Applied Energy 87 (2010) 356–361

Contents lists available at ScienceDirect

Applied Energy

journal homepage: www.elsevier.com/locate/apenergy

Modelling the impact of oil prices on Vietnam's stock prices

Paresh Kumar Narayan [a,*], Seema Narayan [b]

[a] School of Accounting, Economics and Finance, Deakin University, Victoria 3125, Australia
[b] School of Economics, Finance and Marketing, Royal Melbourne Institute of Technology University, Melbourne, Australia

ARTICLE INFO

Article history:
Received 1 February 2009
Received in revised form 10 May 2009
Accepted 25 May 2009
Available online 27 June 2009

Keywords:
Vietnam
Stock prices
Cointegration

ABSTRACT

The goal of this paper is to model the impact of oil prices on Vietnam's stock prices. We use daily data for the period 2000–2008 and include the nominal exchange rate as an additional determinant of stock prices. We find that stock prices, oil prices and nominal exchange rates are cointegrated, and oil prices have a positive and statistically significant impact on stock prices. This result is inconsistent with theoretical expectations. The growth of the Vietnamese stock market was accompanied by rising oil prices. However, the boom of the stock market was marked by increasing foreign portfolio investment inflows which are estimated to have doubled from US$0.9 billion in 2005 to US$1.9 billion in 2006. There was also a change in preferences from holding foreign currencies and domestic bank deposits to stocks local market participants, and there was a rise in leveraged investment in stock as well as investments on behalf of relatives living abroad. It seems that the impact of these internal and domestic factors were more dominant than the oil price rise on the Vietnamese stock market.

1. Introduction

Since Hamilton's [11] work, showing that oil price increases were responsible for almost every post-World War II US recessions, a stream of studies have examined the oil price-macroeconomic nexus; see, for instance, Loungani [20], Burbridge and Harrison [3], Gisser and Goodwin [8], and Uri [27].

In addition to these studies on the impact of oil prices on various macroeconomic variables, there are studies that have specifically modelled the impact of oil prices on stock prices (or stock returns). These studies include Jones and Kaul [19], Huang et al. [15], Sadorsky [26], Papapetrou [24], and El-Sharif et al. [6].

Jones and Kaul [19] investigate the impact of oil prices on stock returns for the United States (1947–1991), Canada (1960–1991), Japan (1970–1991), and the UK (1962–1991) using simple regression models and find that oil prices have a negative effect on stock returns for all countries.

Papapetrou [24] uses a vector error correction model to examine the impact of oil price on stock returns in Greece for the monthly period 1989:1–1996:6. Her variance decomposition analysis reveals that an oil price shock has a negative effect on stock returns for the first 4 months.

El-Sharif et al. [6] investigate the relationship between the price of crude oil and equity values in the oil and gas sectors of the UK using a multi-factor model using daily data for the period 01/1/1989 to 30/6/2001. They find that a rise in oil prices raises the returns in the oil and gas markets.

Sadorsky [26] examines the relationship between oil prices and stock returns for the USA by using monthly data for the period 1947:1–1996:4. His variance decomposition analysis reveals that stock returns fall in the short-term in response to a rise in oil prices.

The goal of this paper is to add to this scarce literature on developing countries. To achieve this, we examine the relationship between oil prices and stock prices for Vietnam, using daily data for the period 2000–2008.

There are four main contributions of this study to the literature. First, in this paper we employ two estimation techniques that have not been previously used to study the relationship between oil price and stock markets. In particular, in testing for the cointegration relationship, we employ the Gregory and Hansen [9] residual based test that accounts for one endogenous structural break, and the Hatemi-J [14] residual based test, which is essentially an extension of the GH (1996) test, that accounts for two endogenous structural breaks. Given the volatility of the share market and oil prices, it is also important to test whether parameters or the system are stable. We specifically consider this in this paper, and achieve the goal by using the Hansen [12] and Quandt–Andrews (see [1]) tests for parameter stability.

Second, we extend the modelling framework from a bivariate to a multivariate one. In other words, we augment the bivariate model to a multivariate model by including a third variable, namely the exchange rate variable. This is important, since in the applied

* Corresponding author. Address: School of Accounting, Economics and Finance, Faculty of Business and Law, Deakin University, 221 Burwood Highway, Burwood, Victoria 3125, Australia. Tel.: +61 3 924 46180; fax: +61 3 924 46034.
E-mail address: paresh.narayan@deakin.edu.au (P.K. Narayan).

0306-2619/$ - see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.apenergy.2009.05.037

economics literature it is argued that bivariate models give rise to omitted variable bias. It follows that our model is an advance over the ones used in the existing literature.

Third, Vietnam is an emerging country. Over the last 5 years, Vietnam's stock market has grown rapidly (see Section 2). A study that examines the relationship between oil prices and stock returns through including the exchange rate variable will have direct relevance for policy. Oil price is considered as a permanent shock while exchange rate shocks are treated as nominal shocks, meaning they are temporary shocks. How these two variables—which have monetary policy relevance as well—affect the stock returns of an emerging economy will shed new light and will add to what is already known regarding the behaviour of emerging stock markets in responses to macroeconomic changes/shocks.

Fourth, the bulk of the studies that examine the relationship between oil prices and stock returns are on developed markets. The one exception is Hammoudeh and Aleisa [10], who find some evidence of a negative relationship between oil prices and returns in the case of six Gulf Cooperation Council countries. Hence, our study contributes to the literature on developing countries in general, and emerging markets in particular.

The balance of the paper is organised as follows. In the next section, we provide a brief overview of the Vietnam stock market. In section 3, we discuss the empirical model and the theoretical framework. In section 4, we discuss the data, estimation approach and the main findings. In the final section, we provide some concluding remarks.

2. A brief overview of the Vietnam stock market

Financial and economic reforms in Vietnam were partly responsible for the emergence of the Vietnam Stock Market. The Vietnamese financial economy consists of two stock exchanges, namely the Ho Chi Minh City Securities Trading Centre (HSTC) and the Hanoi Securities Trading Centre (HaSTC). The state securities commission is responsible for monitoring the stock exchanges. In this paper, we consider the Vietnam stock exchange or the VN-Index which is a capitalisation weighted index of all the companies listed on the Ho Chi Minh stock exchange. The index was created with the base index value of 100 as of July 28, 2000.

In the last few years, Vietnam's stock market has surged, and its performance has been remarkable. From 22 listed companies on the stock market, the number rose to 171 in 2008. Market capitalisation of the listed companies increased from 1% of GDP in 2004 to 28.5% of GDP in 2007 [28]. Similarly, the stock price index rose quite sharply: the Ho Chi Minh City Stock Market Price index rose by 281% between end-2005 and end-February 2007. This period has been marked as the stock market boom period in Vietnam.

Compared with other emerging markets, namely China, India, and South Africa, while Vietnam's stock market is relatively less developed, the speed to growth over the last 5 years has been equally impressive and on some counts has outperformed other emerging markets. For example, the number of listed companies on the Indian market declined from 5644 in 2003 to 4921 in 2008, and from 426 to 425 over the corresponding period for South Africa. However, in Vietnam, the number of listed companies increased from 22 in 2003 to 171 in 2008.

Similarly, when we compare the annual average growth rate in market capitalisation of listed companies, we notice that Vietnam outperforms China, India and South Africa. For example, the annual average growth rate in market capitalisation as a percentage of GDP over the period 2003-2007 was 456% in Vietnam, followed by China (64.8%), India (36.5%), and South Africa (16.8%).

3. Empirical model and theoretical framework

Since our interest in this paper is on time series data, spanning the period 2000–2008, we consider the following long-run model, assuming that all variables are characterised by a unit root process:

$$\ln SP_t = \alpha_0 + \alpha_1 \ln OILP_t + \alpha_2 \ln ER_t + \varepsilon_t \quad (1)$$

Here, ln SP is the natural log of the stock price series, ln OILP is the natural log of the crude oil price series, and ln ER is the natural log of the nominal exchange rate series.

The theoretical relationship between oil and stock prices is as follows. Stock prices are discounted values of expected future cash flows. The realised stock returns can be expressed as follows:

$$R = \frac{d(E(c))}{E(c)} - \frac{d(E(r))}{E(r)} \quad (2)$$

Here, R is the stock returns, computed as $\log(SP_t/SP_{t-1}) * 100$; c is the cash flow stream; r is the discount rate; $E(.)$ is the expectation operator; and $d(.)$ is the differentiation operator. We notice that stock returns are influenced by systematic movements in expected cash flows and discount rates.

There are two channels through which oil prices can impact stock prices (returns). First, oil is considered an input in the production process. A rise in the oil price raises the cost of production, which will depress aggregate stock prices. Second, as lucidly explained by Haung et al. [15], expected oil prices also affect stock returns via the discount rate, which consists of both the expected inflation rate and the expected real interest rate. Since, both expected inflation and interest rates are influenced by oil prices, for a net importer of oil an oil price increase will put downward pressure on the country's foreign exchange rate and upward pressure on the expected domestic inflation rate. A higher expected inflation rate raises the discount rate, which has a negative effect on stock returns.

The relationship between exchange rates and stock returns could be positive or negative depending upon whether the country is an export or an import dominant country. Dornbusch and Fischer [5] argue that exchange rates affect the competitiveness of firms by changing the value of its earnings and cost of its funds. For an export dominant country, as its exchange rate increases, competitiveness of exports falls, which has a negative effect on domestic stock prices. For an import dominant country, an appreciation in the exchange rate by reducing input costs generates a positive effect on domestic stock prices.

Markowitz's portfolio theory [22,23] can be used to explain that portfolios that give high returns need to be reconsidered when exchange rates increase or decrease. A depreciation of the Vietnamese currency can lead to a portfolio switch from domestic assets, such as stocks, to foreign assets since depreciation reduces returns for foreign investors when these funds are translated to the home currency. For the internationally-diversified domestic investor, the depreciation of the Vietnamese currency causes foreign stocks to be more expensive, causing a substitution into domestic assets, thereby increasing domestic stock prices.

4. Data, approach and results

4.1. Data

The data series, namely stock prices, nominal exchange rates and oil prices are extracted from the BLOOMBERG database. The oil price data is the WTI spot price index. Data is daily for the period 28/07/2000 to 16/06/2008. Plots of the data series are provided in Figs. 1–3 for the stock price series, exchange rate series (nominal

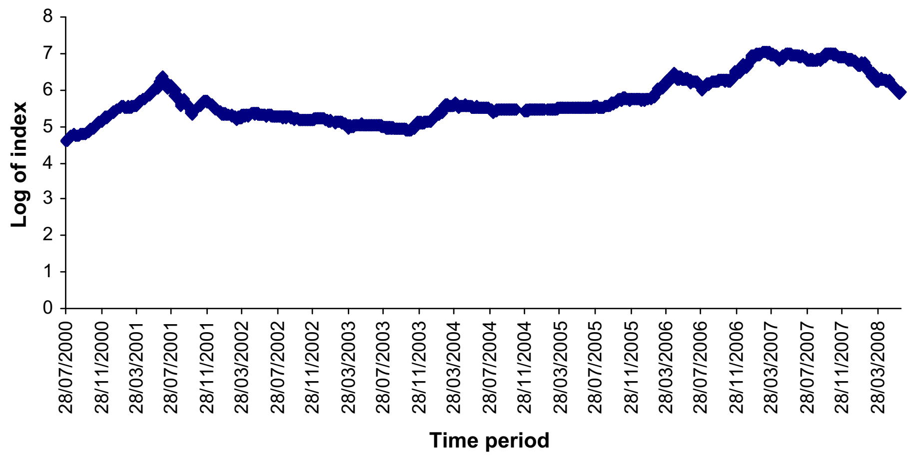

Fig. 1. Vietnam's stock price index.

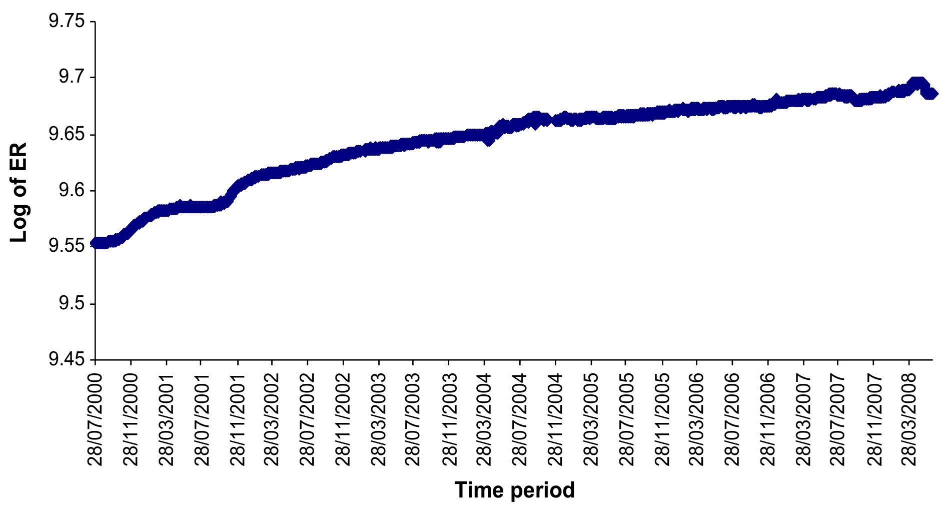

Fig. 2. Exchange rate series.

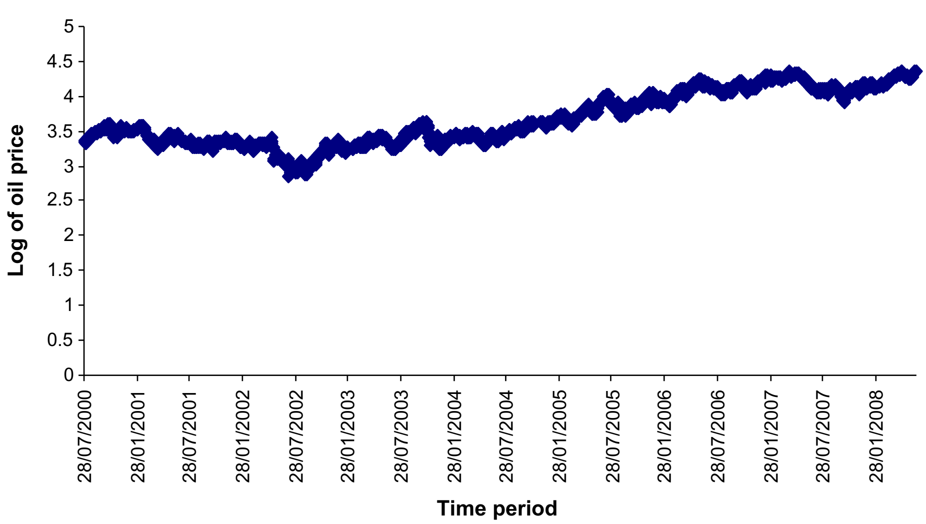

Fig. 3. Oil price (WTI spot price index) series.

exchange rate, vis-à-vis the US dollar), and the oil price series, respectively. One common observation from the three data series is that over the period 2000–2008 all the series have experienced a rise; there is an upward trend.

4.2. Unit root tests

As a first step in the empirical analysis, we perform unit root tests to confirm the integrational properties of the data series.

We perform this exercise on six variables, namely nominal exchange rate, the growth rate in nominal exchange rate, crude oil price, the growth rate of crude oil price, stock price, and the growth rate of stock price. For this purpose, we use two unit root tests, namely the Dickey and Fuller [4] test and the Dickey and Fuller generalised least squares test including a constant and a trend in the model. Both tests have the same null hypothesis: that there is a unit root. The optimal lag lengths are selected by using the Schwarz Bayesian criteria. The results are reported in Table 1. We notice that for the levels of the series (ER, OILP and SP), we are unable to reject the unit root null hypothesis. However, when we subject the growth rates of these three variables to unit root tests, we are able to reject the unit root null hypothesis at the 1% level of significance. The implication of this finding is that we can examine evidence for any possible cointegration (long-run) relationship between stock prices, exchange rates and oil prices for Vietnam.

4.3. Cointegration tests

4.3.1. Johansen test

To test for a long-run relationship among the variables, we apply the Johansen [17,18] cointegration test. Given that it is possible to have multiple long-run equilibrium relationship between stock prices and its proposed determinants, the technique described by Johansen [17,18] allows one to determine the number of statistically significant long-run relationships. The Johansen approach to cointegration is based on a Vector Autoregression (VAR) model. The test is well known in the applied economics literature; as a result, we do not repeat the methodology here in order to conserve space.

We use the Johansen [17] procedure for cointegration test based on the maximum likelihood approach and includes a time trend which takes into account the possible effect of a trending GDP. Note that due to the unavailability of daily data on GDP we could not model this explicity. He suggests two tests, namely the trace test and the $\lambda-\max$ statistic. The trace test examines the null hypothesis that the number of cointegrating vectors in the system r, is less than or equal to r_0 where $r_0 < p$ and p is the number of variables in the system, whereas the alternative hypothesis is that the impact matrix is of a full rank. The $\lambda-\max$ test examines the null hypothesis that there are r_0 cointegrating vectors versus the alternative of r_0+1 cointegrating vectors. The results are reported in Table 2 and imply the existence of a cointegrating relationship between stock prices, oil prices, and exchange rates in the case of Vietnam.

4.3.2. Structural break cointegration test

In this section, we apply two tests for cointegration that account for structural breaks. The first test is the Gregory and Hansen [9] test which accounts for one endogenous structural break and the second test is an extension of the GH test but accounts for two endogenous structural breaks; this has been proposed by Hatemi-J [14]. While the authors have proposed several models, we are only concerned with their Model 4, which examines a regime shift. The model has the following form:

$$y_t = \alpha_1 + \alpha_2 D_t^\tau + \beta_0 t + \beta_1^\tau x_{2t} + \beta_2^\tau x_{2t} D_t^\tau + \mu_t \quad t = 1, \ldots, n. \tag{3}$$

Here, α_1 is the intercept before the shift and α_2 is the change in the intercept due to the shift, β_1 denotes the cointegrating slope coefficients before the regime shift, and β_2 denotes the change in the slope coefficient. Here $D_t^\tau = 0$ for $t < \tau$ and $D_t^\tau = 1$ for $t \geqslant \tau$. To test for cointegration between y_t and x_t with structural change, i.e. the stationarity of μ_t, Gregory and Hansen [9] propose a suite of tests. These statistics are the commonly used ADF statistic and extensions of the Z_α and Z_t test statistics of Phillips [25]. These statistics are defined as:

$$ADF^* = \inf_{\tau \varepsilon T} ADF(\tau) \tag{4}$$

$$Z_\alpha^* = \inf_{\tau \varepsilon T} Z_\alpha(\tau) \tag{5}$$

$$Z_t^* = \inf_{\tau \varepsilon T} Z_t(\tau) \tag{6}$$

If the breakpoint is unknown *a priori*, the model is estimated recursively allowing the breakpoint τ to vary such that $|0.15T| \leqslant \tau \leqslant |0.85T|$, where T is the sample size. The null hypothesis of no cointegration is investigated by application of the three tests (Eqs. (4)–(6)). Here, we are interested in the smallest values for ADF(τ), $Z_\alpha(\tau)$ and $Z_t(\tau)$ across all possible breakpoints required to reject the null hypothesis of no cointegration. The critical values for the one-break test are reported in Gregory and Hansen [9] while the critical values for the two-break test are reported in Hatemi-J [14].

The results are reported in Table 3. We find that in the case of both the one-break and two-break tests the null hypothesis of no cointegration is rejected in two out of the three tests. This implies that consistent with our finding from the Johansen test, there is evidence of a long-run relationship between stock prices, exchange rates and oil prices in the case of Vietnam.

4.4. Long-run elasticities

The long-run elasticities based on the ordinary least squares (OLS) and the dynamic OLS (DOLS) procedures are reported in

Table 1
Unit root tests.

Variables	ADF	ADF-GLS
ER	−3.438	0.4471
GER	−41.766***	−40.941***
OILP	−0.4811	0.4247
GOILP	−42.660***	−42.985***
SP	−1.2690	−0.5900
GSP	−12.636***	−3.2910***

Note: The 5% critical value for the ADF test is and for the ADF-GLS test it is −1.941.
*** Denotes statistical significance at the 1% level.

Table 2
Cointegration test.

H_0	H_A	λ_{tr} test	λ_{tr} (0.95)
$r = 0$	$r = 1$	56.37**	42.91
$r \leqslant 1$	$r = 2$	28.95**	25.87
$r \leqslant 2$	$r = 3$	12.05	12.51
H_0	H_A	λ_{max} test	λ_{max} (0.95)
$r = 0$	$r = 1$	27.42**	25.82
$r = 1$	$r = 2$	16.90	19.38
$r = 2$	$r = 3$	12.05	12.51

Note: The critical values are calculated using then the approach in MacKinnon et al. [21].
** Denote statistical significance at the 5% level.

Table 3
Gregory and Hansen test.

SP = f(OP, ER)	ADF	T_b	Z_t^*	T_b	Z_α^*	T_b
One-break	−2.89 [7]	0.80	−155.05**	0.61	−2111.3**	0.20
Two-break	-3.80 [7]	0.19/0.46	−165.75**	0.18/0.46	−2107.1**	0.15/0.25

Notes: For the one-break test, the 5% CVs are −5.50 and −58.33 for the ADF/Z_t^* tests and Z_α^* tests, respectively [9]. For the 2-break test, the corresponding 5% CVs are −6.46 and −83.64 [14].

Table 4
Long-run elasticities.

	OLS	DOLS
Constant	−6.3823 (−1.7483)	−4.6865 (−0.9455)
OILP	1.2757*** (38.386)	1.3022*** (37.921)
ER	0.7703** (1.9879)	0.5843 (1.1165)

** Denote statistical significance at the 5% level.
*** Denote statistical significance at the 1% level.

Table 4. We find that oil prices and exchange rates have a statistically significant effect on stock prices in Vietnam. More specifically, we find that a 1% increase in the oil price increases stock prices by around 1.3%. This result is statistically significant at the 1% level.

In terms of the relationship between exchange rate and stock prices, we find that a 1% increase in the exchange rate – which reflects a depreciation of the Vietnamese currency – increases stock prices by less than 1%. This result is, however, statistically significant in only one of the two models.

4.5. Error correction model

When a cointegrating relationship exists amongst a set of variables then a dynamic error correction model of the variables can be extracted, as shown by Engle and Granger [7]. This dynamic relationship is depicted in the following short-run regression model:

$$GSP_{ij,t} = \beta_0 + \sum_{q=0}^{m} \eta_q GOILP_{i,t-q-1} + \sum_{q=0}^{m} \theta_q GER_{t-q} + \delta\varepsilon_{t-1} + \mu_t \qquad (7)$$

All variables in Eq. (7) were defined earlier and are in growth form to ensure stationarity; additionally, ε_{t-1} is the one period lagged error correction term, and m is the lag length, which is selected using the Schwarz Bayesian criteria. The main feature of Eq. (7) is that it captures both the short-run and long-run relationship between stock returns and the oil price and exchange rate returns. The long-run relationship is captured by the lagged value of the long-run error correction term, which is expected to be negative, reflecting how the system converges to the long-run equilibrium implied by Eq. (1).

The results from the short-run model are reported in Table 5. We find that in the short-run neither the growth rate in oil prices nor the growth rate in the exchange rate is statistically significant. The one period lagged error correction term is, however, statistically significant at the 1% level. This implies that there is indeed a long-run relationship among stock returns and the returns to oil prices and exchange rates. The coefficient of 0.32 suggests that the speed of adjustment is fairly high: around 32% of the adjustment takes place the following day of the shock to the system.

However, the diagnostic tests reveal that there is heteroskedasticity. Based on the ARCH LM test which examines the null hypothesis of "no ARCH" effects, we are able to reject the null hypothesis at the 1% level. The test statistic for ARCH LM (50, 1677) turns out to be 45.3 with a probability value of zero. Similarly, the null hypothesis of a normal distribution based on the Jarque-Bera test is also rejected at the 1% level. This, particularly ARCH effects, may bias the results from the OLS estimator. Hence, to remedy this, we estimate the short-run model using a GARCH (1,1) specification. The results are reported in panel B of Table 5. While the statistical significance and signs of the variables do not change, we notice that the coefficient on the one period lagged error term is almost half of what it was in the OLS model. So according to the GARCH model, we find that only 15% of the adjustment occurs the day after the shock. Most importantly, the ARCH LM test turns out with a value of 0.50 and a probability value of 0.99. This means that the null of "no ARCH" effect cannot be rejected. It follows that unlike the OLS model, the GARCH model does not suffer from ARCH effects.

One feature of the results when we compare the long-run model with the short-run model is that while the determinants of stock prices are statistically significant in the long-run they are statistically insignificant in the short-run. We believe that this is because the short-run in our empirical analysis amounts to a day, and the impact of exchange rates and oil prices on the stock market are not felt on a day-to-day basis, but it seems the impact begins only after some time, as depicted in the long-run model.

Table 5
Short-run elasticities.

	Coefficient	*t*-Statistics
Panel A: OLS		
Constant	0.0672	1.6327
GOILP	0.0102	0.5916
GER	0.9563	1.1672
ε_{t-1}	−0.3249***	−2.9681
		p-values
Panel B: GARCH (1, 1)		
Constant	−0.0203	0.2807
GOILP	0.1427	0.7326
GER	0.0019	0.7942
ε_{t-1}	−0.1538***	0.0006

*** Denotes statistical significance at the 1% level.

4.6. Parameter stability test

In this section, we apply the parameter stability test proposed by Hansen [12] and the Quandt–Andrews breakpoint test for one or more unknown structural breakpoints.

Hansen recommends testing parameter stability by using three different test statistics, namely the SupF test, the MeanF test, and the L_C test. All the three tests examine the null hypothesis of no sudden shift in regime. The tests are performed by using a trimming region of 15%. The results are reported in Table 6. We find that two of the three tests do not reject the null hypothesis of no sudden shift in regime. This implies that there is strong evidence that parameters are stable for Vietnam's stock price-exchange rate and oil price relationship.

Next, we apply the Quandt–Andrews test. This test examines one or more structural break points in a sample. The null hypothesis is "no breakpoints", and the test statistics are based on the Maximum statistic, the Exp Statistic, and the Ave statistic (see [1,2]). We choose a trimming region of 15%. The probability values are calculated using [13] method. The results are reported in

Table 6
Parameter stability test of Hansen [12].

Tests	Test statistics	*p*-Value
Lc	0.126	0.200
MeanF	3.615	0.110
SupF	19.665	0.010***

*** Denotes that the null hypothesis is rejected at the 1% level.

Table 7
Quandt–Andrews unknown breakpoint test.

Statistic	Value	*p*-Value
Max. LR F-stat. (5/15/2006)	6.92	0.74
Max. Wald F-stat. (5/15/2006)	6.92	0.74
Exp LR F-stat.	1.69	0.73
Exp Wald F-stat.	1.69	0.73
Ave LR F-stat.	2.47	0.80
Ave Wald F-stat.	2.47	0.80

Table 7. Total breakpoints considered by the test were 1244 and the null hypothesis of no break within the trimmed sample period is not rejected by any of the three test statistics.

5. Concluding remarks

The goal of this paper was to examine the relationship between stock prices and oil prices for Vietnam. Over the last few of years, two features regarding this relationship for Vietnam is noteworthy: first, oil prices have surged over the last couple of years to over US$100 per barrel; and second, Vietnam's stock market has grown impressively by about 280%. We examine this relationship by including the nominal exchange rate as an additional determinant of stock prices. Our empirical analysis is based on daily data for the period 2000–2008.

Amongst our main results, we find that stock prices, oil prices, and nominal exchange rates are cointegrated; that is, they share a long-run relationship. We estimate long-run elasticities and find that both oil prices and exchange rates have a statistically significant positive effect on stock prices. We estimate the short-run elasticities and find that neither the oil price nor the exchange rate has a statistically significant impact on stock returns.

That we find a positive and statistically significant relationship between stock prices and oil prices is inconsistent with theoretical expectations. The reason for the existence of this relationship is the different and unique factors that have contributed to the Vietnamese stock market boom during the same time when the oil price was rising rapidly. These factors, as identified by the IMF [16], include: (1) the increasing foreign portfolio investments inflows which are estimated to have doubled from US$0.9 billion in 2005 to US$1.9 billion in 2006, equivalent to 3.1% of GDP; and (2) local market participants have changed preferences from holding foreign currencies and domestic bank deposits to stocks, and there has been a rise in leveraged investment in stock as well as investments on behalf of relatives living abroad. It seems that the impact of these internal and domestic factors on the Vietnamese stock market were more dominant than the oil price rise.

References

[1] Andrews DWK. Tests for parameter instability and structural change with unknown change point. Econometrica 1993;61:821–56.

[2] Andrews DWK, Ploberger W. Optimal tests when a nuisance parameter is present only under the alternative. Econometrica 1994;62:1383–414.

[3] Burbridge J, Harrison A. Testing for the effects of oil-price rises using vector autoregression. Int Econom Rev 1984;25:459–84.

[4] Dickey DA, Fuller WA. Distribution of the estimation for autoregressive time series with a unit root. J Am Stat Assoc 1988;74:427–31.

[5] Dornbusch R, Fischer S. Exchange rates and the current account. Am Econom Rev 1980;70:960–71.

[6] El-Sharif I, Brown D, Burton B, Nixon B, Russell A. Evidence on the nature and extent of the relationship between oil prices and equity values in the UK. Energy Econom 2005;27:819–30.

[7] Engle RF, Granger CWJ. Cointegration and error correction: representation, estimation and testing. Econometrica 1987;55:251–76.

[8] Gisser M, Goodwin TH. Crude oil and the macroeconomy: tests of some popular notions. J Money Credit Bank 1986;18:95–103.

[9] Gregory AW, Hansen BE. Residual based test for cointegration in models with regime shifts. J Econometrics 1996;70:99–126.

[10] Hammoudeh S, Aleisa E. Dynamic relationships among GCC stock markets and NYMEX oil futures. Contemp Econom Policy 2004;22:250–69.

[11] Hamilton JD. Oil and the macroeconomy since World War II. J Polit Economy 1983;92:228–48.

[12] Hansen B. Tests for parameter instability in regressions with I(1) processes. J Business Econom Stat 1992;10:321–35.

[13] Hansen BE. Approximate asymptotic *p*-values for structural-change tests. J Business Econom Stat 1997;15:60–7.

[14] Hatemi-J A. Tests for cointegration with two unknown regime shifts with an application to the financial market integration. Emp Econom 2008;35:497–505.

[15] Huang RD, Masulis RW, Stoll HR. Energy shocks and financial markets. J Futur Markets 1996;16:1–27.

[16] International Monetary Fund (IMF). Vietnam: selected issues. IMF Country paper no. 07/385, Washington, DC; 2007.

[17] Johansen S. Statistical analysis of cointegration vectors. J Econom Dynam Control 1988;12:231–54.

[18] Johansen S. Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica 1991;59:1551–80.

[19] Jones CM, Kaul G. Oil and stock markets. J Finance 1996;51:463–91.

[20] Loungani P. Oil price shocks and the dispersion hypothesis. Rev Econom Stat 1986;68:536–9.

[21] MacKinnon JG, Haug AA, Michelis L. Numerical distribution functions of likelihood ratio tests for cointegration. J Appl Economet 1999;14:563–77.

[22] Markowitz HM. Portfolio selection. J Finance 1952;7:77–91.

[23] Markowitz HM. The foundations of portfolio theory. J Finance 1991;46:469–77.

[24] Papapetrou E. Oil price shocks, stock market, economic activity and employment in Greece. Energy Econom 2001;23:511–32.

[25] Phillips PCB. Time series regression with a unit root. Econometrica 1987;55:277–301.

[26] Sadorsky P. Oil price shocks and stock market volatility. Energy Econom 1999;21:449–69.

[27] Uri ND. Changing crude oil price effects on US agricultural employment. Energy Econom 1996;18:185–202.

[28] World Bank. World development indicators. Washington (DC): World Bank; 2009.