Vietnamese Money Supply M$_1$ and Stock Price Behavior

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Abstract

This study applies Enders and Siklos' (2001) procedure to test for the long-run asymmetric co-integrating relationship and Granger causality between Vietnamese monthly money supply M$_1$ and monthly equity index over the period July 2000 to August 2010. The empirical results suggest a long-run asymmetric co-integration relationship between the narrowly defined money supply and equity index, indicating that the countercyclical monetary policies affect investors differently in different phases of business cycles. The empirical results further suggest that Vietnamese equity investors are more responsive to contractionary than expansionary monetary policy measures. Thus, the Vietnamese Central Bank countercyclical monetary policy is effective in influencing the equity markets. The empirical findings should be of special interest for the Central Bank in formulating and implementing its countercyclical monetary policy, for equity investors in designing their investment strategies, and corporate executives in determining their capital structures.

Keywords: Asymmetry, co-integration, market equity index, money supply, TAR Model, and Vietnam.

1. Introduction

Since the late 1930s, Keynesian fiscal policy has played a critical role in macroeconomic management in market economies. Beginning in the 1960s, changes in international economic conditions resulted in persistently large government budget deficits in economies around the world. As articulated by Mishkin (1995), this fiscal policy has lost its luster due to persistent budget shortfalls, large public debts, and doubt about the political system's ability to utilize the fiscal policy instrument in a timely and effective manner to achieve desirable stabilization outcomes. Consequently, the stabilization of output and inflation has been left largely to monetary policy.

Clearly, monetary policy becomes more and more important as an instrument for macroeconomic policy-making and macroeconomic management. However, formulating and implementing monetary policy in a transitional economy such as the case of Vietnam is very challenging. The State Bank of Vietnam supervisors encountered difficulties enforcing the rules and regulations. Moreover, excessive loans to shareholders are a particular problem for joint- stock banks as regulations limiting credit to a single borrower can be easily circumvented. The national monetary policy has been guided by, at times, conflicting policy objectives. Domestically, these conflicting objectives include economic growth, price and currency stability, financing inefficient state owned enterprises through policy directed lending and financial system stability.

The Vietnamese banking system consists of two segments: the four dominant large state owned commercial banks, and a number of small and more dynamic foreign-owned and joint- venture banks. The state owned commercial banks frequently operate on a non-commercial basis, with a culture of policy lending, which is subject to direct government interference. However, the rest of the banking system is more market-oriented. Transparency in banking operations, especially in the lending decisions, is always a thorny issue. These complicate the transmission of monetary policy, which operates under a mix of direct channels (through the state owned commercial banks) and market mechanisms (through other banks) in an opaque environment.

Even under the increases in inflation pressure, the State Bank of Vietnam must continue to focus its operations on the need to meet the economic growth objectives set by the National Assembly. As a result, Open Market Operations at times have been used primarily to inject liquidity into the banking system as needed to support the state owned commercial banks' own budget shortfalls and the financing of large public infrastructure projects. One of the consequences of the above policy has been the increase in non-performing loans, mostly from the state-owned enterprises, accumulated in the financial institutions' balance sheets.

Even with reforms, the governmental banking decrees and legislatures modifying the National Assembly's 1997-laws relating to the operations of the central bank and commercial banks, the internal and external difficulties of the Vietnamese banking system are still

problematic. As recently as December 2006, the State Bank of Vietnam was still wrapped in a vicious circle, evidenced in the IMF Country Report 06/421:"The State Bank of Vietnam revised monetary program for 2006 targets a deceleration of credit growth to 20 percent by end-2006. The team supported the authorities' aim to low credit growth and welcomed the increased caution exercised by the state owned commercial hanks in their new lending. However, given a still large amount of excess bank liquidity, there is a risk that credit growth will resurge during the remainder of the year, especially if this proves necessary to ensure the financing of strategic state owned enterprise projects. Moreover, challenges may be posed by financing of strategic state owned enterprise projects. Additional challenges may be posed by owned enterprise bonds and stock market-related lending. The authorities acknowledged that bank financing for many large state owned enterprise projects was likely to materialize in the corning months."

The standard neoclassical paradigm of financial economics assumes that investors react to noteworthy news events by adjusting their investment portfolios because these events change the risk-return profile of securities. Therefore, changes in the money supply M_1 is an indicator of changes in future macroeconomic conditions such as inflation, interest rate and unemployment, sophisticated and unsophisticated investors alike will react according to their ability to access research information and reposition their portfolios. More specifically, neo-classical economists theorized that an increase in money supply strengthens the stock prices. Conversely, a fall in money supply should slow down the stock prices.

The post-Keynesian school of economics (see Wray, 1998 for the exposition of post-Keynesian thinking) has long questioned the importance of the above hypothesized relationship. This school of thought posits that movements in money supply M_1 reflect the shift of money from long-term saving deposits to demand deposits and vice versa as a result of the preceding changes in stock prices. For example, raises in stock prices induce investors to liquidate their long-term saving deposits to use the fund to purchase stocks and other financial assets. In this portfolio adjustment process demand deposits tend to increase, which in turn raises money M_1. The trend is reversed when assets and stock prices are falling. From this logic, some post-Keynesian economists argue that changes in stock prices actually cause changes in money supply M1 and not the other way around.

Additionally, the asymmetries in financial market instruments are neither new nor novel. They have been studied extensively and documented in the literature of the indirect financing segment of the financial industry. Arak et al. (1983), Goldberger (1984), Forbes and Mayne (1989), Levine and Loeb (1989), Mester and Saunders, (1995), Dueker, (2000), and Tkacz (2001) report asymmetries in the U.S. prime lending rate. Thompson (2006) confirms that the asymmetries in the US prime lending-deposit rate spread. Cook and Hahn (1989), Moazzami (1999), and Sarno and Thornton (2003) find asymmetries in U.S. Treasury securities. Frost and Bowden (1999) and Scholnick (1999) report asymmetries in mortgage rates in New Zealand, and Canada. Heffernan (1997) and Hofmann and Mizen (2004) indicate asymmetric behavior of retail rates in the United Kingdom. Hannan and Berger (1991), and Neumark and Sharpe (1992), Diebold and Sharpe (1992) examine various deposit rates.

The rationale for incorporating the possible asymmetric adjustment process of the stock prices to the long-run equilibrium can be attributed to the seemingly opposite effects of the efficient market hypothesis and the counter-cyclical monetary policy over different phases of business cycles (Thompson, 2006; Nguyen et al., 2010). For instance, during the contractionary phases of business cycles, the countercyclical monetary policy would usually increase the money supply reducing market interest rates, while the information from that state of the economy would precipitate investors to resist adjusting their required rate of return on the stock market portfolio downward because their perceived market portfolio risk increases. Thus, the stock prices only increase slowly. By the same logic, it may be argued that, during the expansionary phases of business cycles, investors are less likely to resist adjusting their required rate of return on the stock market portfolio downward while the Central Bank is expected to reduce the growth in the money supply, raising market interest rates. It is expected that stock prices would adjust downward faster when the cycles are closer to their peaks.

The existence of the asymmetric response of the stock prices to the changes in the money supply will affect firms relying on equity market for funds differently than those using loans for their financial resources. Thus, policymakers should be aware that counter-cyclical monetary policy may have different effects due to stock price asymmetries in their formulation of monetary policy. Additionally, keeping pace with the age of globalization, the equity market has been increasingly internationalized. Thus, modeling the asymmetry in the stock prices may provide a better understanding of the countercyclical monetary policy and the equity market worldwide.

The above discussions imply the hypothesis of an asymmetric co-integrating relationship and Granger causality between stock prices and the money supply. To formally investigate these possibilities, this study utilizes Enders and Siklos' (2001) procedure to test for an asymmetric co-integrating relationship and Granger causality between Vietnamese stock prices and the monthly money supply M_1. The remainder of this paper is organized as follows: The next section briefly discusses the Vietnamese equity market and banking industry; the section that follows describes the data for this study and some descriptive statistics; the following sect1on briefly describes the methodology used in the investigation; the next section reports the empirical test results; and the final section provides some concluding remarks.

2. Vietnamese Equity Market and Banking Sector

Vietnam's first stock exchange, known as the Ho Chi Minh City Securities Trading Center, was established in July 2000. By the spring of 2005, the number of companies listed on the exchange had reached 28, representing a total market capitalization of only U.S. $270 million. In March 2005, Vietnam opened an over-the-counter exchange known as the Hanoi Securities Trading Center. The purpose of the second exchange was to expedite the process of equitization (partial privatization) of state-owned enterprises. Although these exchanges are still very small, officials set the goal of expanding their combined market capitalization to 10 percent of gross domestic product by 2010 and gradually phasing out

restrictions on foreign ownership o f s h a r e . In September 2005, Vietnam's prime minister announced that the limit on foreign share ownership would rise from 30 percent to 49 percent. Actually, as indicated by Table 1, at the end of 2012, the number of companies listed is 183 and the total market capitalization accounts for only 23.2 percent of gross domestic product. The Vietnam Stock Index or VN-Index is a capitalization-weighted index of all the companies listed on the Ho Chi Minh City Stock Exchange. The index was created with a base index value of 100 as of July 28, 2000. Prior to March 1, 2002, the market only traded on alternate days.

Table 1.Market Capitalization of Listed Companies as Percentage of Gross Domestic Product

Advanced Markets	2009	2010	2011	2012	Asian Emerging Markets	2009	2010	2011	2012
Australia	136.3	127.8	86.6	84.6	Bangladesh	7.9	15.6	21.0	15.1
Canada	125.7	137.0	107.2	110.7	People's Rep. of China	100.3	80.1	46.3	44.2
France	75.3	75.6	56.4	69.8	India	86.4	94.4	54.2	68.6
Germany	39.3	43.5	32.9	43.7	Malaysia	126.6	166.3	137.2	156.9
Japan	67.1	74.6	60.0	61.8	Pakistan	20.5	21.6	15.5	18.9
Rep. of Korea	100.3	107.3	89.2	104.5	Philippines	47.6	78.8	73.8	105.6
New Zealand	57.6	51.4	45.1	47.7	Sri Lanka	19.3	40.2	32.8	28.7
Singapore	160.1	170.4	125.8	150.8	Thailand	52.4	87.1	77.7	104.7
United States	108.5	118.9	104.3	119.0	*Vietnam*	*21.8*	*19.2*	*14.8*	*23.2*
Average	96.7	100.7	78.6	77.1	*Average*	53.6	67.0	52.6	62.9

Source: *World Bank, World Development Indicators. Market capitalization is the share price times the number of shares outstanding. Listed domestic companies are domestically incorporated companies listed on the country's stock exchange at the end of the year (2012). Listed companies do not include investment companies, mutual funds, or collective investment vehicles.*

Additionally, many regulations issued in 2006 and the officially accepted to be WTO member have changed the landscape of the Vietnamese equity market significantly. On May 03, 2006 the Vietnam Securities Depository officially went into operation under Decision No. 189/2005/QD-TTg signed on July 27, 2005 to increase the market performance in general, and the clearing and settlement system in particular. On June 01, 2006 the Hanoi Securities Trading Center increased the number of trading days from 3 to 5 days a week, in order to increase the market liquidity. On June 14, 2006, the Ho Chi Minh City Securities Trading Center increased the number of order matching phases from 2 to 3 phases a day (1st phase from 8h40 to 9h10, 2nd phase from 9h20 to 9h50, 3rd phase from 10h to 10h30) in order to meet investors' trading demand. Finally, on November 07, 2006 Vietnam was passed membership to become 150th member of the World Trade Organization, and would officially join on January 11, 2007. That event made new opportunities and challenges in the country's cultural and economic integration course into the globe, especially with respect to the financial aspect of the economy. As Table 1 indicates, Vietnamese equity market is still relatively not well developed.

As to the banking industry, Vietnam's banks suffer from low public confidence, regulatory and managerial weakness, and high levels of non-performing loans (NPL), non-compliance with the Basel capital standards and the absence of international auditing. Since 1992 Vietnam's banking system has consisted of a combination of state-owned, joint-stock, joint-venture and foreign banks, but the state-owned commercial banks predominate, and they suffer from high levels of NPL, most of them made to state-owned enterprises. Consequently, in September 2005 Vietnam decided to equitize all five state-owned banks-a change from previous plans to equitize only two of them. In addition, Vietnam plans to boost the transparency of its financial system by establishing a credit-rating agency and performance standards for joint-stock banks. Large foreign banks are balancing their strong interest in serving multinationals in Vietnam and frustration with continuing restrictions on their activities. As reported by the Asian Focus (2011), heavy lending to state-owned enterprises by state-owned commercial banks —notably prior to the 1997-98 Asian Financial Crisis—has led to relatively higher levels of non-performing loans than at other financial institutions. State-owned commercial banks accounted for the largest share of lending, with 49.3% of total loans as of year-end 2010, down from 58.4% in 2007.

Although Vietnam is a cash-based society, as reported by the Asia Focus (2011) rapid economic growth has contributed to rising household incomes and an increasing demand for retail banking services. Credit and debit card use has become more common, with the number of cards issued doubling between 2008 and 2010 to 28.5 million. the Asia Focus further articulates that the number of automated teller machines (ATMs) in the country has also climbed dramatically, rising from 1,800 in 2005 to 11,000 as of December 2010. However, despite this growth, banking penetration rates remain relatively low. As of December 2009, the Asia Focus estimated that 20% of Vietnam's population had bank accounts and around half of those with accounts actively used consumer banking services. The Asian Focus also posits that although these figures have likely risen somewhat during 2010 given the rising trend in credit cards and ATMs, the Vietnamese market continues to present growth opportunities for banking service providers.

In transitional and developing economies such as Vietnam, the conduct of the monetary policy, and hence the money supply, has been influenced by the following institutional and structural constraints. In early 1998, state owned commercial banks still accounted for 80% of deposits and their lending remained subject to political direction. State enterprises continue to receive borrowing privileges, including obtaining loans without collateral, easier access to foreign currency loans and subsidized interest rates. Accounting practices rendered credit evaluations problematic and off-balance sheet liabilities, such as letters of credit, emerged as a major source of risk *(IMF Staff Country Report No 98/30, 1998)*.

3. Data

This study uses data on the monthly equity market index money and the narrowest money supply M_1 (in trillion) from the Vietnamese Central Bank over the period from July 2000 to August 2010. The monthly market equity index and the narrowest money supply M_1 are

expressed in natural logarithmic values. The natural logarithmic values of the monthly market equity index and the narrowest money supply M_1 are denoted by EP_t and MS_t, respectively.

Throughout this study, EP_t and MS_t are referred to as the stock price index and the money supply. The difference between EP_t and MS_t is defined as the basis or the spread between stock price index and the money supply and is denoted by SP_t. Moreover, given a level of the stock price, a decrease in the money supply M_1, would widen the spread between the stock price and the money supply M_1: a widening of the basis. The opposite is true if the money supply M_1 changes in the other direction. The descriptive statistics reveal that the mean money supply during the sample period is 5.432 percent ranging from 4.358 percent to 6.401 percent with standard deviation being 0.595, while the mean stock price is 5.790 percent, ranging from 4.605 percent to 7.024 percent with is standard deviation being also 0.595. Their correlation is 72.19 percent.

THE LOGARITHMS OF VIETNAMESE STOCK PRICE INDEX, THE NARROWEST MONEY SUPPLY, AND THEIR SPREAD

July 2000 to August 2010
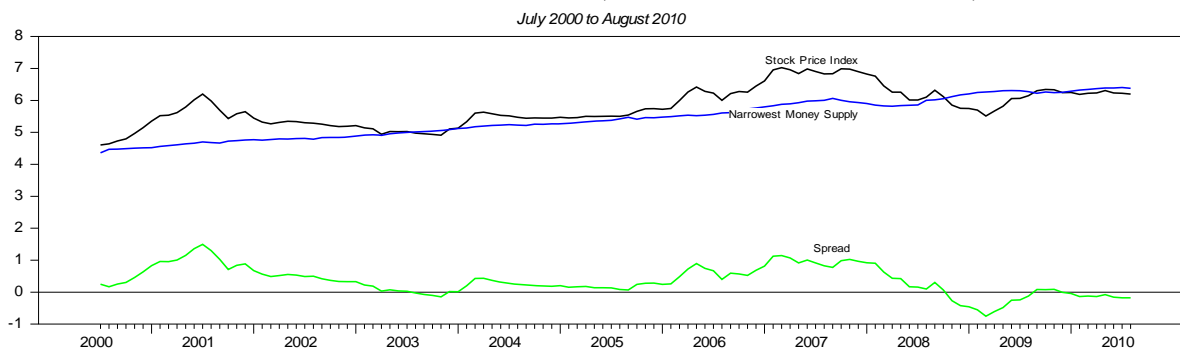
Source: *Vietnamese Central Bank, Bloomberg, and calculations by the author.*

Figure 1

4. Methodological Issues and Analytical Framework

4.1 Structural Break

Over time, every economy would experience many business cycles caused by internal and external shocks; therefore, countercyclical monetary policy measures would be used to bring the economy back to its long-run path. Consequently, the spread between stock the price index and the money supply is most likely to suffer some structure breaks. To search endogenously for the possibility of any structural break in the basis, this study utilized Perron's (1997) endogenous unit root test function with the intercept, slope, and the trend dummy, as specified by equation (1), to test the hypothesis that the spread between stock price index and the money supply has a unit root.

$$SP_t = \mu + \theta DU + \alpha t + \gamma DT + \delta D(T_b) + \beta SP_{t-1} + \sum_{i=1}^{k} \psi_i \Delta SP_{t-i} + \upsilon_t \qquad (1)$$

where t is a linear time trend; $DU = 1(t > T_b)$ is a post-break constant dummy variable; $DT = 1(t > T_b)$ is a post-break slope dummy variable; $D(T_b) = 1(t = T_b + 1)$ is the break dummy variable; and ε_t are white-noise error terms. The null hypothesis of a unit root is stated as $\beta = 1$. The break date, T_b, is selected based on the minimum t-statistic for testing $\beta = 1$ (see Perron, 1997).

4.2 Threshold Autoregressive (TAR) Model

Additionally, to further investigate the nature of the Granger causality between the Vietnamese equity index and the narrowest money supply, this study uses the threshold autoregressive (TAR) model, developed by Enders-Siklos (2001), that allows the degree of autoregressive decay to depend on the state of the spread between the logarithm values of the Vietnamese market equity and the narrowest money supply M_1 or the basis, i.e. the "deepness" of cycles. The estimated TAR model would empirically reveal if the basis tends to revert back to the long-run position faster when the spread is above or below the threshold. Therefore, the TAR model indicates whether troughs or peaks persist more when shocks or countercyclical monetary policy actions push the basis out of its long-run equilibrium path. In this model's specification, the null hypothesis that the basis contains a unit root can be expressed as $\rho_1 = \rho_2 = 0$, while the hypothesis that the basis is stationary with symmetric adjustments can be stated as $\rho_1 = \rho_2$.

The first step in the Enders-Siklos' (2001) procedure is to regress the spread between the logarithms of the stock price index and the money supply, SP_t, on a constant, a linear trend and an intercept dummy (with values of zero prior to the structural break date and values of one for the structural break date and thereafter), as specified by equation (2).

$$SP_t = \beta_0 + \beta_2 trend_t + \beta_3 Dummy_t + \varepsilon_t \qquad (2)$$

The saved residuals, ε_t from the estimation of equation (2), denoted by $\hat{\varepsilon}_t$, are then used to estimate the following TAR model:

$$\Delta\hat{\varepsilon}_t = I_t \rho_1 \hat{\varepsilon}_{t-1} + (1 - I_t)\rho_2 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta\hat{\varepsilon}_{t-p} + \hat{u}_t \qquad (3)$$

where $\hat{u}_t \sim i.i.d.(0,\sigma^2)$, and the lagged values of $\Delta\hat{\varepsilon}_t$ are meant to yield uncorrelated residuals.   As defined by Enders and Granger (1998), the Heaviside indicator function for the TAR specification is given as:

$$I_t = \begin{cases} 1 & if\ \hat{\varepsilon}_{t-1} \geq \tau \\ 0 & if\ \hat{\varepsilon}_{t-1} < \tau \end{cases} \tag{4}$$

The threshold value, τ, is endogenously determined using the Chan's (1993) procedure which obtains τ by minimizing the sum of squared residuals after sorting the estimated residuals in an ascending order, and eliminating 15 percent of the largest and smallest values.

The elimination of the largest and the smallest values is to assure that the $\hat{\varepsilon}_t$ series crosses

through the threshold in the sample period.   Throughout this study, the included lags are selected by the statistical significances of their estimated coefficients as determined by the *t-statistics*.

4.3 The Asymmetric Error-Correction Model

Moreover, to investigate the short-run asymmetric dynamic behavior between the stock price index and the money supply M_1, this study specifies and estimates the following asymmetric error-correction model.   The estimation results of this model can be used to study the nature of the Granger causality between the stock price index and the money supply. The empirically determined nature of the Granger causality will help to empirically evaluate the neoclassical and post-Keynesian hypotheses regarding the relationship between money supply M_1 and the stock price index in the last decade of the Vietnamese financial markets. Additionally, the following TAR-VEC model differs from the conventional error-correction models by allowing asymmetric adjustments toward the long-run equilibrium.

$$\Delta EP_t = \alpha_0 + \rho_1 I_t \hat{\varepsilon}_{t-1} + \rho_2 (1 - I_t)\hat{\varepsilon}_{t-1} + \sum_{i=1}^{n} \alpha_i \Delta EP_{t-i} + \sum_{i=1}^{q} \gamma_i \Delta MS_{t-i} + u_{1t} \tag{5}$$

$$\Delta MS_t = \tilde{\alpha}_0 + \tilde{\rho}_1 I_t \hat{\varepsilon}_{t-1} + \tilde{\rho}_2 (1 - I_t)\hat{\varepsilon}_{t-1} + \sum_{i=1}^{n} \tilde{\alpha}_i \Delta EP_{t-i} + \sum_{i=1}^{q} \tilde{\gamma}_i \Delta MS_{t-i} + u_{2t} \tag{6}$$

where $u_{1,2t} \sim i.i.d.(0,\sigma^2)$ and the Heaviside indicator function is set in accord with (4).   This

model's specification recognizes the fact that the stock price index (i.e. the investors, because the investors collectively determine the stock prices) respond differently depending on whether the basis is widening or narrowing, i.e. contractionay or expansionary monetary policy.

5. Empirical Results

5.1 Results of the Test for Structural Break

The estimation results of Perron's endogenous unit root tests are summarized in Exhibit 1. An analysis of the empirical results reveals that the post-break intercept dummy variable, *DU*, is positive and is insignificant at any conventional level. Also, the post-break slope dummy variable, *DT*, is negative and is significant at the 1 percent significant level. The time trend is negative but is insignificant at any significant level. The empirical results of these tests suggest that the spread between the logarithm values of the Vietnamese market equity index and the narrowest money supply M_1 or the basis followed a stationary process with a break date of October 2006, which may be attributable to the consequence of the aforementioned introductions of regulations into the equity markets earlier in the year. However, the $t(\alpha=1)=-4.26660$ is not sufficiently large to confirm the structural break. To definitely affirm this break, the Chow's test was carried out and the result confirms the suggested date of the structural break of basis. The confirmed structural break may be attributable to the aforementioned revision of The State Bank of Vietnam's monetary program for 2006 targets a deceleration of credit growth to 20 percent by end-2006.

Exhibit 1- Perron's Endogenous Unit Root Test, Vietnamese Data 2000:07 to 2010:08

$$SP_t = 0.10621 + 0.66238\,DU - 0.00007\,t - 0.00639\,DT - 0.16207\,D(T_b) + 0.77954\,SP_{t-1} + \upsilon_t$$

$$(1.86535) \quad (3.55872^*) \quad (-0.74365) \quad (-3.52851^*) \quad (-1.27014) \quad (15.08646^*)$$

No. of augmented lags: $k = 11$ Break Date: October 2006 $t(\alpha = 1) = -4.26660$

Notes*: Critical values for t-statistics in parentheses: Critical values based n = 100 sample for the break-date (Perron, 1997). "* " indicates significance at the 1 percent level.*

5.2 Results of Cointegration Test with Asymmetric Adjustment

To examine whether or not the logarithmic values of the stock price index and the money supply are co-integrated when allowing for asymmetric adjustments, the spread between the logarithms of stock price index and the money supply is regressed on a constant, a linear trend and an intercept dummy with values of zero prior to October 2006 and values of one for October 2006 and thereafter. The estimation results are reported in Exhibit 2.

Exhibit 2- Estimation Results for Equation, Vietnamese Data, July 2000 to August 2010

$$SP_t = 0.8389 - 0.0110\,Trend_t + 0.5117\,Dummy_t + \varepsilon_t$$

$$(10.0964^*) \quad (-6.0062^*) \quad (3.8564^{*)})$$

$lnL = $ -55.4629 $\overline{R}^2 = 0.2430$ DW statistic[a] = 0.1246 $F_{(2,119)} = 20.4171^*$

Notes*: "* " indicates significance at the 1 percent level.*

  (a) *As articulated by Enders and Siklos (2001, p. 166), in this type of model specification, ε_t may be contemporaneously correlated.*

The residuals from these estimations are used to estimate the TAR model specified by equations (3) and (4). The estimation results for the TAR model are reported in Exhibit 3.

Over all, the empirical results reveal that the null hypothesis of symmetry, $\rho_1 = \rho_2$, is soundly rejected at the 1 percent significant level based on the partial $F = 8.1516$, indicating statistically that adjustments around the threshold value of the basis - the difference between the natural logarithmic values of the Vietnamese stock price index and the money supply M_1- the basis - are asymmetric.

Additionally, The calculated statistic $\Phi_\mu = 5.5591$ indicates that the null hypothesis of no co-integration, $\rho_1 = \rho_2 = 0$, should also be rejected at the 1 percent significance level, confirming that the basis is stationary. With regard to the sationarity of the basis, Ewing, et al. (2006) pointed out that this simple finding of stationarity is consistent with the two underlying series comprising the basis being co-integrated in the *conventional, linear combination sense*.

Exhibit 3-Unit Root and Tests of Asymmetry, Vietnamese Data July 2000 – August 2010

ρ_1	ρ_2	τ	$H_0 : \rho_1 = \rho_2 = 0$	$H_0 : \rho_1 = \rho_2$	aic	sic
-0.6469[*]	-0.0522	0.35107	$\Phi_\mu = 5.5591$[*]	F = 8.1516[*]	-4.1191	-4.0030
	$Q_{(12)}=12.6100[0.3980]$		$\ln L = 81.8744$	$F_{(4,115)}=6.5453$*	DW = 2.1125	

Notes: *The null hypothesis of a unit root, $H_0 : \rho_1 = \rho_2 = 0$, uses the critical values from Enders and Siklos (2001, p. 170, Table 1 for four lagged changes and n = 500). * indicates the 1 percent level of significance. The null hypothesis of symmetry, $H_0 : \rho_1 = \rho_2$, uses the standard F distribution. τ is the threshold value determined via the Chan (1993) method. $Q_{(12)}$ denotes the Ljung-Box Q-statistic with 12 lags.*

These test results support the long held theoretical articulation of the co-integrating relationship between stock prices and money supply. The estimation results reveal that ρ_1 is significant at the 1 percent level, while ρ_2 is statistically insignificant at any conventional level. In fact, the point estimates suggest that the spread tends to decay at the rate of $|\rho_1| = 0.6469$ for $\hat{\varepsilon}_{t-1}$ above the threshold, $\tau = 0.35107$, and at the rate of $|\rho_2| = 0.0522$ for $\hat{\varepsilon}_{t-1}$ below the threshold.

Finally as mentioned above, the finding of $|\rho_1| > |\rho_2|$ indicates a *faster* convergence for positive disequilibrium than for negative disequilibrium. $\hat{\varepsilon}_{t-1} > 0.35107$ is indicative that the

decline in the money supply, as a result of the contractionary monetary policy, has widened the difference between the stock price and the money supply. This widening of their basis initiates a downward adjustment in the stock price. This result implies that the stock price adjusts faster to the threshold value when the Vietnamese Central Bank tightens money supply, widening the above defined basis than when the authority eases the money supply, narrowing the basis. These findings suggest that the equity investors and hence the stock prices are more responsive to contractionary monetary policy as reflected in the decline in the money supply M_1. These results suggest that the monetary policy affects the Vietnamese corporations and hence investors differently in different phases of the business cycles in the long run.

5.3 Results of the Asymmetric Error-Correction Models

Exhibit 4 summarizes the estimation results for the TAR-VEC model specified by equations (5) and (6) using natural logarithmic values of the Vietnamese stock price index and the monthly money supply M_1. In the summary of the estimation results, the partial F_{ij} represents the calculated partial *F-statistic* with the p-value in square brackets testing the null hypothesis that all coefficients *ij* are equal to zero. "*" indicates the 1 percent significant level of the *t-statistic*. $Q_{LB\ (12)}$ is the Ljung-Box statistic and its significance is in square brackets, testing for the first twelve of the residual autocorrelations to be jointly equal to zero. *lnL* is the log likelihood. The overall *F-statistic* with the p-value in square brackets tests the

overall fitness of the model. The retained estimated coefficients α_i, γ_i, $\tilde{\alpha}_i$, and $\tilde{\gamma}_i$ are

based on the 5 percent level of significance of the calculated *t-statistics*.

An analysis of the overall empirical results indicates that the estimated equations (5) and (6) are absent of serial correlation and have good predicting power as evidenced by the Ljung-Box statistics and the overall *F-statistics*, respectively.

As to the long-run adjustment, the statistical significances of the error correction terms and

$|\rho_1| > |\rho_2|$ in equation (5) indicate that the stock price asymmetrically responds to negative

and positive spreads. In fact, estimation results of the TAR-VEC reveal that stock price reverses to the long-run equilibrium faster when the Vietnamese Central Bank tightens the money supply M_1, widening the basis compared to ease monetary policy actions. With

regard to the long-term money supply M_1, the estimation results of equation (6) show $|\tilde{\rho}_2|$

$< |\tilde{\rho}_1|$. However, both $|\tilde{\rho}_1|$ and $|\tilde{\rho}_2|$ are not statistically significant at any conventional

level, indicating that the money supply does not respond to either the widening or the narrowing of the spread between stock price and the money supply in the long run. These empirical findings suggest that Vietnamese monetary policy makers have not been sensitive to equity market in the long run.

Exhibit 4- Asymmetric Error Correction Model, Vietnamese Monthly Data, 2000:07-2010:08

		Independent Variables			
Eq. (5)	*Overall* $F_{(11,88)} = 7.8268[0.0000]$; *lnL= 107.3700; $Q_{(12)}$ =6.47201[0.8905]; $\overline{R}^2 = 0.4314$*				
ΔEP_t	$\alpha_1 = \alpha_9 = \alpha_{11} = \alpha_{19} = \alpha_{21} = 0$	$\gamma_1 = \gamma_8 = \gamma_{19} = \gamma_{20} = 0$		ρ_1	ρ_2
	Partial $F_{11} = 9.4280[0.000]$	*Partial* $F_{12} = 8.5329[0.\ 000]$		-0.1484*	-0.0138
Eq. (6)	*Overall* $F_{(7,91)} = 7.7152[0.000]$; *lnL= 230.7142; $Q_{(12)}$ =15.5880[0.2108]; $\overline{R}^2 = 0.3242$*				
ΔMS_t	$\tilde{\alpha}_{12} = \tilde{\alpha}_{17} = \tilde{\alpha}_{22} = 0$	$\tilde{\gamma}_{10} = \tilde{\gamma}_{12} = 0$		$\tilde{\rho}_1$	$\tilde{\rho}_2$
	Partial $F_{21} = 5.1530[0.003]$	*Partial* $F_{22} = 21.2280[0.000]$		0.0053	0.0102

Notes: *Partial F-statistics for lagged values of changes in the lending rate and Central Bank discount rate, respectively, are reported under the specified null hypotheses. $Q_{(12)}$ is the Ljung-Box Q-statistic to test for serial correlation up to 12 lags. "*" indicates the 1 percent level of significance of the t-statistics.*

With regard to the short-run dynamic Granger causality between stock price and the money supply, the partial *F-statistics* in equation (5) reveals is a bi-directional Granger-causality from the money supply to the stock price, i.e., the stock price responds to both the its own lagged changes and the lagged changes of money supply as well. As to the empirical results for equation (6), the partial *F-statistics* suggest that the money supply responds not only to its own lagged changes but also to lagged changes of the stock price in the short run. Over all, the TAR- VEC estimation results seem to lend credence to the neo-classical in the long run and the Keynesian views in the short run on the causality between the market stock price and the money supply in the last decade.

6. Concluding Remarks

The standard neoclassical paradigm of financial economics assumes that investors react to noteworthy news events by adjusting their investment portfolios because these events change risk-return profile of securities. Therefore, a change in the growth rate of the money supply M_1 is an indicator of future macroeconomic conditions such as higher interest rate, sophisticated and unsophisticated investors alike will react according to their ability to access research information and reposition their portfolios. Consequently, the stock prices will move. The post-Keynesian school of economics posits that movements in money supply M_1 reflect the shift of money from long-term saving deposits to demand deposits and vice versa as a result of the preceding changes in stock prices. The results of this study empirically reveal both the neoclassical and the post Keynesian paradigm that there is a bidirectional Granger causality between the stock price index and the narrowest defined money supply. In

fact, their Granger Causality is asymmetric. This asymmetric relationship indicates that the counter cyclical monetary policies affect corporations differently in different phases of business cycles.

The empirical results reveal the existence of the asymmetric response of the stock prices to the changes in the money supply, which will in turn affect firms relying on equity market for funds differently than those using loans for their financial resources. Thus, policymakers should be aware that countercyclical monetary policy may have different effects due to the asymmetric behavior of stock prices in their formulation of monetary policy. Additionally, keeping pace with the age of globalization, the equity market has been increasingly internationalized; these findings may provide a better understanding of the countercyclical monetary policy and the equity market worldwide.

More specifically, the results reveal that the stock price adjusts faster to the threshold value when the Vietnamese monetary authority tightens the money supply, widening the basis than when the Central Bank eases the monetary policy, narrowing the basis. These findings suggest that the stock price is more responsive to contractionary monetary policy as reflected in the decline in the money supply M_1.

Most of studies of Vietnamese equity market are of micro-nature and detailed operations. The macro nature of the empirical results of this investigation would help policy makers to design and implement proper policy, investors to design their investment strategies, and corporate executives to determine their capital structures.

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