A., Ramchander, S., and Song, F., 1997. Stock prices, inflation and output: evidence from India. Applied Financial Economics 7, 439-445.

Choudhry, T., 2001. Inflation and rates of return on stocks: evidence from high inflation countries. Journal of International Financial Markets, Institutions and Money 11, 75-96.

Choudhry, T., and Pimentel, R.C., 2010. Do Stock Returns Hedge against High and Low Inflation? Evidence from Brazilian Companies. The Review of Finance and Banking 2, 061-076.

Cohn, R.A., and Lessard, D.R., 1981. The effect of inflation on stock prices: international evidence. The Journal of Finance 36, 277-289.

Cozier, B.V., and Rahman, A.H., 1988. Stock returns, inflation, and real activity in Canada. Canadian Journal of Economics 759-774.

Crosby, M., 2001. Stock returns and inflation. Australian Economic Papers 40, 156-165.

D'Agostino, R.B., Belanger, A., and D'Agostino Jr, R.B., 1990. A suggestion for using powerful and informative tests of normality. The American Statistician 44, 316-321.

Danthine, J.P., and Donaldson, J.B., 1986. Inflation and asset prices in an exchange economy. Econometrica: Journal of the Econometric Society 585-605.

De Alessi, L., 1964. Do Business Firms Gain From Inflation? The Journal of Business 37, 162-166.

De Alessi, L., 1975. Do business firms gain from inflation? Reprise. The Journal of Business 48, 264-266.

Dickey, D.A., and Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association 427-431.

Ely, D.P., and Robinson, K.J., 1997. Are stocks a hedge against inflation? International evidence using a long-run approach. Journal of international money and Finance 16, 141-167.

Endo, T., 2000. Thailand: Selected Issues. International Monetary Fund.

Engsted, T., and Tanggaard, C., 2002. The relation between asset returns and inflation at short and long horizons. Journal of International Financial Markets, Institutions and Money 12, 101-118.

Fama, E.F., 1981. Stock returns, real activity, inflation, and money. The American Economic Review 71, 545-565.

Fama, E.F., and Schwert, G.W., 1977. Asset returns and inflation. Journal of Financial Economics 5, 115-146.

Firth, M., 1979. The relationship between stock market returns and rates of inflation. The Journal of Finance 34, 743-749.

Fisher, I., 1896. Appreciation and Interest: A Study of the Influence of Monetary Appreciation and Depreciation on the Rate of Interest with Applications to the Bimetallic Controversy and the Theory of Interest. Pub. for the American economic association by the Macmillan company.

Fisher, I., 1930. The Theory of Interest. MacMillan, New York.

Fisher, J.D., and Webb, R.B., 1992. Current issues in the analysis of commercial real estate. Real Estate Economics 20, 211-227.

Floros, C., 2008. Stock returns and inflation in Greece. Applied Econometrics and International Development, Vol. 4, No. 2, 2004.

Fuller, W.A., 1995. Introduction to statistical time series. Wiley-Interscience.

Geske, R., and Roll, R., 1983. The fiscal and monetary linkage between stock returns and inflation. The Journal of Finance 38, 1-33.

Groenewold, N., O'Rourke, G., and Thomas, S., 1997. Stock returns and inflation: a macro analysis. Applied Financial Economics 7, 127-136.

Gultekin, N.B., 1983a. Stock market returns and inflation forecasts. Journal of Finance 663-673.

Gultekin, N.B., 1983b. Stock market returns and inflation: Evidence from other countries. Journal of Finance 49-65.

Ha, P., 2010. Rational Bubbles in the Vietnamese Stock Market and the Relationship Between Monetary Policy and Stock Returns. Faculty of Economics, Thammasat University.

Hess, P.J., and Lee, B.S., 1999. Stock returns and inflation with supply and demand disturbances. Review of Financial Studies 12, 1203-1218.

Hondroyiannis, G., and Papapetrou, E., 2006. Stock returns and inflation in Greece: A Markov switching approach. Review of Financial Economics 15, 76-94.

Jaffe, J.F., and Mandelker, G., 1976. The "Fisher effect" for risky assets: An empirical investigation. The Journal of Finance 31, 447-458.

Jirasakuldech, Benjamas, Emekter, Riza, and Rao, Ramesh P, 2008. Do Thai stock prices deviate from fundamental values? Pacific-Basin Finance Journal 16, 298-315.

Jongwanich, J., and Park, D., 2011. Inflation in developing Asia: pass-through from global food and oil price shocks. Asian-Pacific Economic Literature 25, 79-92.

Kaul, G., 1987. Stock returns and inflation: The role of the monetary sector. Journal of financial economics 18, 253-276.

Kaul, G., 1990. Monetary regimes and the relation between stock returns and inflationary expectations. Journal of Financial and Quantitative Analysis 25, 307-321.

Kessel, R.A., and Alchian, A.A., 1960. The meaning and validity of the inflation-induced lag of wages behind prices. The American Economic Review 50, 43-66.

Khil, J., and Lee, B.S., 2000. Are common stocks a good hedge against inflation? Evidence from the Pacific-rim countries. Pacific-Basin Finance Journal 8, 457-482.

Kim, J.H., and Ryoo, H.H., 2011. Common stocks as a hedge against inflation: Evidence from century-long US data. Economics Letters 113, 168-171.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P., and Shin, Y., 1992. Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? Journal of Econometrics 54, 159-178.

Lee, B.S., 1989. Solving, estimating, and testing a nonlinear stochastic equilibrium model, with an example of the asset returns and inflation relationship. Journal of economic dynamics and control 13, 499-531.

Lee, B.S., 2003. Asset returns and inflation in response to supply, monetary, and fiscal disturbances. Review of Quantitative Finance and Accounting 21, 207-231.

Lee, SR, Tang, DP, and Wong, K.M., 2000. Stock returns during the German hyperinflation. The Quarterly Review of Economics and Finance 40, 375-386.

Li, L., Narayan, P.K., and Zheng, X., 2010. An analysis of inflation and stock returns for the UK. Journal of International Financial Markets, Institutions and Money 20, 519-532.

Lintner, J., 1975. Inflation and security returns. The Journal of Finance 30, 259-280.

Ljung, G.M., and Box, G.E.P., 1978. On a measure of lack of fit in time series models. Biometrika 65, 297-303.

Loungani, P., and Swagel, P., 2001. Sources of inflation in developing countries. International Monetary Fund.

Marshall, D.A., 1992. Inflation and asset returns in a monetary economy. Journal of Finance 1315-1342.

Mishkin, F.S., 1992. Is the Fisher effect for real?: A reexamination of the relationship between inflation and interest rates. Journal of Monetary Economics 30, 195-215.

Mohanty, MS, and Klau, M., 2001. What determines inflation in emerging market economies? BIS Papers 8, 1-38.

Morrison, W.M., 2003. Thailand-US Economic Relations: An Overview, Congressional Research Service [Library of Congress].

Najand, M., and Noronha, G., 1998. Causal relations among stock returns, inflation, real activity, and interest rates: Evidence from Japan. Global Finance Journal 9, 71-80.

Narayan, S., and Narayan, P.K., 2012. Do US Macroeconomic Conditions Affect Asian Stock Markets? Journal of Asian Economics.

Nelson, C.R., 1976. Inflation and rates of return on common stocks. The Journal of Finance 31, 471-483.

Nelson, C.R., and Plosser, C.R., 1982. Trends and random walks in macroeconmic time series: some evidence and implications. Journal of Monetary Economics 10, 139-162.

Newey, W.K., and West, K.D., 1987. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica: Journal of the Econometric Society 703-708.

Nguyen, H.M., Cavoli, T., and Wilson, J.K., 2012. The Determinants of Inflation in Vietnam, 2001–09. ASEAN Economic Bulletin 29, 1-14.

Omran, M., and Pointon, J., 2001. Does the inflation rate affect the performance of the stock market? The case of Egypt. Emerging Markets Review 2, 263-279.

Phillips, P.C.B., 1987. Time series regression with a unit root. Econometrica: Journal of the Econometric Society 277-301.

Plasmans, J., 2006. Modern linear and nonlinear econometrics. Springer Verlag.

Roache, S.K., and Attie, A.P., 2009. Inflation Hedging for Long-Term Investors. International Monetary Fund.

Sharpe, S.A., 2002. Reexamining stock valuation and inflation: The implications of analysts' earnings forecasts. Review of Economics and Statistics 84, 632-648.

Siregar, R.Y., and Goo, S., 2010. Effectiveness and commitment to inflation targeting policy: Evidence from Indonesia and Thailand. Journal of Asian Economics 21, 113-128.

Solnik, B., 1983. The relation between stock prices and inflationary expectations: the international evidence. Journal of Finance 35-48.

Spyrou, S.I., 2004. Are stocks a good hedge against inflation? Evidence from emerging markets. Applied Economics 36, 41-48.

Stulz, R.M., 1986. Asset pricing and expected inflation. The Journal of Finance 41, 209-223.

Unit, E.I., and Britain, G., 2005. Asia's Tsunami: The Impact. Economist Intelligence Unit.

Vu, T.K., 2012. The Causes of Recent Inflation in Vietnam: Evidence from a VAR with Sign Restrictions. Tokyo Center for Economic Research E-43.

Wahlroos, B., and Berglund, T., 1986. Stock returns, inflationary expectations and real activity: New evidence. Journal of Banking & Finance 10, 377-389.

Waiquamdee, A., 2001. Modelling the inflation process in Thailand. BIS Papers chapters 8, 252-263.

Wong, K.F., and Wu, H.J., 2003. Testing Fisher hypothesis in long horizons for G7 and eight Asian countries. 1. Applied Economics Letters 10, 917-923.

Wongbangpo, P, and Sharma, S C, 2002. Stock market and macroeconomic fundamental dynamic interaction: ASEAN-5 countries. Journal of Asian Economics 13, 27-51.

Zhao, X.Q., 1999. Stock prices, inflation and output: evidence from China. Applied Economics Letters 6, 509-511.