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EXCHANGE RATE AND STOCK PRICES INTERACTIONS IN KAZAKHSTAN

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Abstract

This study employs a sample from 1st October, 2007 to 31st December, 2017 from Kazakhstan Stock Exchange (KASE) to investigate the nature of the interaction between exchange rate sensitivity and stock market. First, we test the stationarity of time series using the ADF and PP tests. Additionally, the Johansen and Juselius cointegration procedures were employed for the bivariate as well as multivariate cases. Results of research demonstrated stationarity in differences of the time series and absence of long-run relationship between the variables in bivariate model. When the model is extended to incorporate money supply and reserves, results detect the evidence of cointegration. Moreover, Granger causality tests demonstrate strong bidirectional relationship between exchange rate and stock prices in Kazakhstan. Policy wise, the results suggest that monetary authorities in Kazakhstan in achieving their exchange rate policy objective could take into consideration stock market development.

Keywords: Stock Prices, Exchange Rate, Granger Causality, Cointegration

JEL Classifications: E58, F31, F43, Q43

1. Introduction

Financial markets play important role in boosting economic activity. As a result, economy's vulnerability to the exchange rate risk is of particular interest since fluctuations in the exchange rate can significantly affect the value of firms (Ibrahim, 2000). Consequently, the stock market and stock prices may be affected by changes in the exchange rate. Conversely, fluctuations in stock prices can impact the exchange rate through firms´ portfolio adjustments (Bahmani-Oskooee and Sohrabian, 1992). As a result, questions of whether exchange rate and stock markets are related and what is the nature of the relationship have been receiving extensive attention from researchers and practitioners. Yet, there is no the theoretical and empirical agreement on these issues.

There are two types of theoretical models, flow-oriented models and stock-oriented models that have been employed to investigate the interaction between exchange rate and stock market. According to the flow-oriented models (Dornbusch and Fischer, 1980), stock prices and exchange rates are negatively correlated. Moreover, these models assume that fluctuations in exchange rate cause fluctuations in stock prices[1]. On the other side, according to stock-oriented models (Branson, 1983), there is a positively relationship between stock prices and exchange

[1] In this case, the trade transmission channel takes place. Lower exchange rate improves the trade position of the country and facilitates the economic activity through firm profitability (Gregoriou *et al.* 2009).

rates. Additionally, these models assume that the changes in stock prices cause movements in exchange rates through capital account transactions[2]. If, however, both flow-oriented and stock-oriented approaches are empirically appropriate, a bidirectional relation exists between the two variables.

Moreover, beginning early 2000s, the economy of Kazakhstan was extensively growing with annual growth rate of nine percent on average with greatest part of this growth related to the export of commodities such as oil and natural gas. Since earnings from export of these commodities contribute significantly to the Kazakhstani growth rate, it is very important to investigate how movements of the exchange rate resulted by export revenues would affect stock prices (Agbor 2013). For sustainable development and growth of Kazakhstani economy, it is critical to comprehend the nature of interactions between stock market prices and exchange rates. Despite its development, the Kazakhstani stock market still deficiencies the depth and liquidity. As a result, higher stock prices in Kazakhstan are not expected to be followed by appreciation in the value of the Kazakhstani Tenge. At the same time, given significance of export to the growth rate of the Kazakhstani economy, it is expected that the exchange rate appreciate as a result of export revenues. This exchange rate appreciation would make Kazakhstani goods relatively more expensive on the international arena, reducing demand and cash flows for Kazakhstani companies. As a result, higher exchange rate would result in lower stock prices. This setting of the economy would give support to the flow-oriented model. The results of this study therefore might be very practical for policymakers as it provides extra understanding of the nature of the co-movement between stock prices and the exchange rate in Kazakhstan. For economies that have been developing their financial markets while moving toward more flexible exchange rate[3], which is a case of Kazakhstan, understanding of this issue is particularly fundamental.

The relationship between exchange rate and stock prices is of great importance for policymakers since fluctuations in equity returns and foreign exchange cause significant swings in international investment positions (Mak and Ip, 2017; Cenedese *et al.* 2016). International equity investors holding foreign stocks are usually exposed to exchange rate fluctuations therefore, the results of this research also matter to international investors. For investors, decision making related to hedging foreign exchange risk will depend, along with investment decision, on the relationship between equity and currency returns.

Still, despite the importance of interaction between stock market and exchange rate for economic development, there is a lack of empirical research on the nature of this relationship in Kazakhstan. This study aims at contributing to closing this gap in the literature and explaining the nature of the interaction between stock and currency returns.

The aims of this study, therefore, are two-fold. First, we add to scarce empirical research and broaden the evidence of the interaction between the exchange rate and stock market. The second objective of this research is to determine the strength and direction of the influence of Kazakhstani exchange rate on the Kazakhstani stock market.

Our results demonstrate that there is a causality running from exchange rates to stock prices and vice versa in Kazakhstan, demonstrating that exchange rate and stock prices mutually affect each other in the short run. This short run bi-directional causality might be explained by the fact that both exchange rate and stock market in Kazakhstan are Granger caused by money supply. The uni-directional causality from money supply to both the stock market index and exchange rate implies that the policies to stabilize exclusively the exchange rates market or the stock market may be insufficient for stabilizing the other markets. In this case, the joint cooperation of monetary, exchange rate and reserve policy are needed to achieve the stabilization goals. These short run results also hold over the long run horizon. Indeed, there is a cointegration among variables in the long run such that any deviations from the long-run path will be corrected through adjustments in exchange rate market. These results, therefore, indicate the important

[2] In this case, the higher demand for financial assets impacts the exchange rate. A bullish financial market signals prosperity of domestic economy, thereby causing capital inflows which force the exchange rate to appreciate (Kollias *et al.* 2012).

[3] See, for example, Abdalla and Murinde (1997), who conducted research for countries such as India, Korea, Pakistan, and the Philippines.

role of the exchange rate in Kazakhstani economy. Given the significance of export revenues to the growth profile of the Kazakhstani economy, the appreciation of exchange rate resulted by export revenues causes stock prices to fall.

This paper is structured as follows. Section 2 provides the literature review on this topic. Section 3 outlines the data used while section 4 provides methodology employed for analysis. Empirical results are reported and discussed in section 5. Finally, section 6 concludes.

2. Literature Review

There are several strands of literature related to the nature of the interaction between the stock market and the exchange rate. The first strand of literature is related to the theoretical framework of this relationship. There are two types of theoretical models; namely, flow-oriented models and stock-oriented models that have been employed to investigate the relationship between exchange rate and stock market. While flow-oriented models (Dornbusch and Fischer 1980) suggest that exchange rate changes cause changes in stock market, stock-oriented models (Branson 1983) advocate that changes in stock prices cause changes in the exchange rate. Summing up, the theoretical framework suggests that causality might be running both directions either from exchange rates to stock prices or from stock prices to exchange rates. As a result, theoretically there is no agreement on the nature of the interaction between exchange rates and stock prices.

The second strand of literature provides the empirical evidence on the specifics of interaction between the stock market and the exchange rate. The empirical research has looked at the long-run relationship and the short-run dynamics and employed different approaches including standard Granger (1969) causality test, Johansen (1991) cointegration approach, Toda and Yamamoto (1995) causality testing method, the Error Correction Model (Engle and Granger 1987), and Sims's (1972) version of Granger causality test. The empirical evidence of the interaction between stock prices and exchange rate is mixed supporting both theoretical models.

On one hand, extensive empirical research supports the traditional approach, which argues that movements in exchange rate result in stock price changes (Soenen, 1988; Nieh and Lee, 2001; Fang and Miller, 2002; Granger *et al.* 2000; Tang and Yao, 2018; Wong, 2017; Smyth and Nandha, 2003; Liang *et al.* 2015 among many others). On the other hand, ample empirical evidence lends support to the portfolio approach, suggesting that movements in stock market cause changes in exchange rates (See, for example, Smith 1992; Tang and Yao, 2018; Nieh and Lee, 2001; Stavarek, 2005; Yang and Doong, 2004; Lin, 2012 among many others).

Ramasamy and Yeung (2005) explain these mixed results by sensitivity of the interaction to the business cycle fluctuations and structural changes within an economy. Studies that found evidence in support of the portfolio approach mostly focused on developed countries (Ajayi and Mougouė 1996; Yang and Doong, 2004; Nieh and Lee, 2001; Stavarek, 2005). Following research in developed countries, the relationship between stock prices and exchange rates was also investigated in several emerging markets (Tang and Yao, 2018; Abdalla and Murinde, 1997; Tsen, 2016; Liang *et al.* 2015). Ajayi and Mougouė (1996) investigate the relationship between the exchange rates and stock market for two groups of economies: Advanced countries and Asian emerging markets. Their results for developed countries were in line with the stock-oriented model. However, the directions of causality for Asian emerging economies were mixed.

Some empirical studies provide evidence for both approaches, traditional and portfolio, suggesting bidirectional relationship between stock prices and exchange rates (See Chen and Chen, 2012; Lin, 2012; Bahmani-Oskooee and Saha, 2016; Granger *et al.* 2000; Fang and Miller, 2002). The research of Bahmani-Oskooee and Sohrabian (1992) was the first that found this bidirectional interaction between stock market and the exchange rate. Nieh and Lee (2001), who investigated stock prices and exchange rates for the G7 countries and found one-day significant linkages in some countries, reported similar bidirectional interaction between stock market and the exchange rate. Following research in developed economies, bidirectional interaction between exchange rates and stock prices was also determined for emerging economies (Granger *et al.* 2000; Yang and Doong, 2004). For example, Granger *et al.* (2000) examined the short-term dynamics between stock markets and exchange rates for several Asian countries during the Asian crisis.

Despite the theoretical framework for the relationship between exchange rates and stock prices, some research failed to find any kind of causality (Smyth and Nandha, 2003; Suriani *et al.* 2015; Granger *et al.* 2000; Chen and Chen, 2012). Granger *et al.* (2000) did not find evidence of any interaction between stock prices and exchange rates in Indonesia and Japan. Smyth and Nandha (2003) found a similar result for Bangladesh and Pakistan. Similar results for Pakistan were found by Suriani *et al.* (2015). Hatemi-J and Irandoust (2002) found similar results for Indonesia, the Thailand, Philippines, and Malaysia during the Asian crisis.

Most previous research on this topic had focused attention on developed markets or on comparisons between advanced and emerging economies. However, the Asian financial crisis of the late 1990s revived the interest to the nature of the relationship between exchange rate and stock markets in developing markets (Fang and Miller 2002; Hatemi-J and Irandoust 2002). For example, Fang and Miller (2002) examine the interaction between the stock market and exchange rate in Korea during the Asian financial crisis. Their findings suggest that currency depreciation highly influences the stock market performance.

Previous research assumed that exchange rate changes impacts stock prices in symmetric manner. Bahmani-Oskooee and Saha (2016) argue that influence of changes in the exchange rate on different firms varies significantly depending on whether these firms use imported inputs, or they are export oriented. As a result, they claim that changes in the exchange rate influence stock prices in asymmetric manner, though the influence is mostly short-run. Finally, Bahmani-Oskooee and Saha (2015) provide review and structure of all existing empirical literature and divide them into two groups of univariate and multivariate studies.

In conclusion, theoretical framework offers two types of interaction between the stock price and the exchange rate where direction of causality runs either from the stock price to the exchange rate or vice versa. On the other hand, empirical investigation has found four different types of relationship between exchange rate and the stock market: (1) from exchange rate to stock market, (2) from stock market to exchange rate, (3) bidirectional interaction, and finally, (4) no any correlation between exchange rate and stock market.

3. Data

This analysis first utilizes the bivariate case which was commonly employed by existing research (Bahmani-Oskooee and Saha, 2016; Abdalla and Murinde, 1997). Next, the multivariate framework is employed extending the analysis to include reserves and money supply (Bosupeng 2014; Bilson *et al.* 2001; Valcarcel 2012). It is argued that emerging stock markets are segmented from global capital markets (Bilson *et al.* 2001). As a result, in emerging markets local factors, such as money supply and inflation, rather than global are the main source of variation in equity returns (Valcarcel, 2012).

As a first step, all time series are transformed into natural logarithm values. Under this transformation, first differences correspond to growth rates. Monthly data for the period from January 2007 to December 2017 are utilized for this analysis. For stock prices (*sp*), end of the month values of Kazakhstani Stock Exchange index (KASE) are employed. The exchange rate is measured using values of the real effective exchange rate (REEX). This rate is calculated as a weighted average of the exchange value of Tenge against a basket of the most traded currencies. Money supply (*ms*) is characterized by monetary aggregate M2. Finally, the reserves (*res*) are characterized by official reserves minus value of gold. Data for stock price was obtained from official website of Kazakhstani Stock Exchange while exchange rate, money supply and reserves data were obtained from official website of National Bank of Kazakhstan.

The data demonstrates moderate and steady increase in the KASE index until 2004. The most noticeable turning point in the index was happening by the end of 2008, the most substantial one taking place in the February 2009. This is associated with the devaluation of domestic currency that took place on February 9, 2009. This coincided with all fluctuations taking place in the global financial markets as a result of financial crisis. The second devaluation of local currency happened in February 2014, which was followed by the change of exchange rate system in August 2015, when National Bank of Kazakhstan let domestic currency float freely. These devaluations along with the change of the exchange rate system could result in structural breaks of the data. The Chow test was implemented to check the presence of a structural changes in data. Results of Chow test revealed the existence of a structural breaks. Thus, three dummy variables are included into the model to capture these structural changes.

4. Methodology

This section offers a brief introduction to integration and cointegration techniques for analyzing the stationarity properties of the data as well as Granger causality tests for checking the direction of causation among variables.

4.1. Unit Root and Cointegration Tests

Vector autoregression model of order *p* is employed to investigate the dynamics between exchange rate and stock prices:

$$y_t = c + \sum_{i=1}^{p} F_i \, y_{t-i} + \varepsilon_t \quad (1)$$

where y_t is a (n × 1) endogenous variables vector, *c* is the (2× 1) intercept vector, F_i is the *i*-th (2 × 2) matrix of autoregressive coefficients, and finally $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ is the (2 × 1) white noise. In order to estimate parameters of the VAR, variables y_t should be covariance stationary. Thus, as a starting point to proceed with analysis, stationarity tests are employed. There are few root tests available to examine the stationarity properties of time series. In this analysis, two standard unit root tests, the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP), tests are employed as a prior diagnostic test. Examining the stochastic time series properties of exchange rate and stock price volatility in Kazakhstan before the estimation of the model enables us to evade the spurious results which are generally the outcome of non-stationary time series models. Test for stationarity is conducted as follows:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 \, trend + \sum \beta_j \Delta y_{t-j} + \mu_t \quad (2)$$

In case of non- stationarity of y_t and stationarity of first differences of variables, a vector error correction model (VECM) might be employed for modeling. VECM models are generally utilized in case of verified long-run interaction between the variables in analysis. To examine whether there exists the long-run interaction between the variables, the Johansen (1991) cointegration test is employed. The Johansen (1991) test examines the existence of cointegration through building a VECM:

$$\Delta y_t = c + \Phi y_{t-1} + \sum_{i=1}^{p-1} S_t \, \Delta y_{t-i} + \varepsilon_t$$

where $\Phi = \sum_{i=1}^{p} F_i - I_k$ and $S_t = -\sum_{j=i+1}^{p} F_j$

Estimates of S_i provide the short-run adjustments information, while estimates of Φ convey the long-run adjustments information. The quantity of cointegrating vectors is given by the cointegration rank in VECM. For the long run relationship between the variables to exist, the error correction term (y_{t-1} in the equation) should be negative and significant. The cointegrating rank of the system may range from 1 to n-1 (Greene 2018). There are two different test statistics, the maximum eigenvalue and the trace test statistic, that could be employed to formally test the cointegrating rank, *r*. According to Lutkepohl *et al.* (2001), the trace statistic is more powerful, thus is preferred to the maximum eigenvalue statistic.

Evidence of cointegration indicates the existence of a long-run interaction between the variables. In this case, any deviations from the long-run equilibrium will be corrected. If cointegration between variables exists, then the non-causality between them could be ruled out as the causality in Granger sense between them in at least one direction must be present (Miller and Russek 1991). Thus, in the presence of cointegration, there are two channels that might lead to movements in the variables under consideration. First channel demonstrates the short-run changes in one variable to the fluctuations in another variable. The second channel demonstrates the adjustments of the variables to deviations from the equilibrium path. However, if cointegration is not present, then there exists only one channel that demonstrates short-run interaction between variables.

4.2. Granger Causality Test

This section examines the short-run interrelations between the variables through the use of Granger causality models. If cointegration is not present, VECM is no longer required. In this case, the direction of causality between the variables could be tested through Granger causality tests. This could be examined based on the following equations:

$$\Delta sp_t = \alpha + \sum_{i=1}^{p_1} \delta_i \Delta sp_{t-i} + \sum_{i=1}^{p_2} \phi_i \Delta er_{t-i} + \varepsilon_t$$

$$\Delta er_t = \alpha + \sum_{i=1}^{p_2} \delta_i \Delta er_{t-i} + \sum_{i=1}^{p_1} \phi_i \Delta sp_{t-i} + \varepsilon_t$$

where *sp* is the stock price, *er* is the exchange rate. As both variables are non-stationary time series, both variables are expressed in differences. From the equation, the null hypothesis that exchange rate does not Granger cause the stock prices would imply $\sum_{i=1}^{p_1} \phi_i = 0$. The reverse causation from stock prices to the exchange rate could be similarly tested. From the test, four different possibilities could arise:

1. Granger causality from *sp* to *er*.
2. Granger causality from *er* to *sp*.
3. Bi-directional causality from *sp* to *er* and from *er* to *sp.*
4. No causality

The causality model for the multivariate case is expressed as:

$$\Delta sp_t = \alpha + \sum_{i=1}^{k_1} \delta_i \Delta sp_{t-i} + \sum_{i=1}^{k_2} \phi_i \Delta er_{t-i} + \sum_{i=1}^{k_3} \gamma_i \Delta ms_{t-i} + \sum_{i=1}^{k_4} \lambda_i \Delta res_{t-i} + \rho EC_{t-1} + \varepsilon_t$$

where *res* is the total reserves and *ms* is the money supply (M2). In the multivariate case, there is a cointegration between variables. Thus, the model includes the error correction term. Due to the presence of cointegration in multivariate case, there are two channels that might lead to changes in the variables under consideration. These channels are similar to ones in bivariate case, first channel demonstrating the short-run changes of one variable to the fluctuations in other variables. The second channel demonstrates the adjustments of the dependent variable to deviations from the equilibrium path.

5. Results

This section describes main results of integration and cointegration tests that were performed for analyzing the stationarity properties of data and Granger causality tests to reveal the direction of causality among variables.

5.1. Unit Root Tests

Table 1 presents the estimation results of unit root test. For determining the appropriate lag level, the Akaike's information criterion (AIC) was employed[4].

Panel (a) of the Table 1 demonstrates the test statistics for the levels and illustrates that the null hypothesis of unit root in the data cannot be rejected. Panel (b) of Table 1 demonstrates the test statistics for the first differences. From results of panel (b), the null hypothesis of unit root in the first differences of data is rejected in all cases. Thus, these results confirm that all the series are stationary in first differences.

Table 1. Unit Root Tests

	ADF Tests		PP Tests	
Series	No Trend	Trend	No Trend	Trend
	(a) Log-levels			
SP	-2.893**	-3.130*	-2.113	-2. 321
REER	-3.347*	-3.575*	-2.634*	-2.745
MS	-2.317	-0.251	-2.009	-0.457
RES	-1.751	-1.264	-1.719	-1.057
	(b) First Log-Differences			
SP	-2.793*	-2.795	-5.525***	-5.549***
REER	-4.416***	-4.365***	-6.218***	-6.174***
MS	-4.410***	-5.382***	10.144***	-10.747***
RES	-3.709***	-4.016***	-9.609***	-9.899***

Note: *, ** and *** represent 10%, 5% and 1% significance level respectively. SP: stock price, REER: exchange rate, RES: total reserves and MS: money supply (M2).

5.2. Cointegration Tests

After establishing that each of the series has a unit root in levels but is stationary in differences, the next step is to proceed with the cointegration analysis. Table 2 demonstrates the results of Johansen cointegration test. While panel (a) of Table 2 demonstrates the results for bivariate case, panel (b) presents results of multivariate case.

Table 2. Cointegration Tests

Maximum rank	LL	Eigenvalue	Trace statistic
	(a) Bivariate case		
r=0	241.507		27.499
r<=1	251.756	0.245	70.011
	(b) Multivariate case		
r=0	510.338		52.480
r<=1	525.993	0.34878	21.1702*
r<=2	531.333	0.13611	10.490
r<=3	535.125	0.09868	2.905
r<=4	536.578	0.03902	

Note: *, ** and *** represent 10%, 5% and 1% significance level respectively.

According to results in panel (a), the null hypothesis of absence of cointegration between exchange rate and stock price cannot be rejected. However, according to the results in panel (b) for multivariate case, the cointegration test provides support to the existence of cointegration among the four variables.

[4] Ivanov and Kilian (2001) argue that for monthly data, AIC is preferable over the the Hannan-Quinn information criterion (HQIC) and Schwarz's Bayesian information criterion (SBIC).

In sum, results of cointegration test suggest that in a bivariate case, there is no cointegration between exchange rates and stock prices. However, for a multivariate case results imply an existence of a long-run interaction between stock prices, exchange rates, money supply, and the volume of reserves. The presence of long-run interaction among series discards the non-causality between the variables, as the existence of cointegration implies that there must be a Granger causality among variables running in at least one direction.

5.3. Granger Causality Tests

In case when both non-stationarity and cointegration are present, the traditional asymptotic inference might be invalid. As a result, when some of the data series are non-stationary utilization of regular causality test for the levels might be misleading. For non-stationary level variables, Toda and Yamamoto (1995) offer approach to conduct the Granger causality test regardless of the cointegration among variables.

Table 3. Granger Causality Tests (Bivariate case)

Equation	Excluded	Todo-Yamamoto Test
REER	SP	14.783***
REER	ALL	14.783***
SP	REER	18.425***
SP	ALL	18.425***

Note: *, ** and *** represent 10%, 5% and 1% significance level respectively. SP: stock price, REER: exchange rate.

Results of Toda and Yamamoto tests to examine the causality in Granger sense among variables are presented in Tables 3 and 4. For bivariate case, the results of Toda and Yamamoto test are presented in Table 3, while results for multivariate case are presented in Table 4. According to results in Table 3, the null hypothesis of absence of Granger causality from the exchange rate to stock prices is rejected at the 1 percent significance level. Similarly, the null hypothesis of absence of causality from stock prices to the exchange rates is rejected at 1 percent significance level. According to these results, the causality between the stock prices and exchange rates runs in both directions. These findings, though, may not be conclusive due to the omitted variables bias.

The following results are obtained for multivariate case. The results confirm previous findings that in the Granger sense the causality between the exchange rates and stock prices runs in both directions. These results are in line with findings of Bahmani-Oskooee and Saha (2016) and lend an evidence for both approaches, traditional and portfolio, suggesting bidirectional relationship between stock prices and exchange rates. The importance of exchange rate in explaining the stock prices appears consistent with the significant role of the exchange rate in the policy process. Additionally, the money supply is causally connected with the effective exchange rates but without feedback effect. There is no presence of causality from aggregate reserves to exchange rates, however, the exchange rates are found to Granger cause the reserves. This result is consistent with the policy of National Bank of Kazakhstan that managed the exchange rate and used reserves to keep it within the announced bound. Also, results indicate the significance of monetary policy and volume of reserves in explaining the movements of Kazakhstani stock market. Particularly, the null hypothesis of absence no causation from money supply and reserves to stock prices is rejected at 1 percent significance level. From the results, there is no evidence that money supply reacts to stock prices, aggregate reserves or real exchange rate. Also, results indicate that the level of reserves is Granger caused by money supply, real exchange rate and stock prices.

Table 4. Granger Causality Tests (Multivariate case).

Equation	Excluded	Todo-Yamamoto Test
REER	SP	24.296***
REER	MS	9.993**
REER	RES	7.19
REER	ALL	48.911***
SP	REER	8.872*
SP	MS	14.812***
SP	RES	18.909***
SP	ALL	52.932***
MS	REER	6.973
MS	SP	3.301
MS	RES	4.067
MS	ALL	24.824**
RES	REER	10.131**
RES	SP	20.072***
RES	MS	16.005***
RES	ALL	54.057***

Note: *, ** and *** represent 10%, 5% and 1% significance level respectively. SP: stock price, REER: exchange rate, RES: total reserves and MS: money supply (M2).

However, when cointegration is present among variables, Toda-Yamamoto test is inefficient in comparison with VECM which considers cointegration explicitly. Moreover, Toda-Yamamoto test fails to differentiate between short run and long run causality. Therefore, for multivariate case, the VECM is also performed and its results are presented in Table 5.

Table 5. Adjustment Parameters of VECM

REER	-0.23***
SP	0.41***
MS	0.24***
RES	0.12

Note: *, ** and *** represent 10%, 5% and 1% significance level respectively.SP: stock price, REER: exchange rate, RES: total reserves and MS: money supply (M2).

Table 5 demonstrates results of VECM and conveys the long-term interaction among variables. According to results in Table 5, the parameters of the error correction term, which characterizes another channel of causality, signify the earlier conclusions of cointegration between the variables. Results of VECM imply that in multivariate case any deviations from the long-run equilibrium will be corrected through adjustments in exchange rate market. The results demonstrate that about 23 percent of the deviations from the long-run path are corrected the next month by the decline in real effective exchange rates. The results from the vector error correction model demonstrate that stock market also adjusts to correct for disequilibrium, and about 41 percent of the deviations from the long-run path are corrected the next month by the increase in stock prices. Additionally, the results of VECM suggest that the money supply also adjusts to the deviations from the long-run level. The level of reserves, however, was not found to adjust to deviations from its long-term path.

6. Conclusions

This paper seeks to address the question of whether local macroeconomic variables have explanatory power over stock returns in emerging markets. In particular, this paper has investigated the interaction between two important components of an economy and examined whether the real exchange rate of Tenge and Kazakhstani Stock Exchange index are related to each other. The study employed standard Toda-Yamamoto test for Granger causality and cointegration test to investigate the interaction between exchange rates and stock market index for Kazakhstan. Analysis was conducted for both bivariate and multivariate cases. The results from the bivariate model demonstrate the absence of long-run interaction between the stock market index and the exchange rates. That implies the absence of long-run co-movement between the variables. Moreover, in bivariate case, none of the variables could be predicted by past values of another variable. In the absence of cointegration between the variables, we employ the Toda-Yamamoto test to check for causality in Granger sense between stock prices and exchange rates. Results demonstrate the bi-directional causality between stock prices and exchange rates such that exchange rates Granger cause stock prices and stock prices Granger cause exchange rates. The absence of cointegration in bivariate case may be explained by omission of important variables from the model.

For the multivariate case, the following results are obtained. First, results of this research provide evidence for both approaches, traditional and portfolio, in Kazakhstan suggesting bidirectional relationship between stock prices and exchange rates. Second, money supply Granger causes both the stock prices and exchange rates. Additionally, stock prices are Granger caused by reserves. Moreover, when the model is extended to include the money supply and reserves, there is a cointegration among variables. Third, any deviations from the long-run path will be corrected through adjustments in exchange rate market. These results, therefore, indicate the important role of the exchange rate in Kazakhstani economy. Although the Kazakhstani Tenge was pegged to a basket of currencies, up to the August of 2015, it was effectively tied to the US Dollar. The changes in the US Dollar were generally employed as movements in the exchange rate policy of the National Bank of Kazakhstan. In August 2015, the National Bank of Kazakhstan changed the exchange rate system and let Tenge float freely. Additionally, most of international transactions are conducted in the U.S. Dollar making Kazakhstani economy highly dependent on it. The changes in the rate reflect the competitiveness of Kazakhstani exports on international arena. Given significance of export revenues to the growth profile of the Kazakhstani economy, it is expected that appreciation of exchange rate resulted by export revenues would cause stock prices to fall. On the other hand, the Kazakhstani Stock Exchange index does Granger-cause the real exchange rate of Tenge. As a result, fluctuations of Kazakhstani Stock Exchange index will bring up changes in the exchange rate. All these factors may explain the presence of a short-run causality between exchange rate and stock market in Kazakhstani economy. These results also support the conclusions of Ma and Kao (1990), who claim that an appreciation of the currency of export-oriented countries negatively influences the domestic stock markets in these countries. The uni-directional causality from money supply to both the stock market index and exchange rate implies that the policies to stabilize exclusively the exchange rates market or the stock market may be insufficient for stabilizing the other markets. In this case, the joint cooperation on monetary, exchange rate and reserve policy are needed to achieve the stabilization goals.

For policymakers, the relationship between stock prices and exchange rate is of big importance since fluctuations in foreign exchange and equity returns cause significant swings in international investment positions. Our findings imply that policy-wise, monetary authorities in Kazakhstan in attaining their exchange rate policy objective should be considering the implications for the financial market. These results are important to regulatory exchange authorities when deciding on a policy to improve the market conditions. The results of this research also matter to international equity investors since investors holding foreign stocks are usually exposed to exchange rate fluctuations. For investors, decision making related to hedging foreign exchange risk will depend, along with investment decision, on the relationship between equity and currency returns.

The study opens a possible avenue for further research. New variables possibly can be included, or the same study can be done in other emerging countries such as Russia, Belarus or Kyrgyzstan. The practical implication is that regulator in Kazakhstan should be informed about such a correlation among money supply, reserves, exchange rate and stock prices in a local market.

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