DYNAMIC LINKAGES FOR THE ECONOMY OF VIETNAM

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ABSTRACT

The time series data on stock market return, exchange rate and current account balance for Vietnam are found stationary. As a result, VAR models in first-difference are estimated. Monthly data from January, 2001 through December, 2012 are employed. The estimates of two VAR models show that lagged changes in exchange rate and current account balance have no significant influences on the current change in stock market returns. On the other hand, lagged changes in stock market returns seem to unleash greater influences on the current change in exchange rate. **JEL Classifications:** F31, G01, G12

INTRODUCTION

In brief, stock market development in the unified Vietnam after a prolonged war is a relatively new phenomenon that helps spur economic growth through the financing of industrial output. The Ho Chi Minh City Securities Trading Center (HoSTC) was inaugurated on July 20, 2000 and trading commenced on July 28, 2000. The HoSTC was renamed and upgraded to Ho Chi Minh Stock Exchange (HOSE) on August 8, 2007 and is the largest stock exchange in Vietnam. 308 companies are listed on the HOSE as of January, 2013. Foreign ownership in listed companies is controlled, but limits have been relaxed to allow up to 49% of investments. There are no price restrictions for newly listed securities and Vietnam has continued progress in an "outward-orientation" by gradually allowing market forces to determine stock prices and exchange rates.

A number of hypotheses support the existence of a causal relation between stock prices and exchange rates. 'Goods market approaches' by (Dornbusch and Fischer, 1980) suggest that changes in exchange rates affect the competitiveness of a firm. This contends that fluctuations in exchange rates affect the value of earnings and cost of capital as companies borrow in foreign currencies to fund their operations; reflecting in the perceived value of stocks. For instance, a depreciation of the local currency makes exporting goods attractive and leads to an increase in foreign demand and hence revenue for the firm. The firm's value would appreciate and thus raise stock prices. In contrast, an appreciation of the local currency decreases profits for an exporting firm as there is

a decrease in foreign demand for its products. However, the sensitivity of the value of an importing firm to exchange rate changes is just the opposite to that of an exporting firm. Additionally, variations in exchange rates affect a firm's transaction exposure. In other words, exchange rate movements also affect the value of a firm's future payables (or receivables) denominated in foreign currency. Therefore, on a macro basis, the impact of exchange rate fluctuations on the stock market seems to depend on both the importance of a country's international trade and the degree of the trade imbalance.

An alternative explanation for the relations between exchange rates and stock prices is provided by Branson (1983) and Gavin (1989) through 'portfolio balance approaches' that emphasize the role of capital account transactions. Exchange rates are determined by demand and supply forces. A growing stock market would attract capital flows from foreign investors, which may cause an increase in the demand for a country's currency. The reversal happens in case of falling stock prices where investors would try to sell stocks to avoid further losses, converting their money into foreign currency to move it out of the country. There would be demand for foreign currency in exchange of local currency and it would lead to depreciation of the local currency. As a result, rising (declining) stock prices would lead to an appreciation (depreciation) in exchange rates. Moreover, foreign investment in domestic equities could increase over time due to benefits of international diversification so that foreign investors would gain. Furthermore, movements in stock prices may influence exchange rates and money demand because investors' wealth and liquidity demands could depend on the performance of the stock market. Although theories suggest causal relations between stock prices and exchange rates, existing empirical studies provide mixed results.

Changes in exchange rates influence exports and imports of goods and services resulting in deficits or surpluses in current trade balance. In the late 1980s Vietnam practiced multiple exchange rates and the Dong depreciated rapidly against US Dollar due to triple-digit inflation. The exchange rate was kept fixed from late 1991 through late 1996 at 11,000 VND per US Dollar to restore price stability. Vietnam later allowed exchange rate flexibility within a ±5% range that has been broadened to ±10%. Growth enhancement creates exportable surpluses and reduces import needs of consumer goods and services. The channels of linkages include exports, imports and foreign investments that are affected by changes in the exchange rate. Ultimately, these effects are reflected through changes in stock prices. However, the causal effects between changes in stock market returns and exchange rates vary across countries, sample periods, and applications of econometric techniques. Changes in exchange rates ultimately affect a firm's foreign operations and overall profits and, in turn, its stock prices. The nature of such effects depends on the multinational characteristics of the firms involved. In contrast, a stock market downturn motivates investment elsewhere, reducing demand for domestic currency, lowering interest rates, and causing capital outflows thereby depreciating the local currency vis-à-vis a foreign currency. Rising trade deficits raises foreign debt and depresses domestic consumption and production. As a result, corporate sales and profits decline, thus lowering stock prices. In short, changes in stock market returns, exchange rates, and current account balances are interlinked.

Vietnam is currently classified as an "evolving" economy. It has made significant economic strides by enticing foreign capital and encouraging exports. Today, the US is the largest importer of Vietnamese goods and their largest source of capital. The topic of exchange rate, stock price, and current account balance in the US-Vietnam context remains under-researched. The

sole objective of this paper is to study the dynamic causal linkages among exchange rates, stock price, and current account balance in the above context.

The remainder of the paper proceeds as follows. Section 2 provides a brief review of the related empirical literature. Section 3 outlines empirical methodology. Section 4 reports results. Section 5 offers conclusions and policy implocations.

BRIEF REVIEW OF THE RELATED LITERATURE

The existing empirical literature on the topic of exchange rates and stock price is anecdotal with mixed findings. Aggarwal (1981) found a significant positive correlation between the US dollar and the US stock prices while Soenen and Hennigar (1988) reported a significant negative relationship. Soenen and Aggarwal (1989) attributed the differences in results to the nature of the countries, i.e. whether the countries were export or import dominant. Morley and Pentecost (2000), in their study on G-7 countries, argued that the reason for the lack of strong relationship between exchange rates and stock prices may be due to the exchange controls that were in effect in the 1980s.

Bahmani-Oskooee and Sohrabian (1992) were among the first to use cointegration and Granger causality to explain the direction of movement between exchange rates and stock prices. Since then, various other papers analyzing these aspects and using this technique appeared covering both industrial and developing countries (for example, Granger, et.al. [2000]; Ajayi, et. al. [1998]; Ibrahim [2000]). The directions of causality, similar to earlier correlation studies, were mixed. For Hong Kong, Mok (1993) found that the relationship between stock returns and exchange rates were bidirectional in nature. For the US, Bahmani-Oskooee and Sohrabian (1992) pointed out that there was a two-way relationship between the US stock market and exchange rates. However, Abdalla and Murinde (1997) found that the results for India, Korea and Pakistan suggested that exchange rates influenced stock prices, which was consistent with an earlier study by Aggarwal (1981). In contrast, Abdalla and Murinde (1992) found that the stock prices led the exchange rates in the Philippines. This was consistent with Smith's (1992) finding that stock returns had a significant influence on exchange rate in Germany, Japan and the US.

Walid et al. (2011) suggested that exchange rate changes had a significant impact on stock prices in four emerging countries over 1994-2009, but the impact was asymmetric and exchange rates were regime dependent. Hau and Rey (2006), and Andersen et al. (2007) showed a negative correlation between equity returns and exchange rate changes in several industrialized countries. The empirical findings of Ma and Kao (1990) seemed to be consistent with the "goods market theory" and suggested that stock prices in export oriented economy were negatively impacted by the appreciation of exchange rates, and for an import oriented economy the stock prices were positively affected by the appreciation of exchange rates. Rahman and Mustafa (1996) and Rahman et al. (1997) found weak evidence of a causal connection between real exchange rates and real trade balance. Fratzscher and Straub (2009) analyzed the effect of equity price shocks on current account positions for G-7 countries in 1974-2007. Such shocks were found to exert a sizable effect by worsening trade balance. However, the response of the trade balance to equity price shocks varied substantially across countries. Before the 2007-2009 financial crises, the USA and several other countries had large imbalances of trade. At the same time, prices of assets such as houses and stocks boomed. These developments were interlinked

(Fratzscher et al. 2010; Laibson and Mollerstrom, 2010; Gete, 2010; and Adam et al., 2011). They suggested that current trade account imbalances should be taken as warning signs of a potential future financial crisis. Bergin (2011) argued that rising asset values in the USA permitted households to borrow more easily to boost consumption, while the net sales of debt securities abroad financed current account deficits.

Pavlova and Rigobon (2007) argued that the sign of the stock market-exchange rate association might change based on whether supply or demand shocks dominate the economy. They added that demand shocks were twice as important as supply shocks in describing the behavior of asset prices and exchange rates. Hau and Rey (2006), on the other hand, suggested a negative association between stock market return differentials and currency value due to portfolio rebalancing by equity investors. Within an export-oriented emerging market context, a demand shock in large foreign countries, proxied by developed stock market returns, positively affected both the emerging stock market and the value of the national currency (Phylaktis and Ravazzolo, 2005). For transition economies, the Balassa-Samuelson effect also worked towards a positive association between the currency value and domestic stock market, when measured at sufficiently low frequencies (Crespo-Cuaresma et al., 2003).

Kim (2003) found that the real value of the dollar was negatively related to S&P500 stock index in the long run cointegrating equation. Morley (2002) attributed cross-country differences in stock market-exchange rate relationship to the financial systems differences in European countries. Stock market return differentials were positively and contemporaneously related to bilateral exchange rates and the coefficients were increasing over time. Such relationship was stronger in the UK and, to some extent, the Netherlands in comparison with Germany, France, and Italy with bank-oriented financial systems. Nieh and Lee (2001) found no significant long-run relationship between stock prices and exchange rates in the G-7 countries. Employing a Copula Approach, Ning (2010) found significant symmetric upper and lower tail dependence between stock markets and foreign exchange market for the USA, UK, Germany, Japan and France. Albuquerque et al. (2008) showed that market-wide private information derived from industry-specific order flows in the stock market helped forecast exchange rates 1-2 month(s) ahead. However, the direction of the relationship remained unreported.

Pan et al. (2007), who controlled for Asia index and interest rate differentials, reached mixed results on the causality between foreign exchange and stock markets in seven selected Asian countries, though during the crisis it was clear that exchange rate changes caused stock market returns to change. Using effective exchange rates for Poland, Czech Republic, Hungary, and Slovakia for the 1993/95-2003 sample period and employing a VECM model, Stavárek (2005) found no short-run and long-run relationship between exchange rates and stock markets, and suggested stock markets not to be tightly linked to the real economy. Employing Granger-causality and cointegration methodology, using weekly data on Greece, the Czech Republic and Hungary for the 1994-2000 period and controlling for DJIA and DAX respectively, Grambovas (2003) found a "strong" link between foreign exchange and stock market prices for Greece and Hungary, but not for the Czech Republic. Using weekly data for the 1995-2008 period, and employing VAR-multivariate GARCH methodology, Fedorova and Saleem (2010) documented significant effect of currency returns on the stock market returns in Hungary, the Czech Republic and Russia, but not in Poland, There was also evidence of several shocks and volatility spillovers between currency and stock markets.

More recently, Ülkü and Demirci (2012) studied joint dynamics of emerging

stocks and foreign exchange markets for European emerging markets where this interaction was of particular significance due to large external deficits. Their results showed that global developed and emerging stock market returns accounted for a large proportion of the (permanent) co-movement between the stock index and currency value. The residual interaction after controlling for global indexes was small. The sign of the currency-stock market relationship was driven by dependence on foreign capital (predominantly positive for countries which were net receivers of foreign portfolio capital) and depth of the local stock market. Jiranyakul (2012) found that co-integration and non-causality tests did not adequately capture the interactions between the Thai stock prices and the foreign exchange market. However, the results from a bivariate constant conditional correlation autoregressive conditional heteroskedastic model and the standard Granger causality test in multivariate framework indicated the existence of unidirectional causation running from exchange rate return to stock market return with a positive relationship. Additionally, exchange rate return volatility significantly caused stock market returns to decrease. Also, there were bidirectional causal relations between stock market risk and exchange rate risk, but in different directions.

EMPIRICAL METHODOLOGY

The stock market return and the exchange rate functions pertaining to the current topic of interest are specified as follows:

$$R = (E, CAB)\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

$$E = (R, CAB)\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

where, R = nominal monthly stock market return in Vietnam, E = bilateral nominal exchange rate (Vietnam's Dong per US Dollar), and CAB = nominal bilateral current account balance of Vietnam with USA. Monthly data from January, 2001 through December, 2012 are employed since Vietnam's stock market came into operation in January, 2001. The data are obtained from the US Census Bureau and the Oanda Corporation.

Prior to testing for cointegration, the time series properties of the variables involved are examined. To test for unit root (nonstationarity) in the variables, the modified Dickey-Fuller test, the modified Phillips-Perron test (Elliot et al., 1996; Ng and Perron, 2001) and the fairly standard KPSS (Kwiatkowski, Phillips, Schmidt and Shin, 1992) test for no unit root (stationarity) are implemented instead of the standard ADF and PP tests (for concerns of their high sensitivity to the selection of lag-lengths). It is important to examine the time series properties of variables since an application of Ordinary Least Squares (OLS) to estimate a model with nonstationary time series data results in the phenomenon of spurious regression (Granger and Newbold, 1974) invalidating the inferences through the standard t-test and joint F-test (Phillips, 1986). To be cointegrated, variables must possess the same order of integration, i.e., each variable must become stationary on first-order differencing depicting I (1) behavior.

Second, the cointegration procedure, as developed in Johansen (1988, 1992 and 1995), and Johansen and Juselius (1990), is implemented that allows interactions in the determination of the relevant macroeconomic variables and being independent of the choice of the endogenous variable. It also allows explicit

hypothesis testing of parameter estimates and rank restrictions using likelihood ratio tests. The empirical exposition of the Johansen-Juselius methodology is as follows:

$$\Delta V_t = \tau + \Omega V_{t-1} + \sum_{j=1}^{k-1} \Omega_j \Delta V_{t-j} + m_t$$

..........(3)

where, V_t denotes a vector of R, E and CAB, and $\Omega = \alpha\beta'$. Here, α is the speed of adjustment matrix and β is the cointegration matrix. Equation (3) is subject to the condition that Ω is less-than-full-rank matrix, i.e., r < n. This procedure applies the maximum eigenvalue test (λ_{max}) and trace test (λ_{trace}) for null hypotheses on r. Both tests have their trade-offs. λ_{max} test is expected to offer a more reliable inference as compared to λ_{trace} test (Johansen and Juselius (1990), while λ_{trace} test is preferable to λ_{max} test for higher testing power (Lütkepohl, et, al., 2001). However, the Johansen-Juselius test procedure is also not immue to supersensitivity to the selection of lag-lenghts. The optimum lag-lengths are determined by the AIC (Akaike Information Criterion), as developed in Akaike (1969).

Third, on the evidence of cointegrating relationships among the variables, there will exist an error-correction representation (Engle and Granger, 1987). The error-correction models take the following forms:

$$\Delta R_t = \beta_1 e_{t-1} + \sum_{i=1}^{k} \phi_i \Delta R_{t-i} + \sum_{j=1}^{k} \delta_j \Delta E_{t-j} + \sum_{j=1}^{k} \psi_j \Delta CAB_{t-j} + u_{1t}$$ ....(4)

$$\Delta E_t = \beta_2 e'_{t-1} + \sum_{i=1}^{k} \pi_i \Delta E_{t-i} + \sum_{j=1}^{k} \gamma_j \Delta R_{t-j} + \sum_{j=1}^{k} \theta_j \Delta CAB_{t-j} + u_{2t}$$

.......(5)

Equation (4) corresponds to the original equation (1) and equation (5) corresponds to the original equation (2). Here, e_{t-1} and e'_{t-1} are the error-correction terms of equations (4) and (5), respectively. If β_1 and β_2 are negative individually and statistically significant in terms of the associated respective t-value, there is evidence of a long-run causal flow to the dependent variable from the relevant explanatory variables. If δ_j's, Φ_i's and ψ_j's do not add up to zero, there are short-run interactive feedback relationships in the equation (4). Likewise, if π_i's, γ_j's and θ_j's do not add up to zero, there are short-run interactive feedback relationships in the equation (5).

In the absence of nonstationarity and cointegrating relationship among the variables, the above two models are estimated by excluding the error-correction terms (Bahmani and Payesteh, 1993) for Granger causality (Granger, 1998) in trivariate VAR framework. A multivariate VAR is a natural extension of the standard univariate VAR. A shortcoming of the standard framework for Granger causality is that it only allows for examination of interactions between single (univariate) variables within a system, perhaps conditioned on other variables. However, interactions do not necessarily take place between single variables but may occur among groups or "ensembles" of variables. This study thus establishes a framework for Granger causality in the context of causal interactions among three variables (Barrett et al, 2010).

RESULTS

First, to describe the data distribution of each variable, the standard descriptors are estimated. They are shown as follows:

For a normal distribution of data on each variable, mean-to-median ratio, skewness and Kurtosis should be 1, 0 and 3 respectively. Although they appear to be close to proximities, they do not exactly equal the above. Moreover, the P-Value of 0 for each Jarque-Bera statistic rejects the null hypothesis of normal distribution for each variable. In sum, there is no evidence of normal distribution for any variable of interest.

Table 2 reveals the expected sign of each correlation coefficient. The numerical value of each correlation coefficient is very modest, as evidenced above.

Third, the time series property of each variable is examined by implementing ADF, Ng-Perron and KPSS tests. It is important to ascertain appropriate estimating econometric technique. To mention again, the use of OLS for nonstationary time series variables leads to misleading inferences in presence of spurious correlation (Granger and Newbold, 1974). The test results are reported as follows:

The above tests confirm stationarity in each variable at 5% and 10% levels of significance. For both ADF and Ng-Perron critical values in absolute terms at the aforementioned levels of significance being less than the actual values fail to accept the null hypothesis of unit root. In addition, the KPSS test results fail to reject the null hypothesis of no unit root. Thus, all the aforementioned tests confirm stationarity in time series variables under consideration.

Finally, equations (4) and (5) are estimated by excluding the error-correction terms for VARs. The VARs are usually estimated in first-difference with stationary variables with I(0) behavior for short-run causal flows and interactive feedbacks (Granger, 1998). The estimates are reported as follows:

The estimates of VAR model (4) show that net effects of changes in exchange rate and current account balance on changes in stock market returns are very marginal and their individual coefficients are insignificant in terms of their associated t-values. However, the coefficients of lagged-returns are statistically significant providing positive feedbacks to the current change in stock market returns. R^2 shows that only 32% of the change in the current stock market return is due to changes in the lagged independent variables. The overall significance of VAR model (4) is also very marginal in terms of the calculated value of F-statistic at 2.5196.

As evidenced from the estimates of VAR model (5), changes in stock market returns significantly influence exchange rate causing appreciation of Vietnam's Dong against US Dollar. The effects of changes in the current account balance on exchange rates are statistically insignificant. Appreciation of lagged exchange rates also significantly strengthens Vietnam's Dong against US Dollar. R^2 indicates that lagged independent variables can explain 36.6% of the dependent variable. The F-statistic for overall significance of VAR model (5) is, however, higher at 3.8519 as compared to that of VAR model (4).

CONCLUSIONS AND POLICY IMPLICATIONS

All variables are stationary. The VAR models in first-difference are implemented for short-run causation and feedback effects. The estimates of equation (4) show that the lagged effects of changes in exchange rate and current

account balance are insignificant on the current change in stock market return. This is likely to be the outcome of managed float of the Dong vis-a-vis the US Dollar within the ±10% range in lieu of a free floating exchange rate system. The lagged effects of changes in stock market returns are significant due to relaxing of the foreign ownership cap on listed companies from 20% to 49%. This has increased foreign capital inflows as part of portfolio investments. The estimates of equation (5) reveal that the lagged effects of changes on the current account balance are insignificant to the changes in exchange rate primarily due to managed float limiting undue foreign exchange risk. On the contrary, the lagged effects of changes in stock market returns on the current change in exchange rate is comparatively more pronounced. This is due mainly to significant foreign capital inflows into Vietnam's equity market.

In brief, the stock market in Vietnam matters more for the economy than does the US-Vietnam bilateral exchange rate and current account balance. The primary contributing factors to this phenomenon are seemingly managed float of exchange rates and large inflows of foreign equity investments. For policy implications, Vietnam should maintain its focus on domestic macroeconomic fundamentals (e.g., price stability) to stabilize its stock market for enhancing economic growth. The policy of managed float to limit exchange rate risk proves to be a step in the right direction at the moment. Any further change in the exchange rate policy for switching to free float must be weighed with due caution.

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Table 1: Descriptive Statistics
(January, 2001 – July, 2012)

Descriptors	DLSTE (R)	PEXR (E)	DLCAB (CAB)
Mean	0.044420	16157.59	0.032168
Median	0.035890	15665.72	0.042994
Std. Dev.	1.099771	1621.043	0.575998
Skewness	-0.074773	1.264786	0.557336
Kurtosis	3.55612	3.623248	3.15846
Jarque-Bera	11873.44	35.63267	5103.484
Probability	0.000000	0.000000	0.000000
Observations	138	138	138

where, DLSTE = % rate of return on Vietnam's stock market (R)
PEXR = changes in exchange rate (Vietnam's Dong per US Dollar, E)
DLCAB = % changes in Vietnam's Current Account Balance (CAB)

Table 2: Correlation Matrix

	DLSTE (R)	PEXR (E)	DLCAB (CAB)
DLSTE (R)	1.000000	-0.015437	0.048516
PEXR (E)	-0.015437	1.000000	-0.008891
DLCAB (CAB)	0.048516	-0.008891	1.000000

Table 3: Unit Root Tests*

Variables	ADF	Ng-Perron	KPSS
R	-9.1313	-5.0806	0.1869
E	-8.9548	-4.2245	0.13066
TB	-20.4665	-2.7907	0.2093

*ADF critical values in Engle and Yoo (1987) are (-3.4846, -2.8852, and -2.5795), Ng-Perron critical values (-2.5800, -1.9800, and -1.6200), and KPSS critical values (0.7390, 0.4630, and 0.3470) at 1%, 5% and 10% levels of significance, respectively.

Table 4: Estimates of VAR Models (4) and (5)

VAR Model (4): Dependent Variable (ΔR_t)   VAR Model (5): Dependent Variable (ΔE_t)

Lagged Explanatory Variables	Estimated Coefficients*	Lagged Explanatory Variables	Estimated Coefficients*
Intercept	1.5126	Intercept	-479.6968
	(0.8046)		(-1.6644)
ΔR_{t-1}	0.7264	ΔE_{t-1}	-1.1278
	(6.2018)		(-10.1345)
ΔR_{t-2}	0.4672	ΔE_{t-2}	-0.3194
	(3.2215)		(-1.9351)
ΔR_{t-3}	0.2822	ΔE_{t-3}	0.1689
	(1.8004)		(0.9825)
ΔR_{t-4}	0.2953	ΔR_{t-1}	-44.8209
	(1.8223)		(-2.4961)
ΔR_{t-5}	-0.2543	ΔR_{t-2}	-46.1114
	(-1.5772)		(-2.1659)
ΔE_{t-1}	-0.0002	ΔR_{t-3}	-34.8172
	(-0.2057)		(-1.4482)
ΔE_{t-2}	0.0009	ΔCAB_{t-1}	-28.2290
	(0.8649)		(-0.4627)
ΔE_{t-3}	-0.0024	ΔCAB_{t-2}	-0.1553
	(-1.1059)		(-0.0022)
ΔE_{t-4}	0.0626	ΔCAB_{t-3}	14.5908
	(1.2694)		(0.02741)
ΔCAB_{t-1}	-0.4178		
	(-1.0498)		
ΔCAB_{t-2}	0.2016		
	(0.4435)		
ΔCAB_{t-3}	0.3548		
	(0.7721)		
ΔCAB_{t-4}	-0.2631		
	(-0.5748)		

$\overline{R}^2 = 0.3662, F = 3.8519, AIC = 3.0469$

*Associated t-values are reported within parentheses.

$\overline{R}^2 = 0.3262, F = 2.5196, AIC = 2.9821$

*Associated t-values are reported within parentheses.

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