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STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM KAZAKHSTAN

Evgeny V. ILYUKHIN
PhD in Biology, Associate Professor,
Department of Economics, Management and Informatics,
Institute of Aviation Technology and Management
(Ulyanovsk State Technical University),
Ulyanovsk, Russian Federation
evgeny.ilyukhin@gmail.com

The study examines a causal relationship between the stock market and economic growth variables for Kazakhstan. The stock market is found to promote economic growth in the country but the causation between the variables is not always significant. Consistent efforts are required on the part of the Kazakhstan authorities in order to ensure well-organized and competent operation of the stock market because the more efficient market attracts investors. For example, it can be achieved through stimulation of trading activities in the Kazakhstan Stock Exchange.

Keywords: stock market development, economic growth, causality relationship, policy implications

Introduction

The limited capital availability or its ineffective usage is the point of problems of Kazakhstan's economic development. Stock markets can play an important role by providing capital and stimulating its effective use in order to promote economic growth. Some countries are heavily dependent on the stock market development level while regulating economic development. Despite evidence from different countries where the relationship between stock market development and economic growth has been almost unequivocally established, it is not yet discovered for Kazakhstan. Both academicians and practitioners clearly feel a lack of researches and materials in the Kazakh context that would be based on reliable statistics. It provides the reason for conducting this study. As a result, the subject is still important for studying and discussing at the present time. In the context of the study, it aims to assess the contribution of the Kazakhstan stock market to economic growth. The studies on similar cases of countries are presented below.

Caporale *et al* investigated a sample of four countries (Chile, Malaysia, Philippines and South Korea) over the period from 1971:Q1 to 1998:Q4 using a vector autoregressive (VAR) framework based on an endogenous growth model. They find the significance of causality between the stock market components, investment and economic growth in line with the model [3].

Examining a relationship between stock market performance and economic growth in Iran with causality tests, Oskooe discovers the short-run causality between stock prices and economic growth. It would mean that stock market is the main economic indicator of the Iranian economic growth in the short run [6].

Studying the stock market development and economic growth measures from Nigeria over the period from 1990:Q1 to 2009:Q4 and employing cointegration and vector error correction (VEC) model, Adenuga finds that the indicators used to describe the country's stock market development are significant and positively related to economic growth. In addition, the author notes that the simplified trading promotes investment, facilitates efficient capital allocation and stimulates the long-run economic growth [1].

Regmi provides evidence of a causal relationship between stock market development and economic growth for Nepal over the period from 1994 to 2011. Using a unit root test, cointegration, VEC model and NEPSE composite index as a stock market development indicator, the author discovers that stock market development significantly contributes to economic growth of the country [7].

Methods

In order to study the impact of stock market development on economic growth in Kazakhstan, quarterly data with a sample period from 1997:Q1 to 2012:Q4 are adopted. The matrix proposed by Boot, Feibes and Lisman is used in order to translate annual data into quarterly data [2]. The point is to assure that enough data for analysis are obtained. The measures are calculated on the basis of available data of the World Bank Indicator. The estimates are conducted using econometric computer software package GRETL.

In this study, a quantitative analysis of the short-run impact is based on VAR and considered as 'Granger causality'. This kind of causality does not necessarily mean causality relationship but the fact that a change in one factor precedes a change in another one.

The tests are carried out on the basis of equations 1 and 2:

$$Y_t = \alpha_0 + \sum_{i=1}^{k_1} \alpha_i Y_{t-i} + \sum_{i=1}^{k_2} \beta_i X_{t-i} + \varepsilon_t,$$

$$X_t = \gamma_0 + \sum_{i=1}^{k_3} \gamma_i Y_{t-i} + \sum_{i=1}^{k_4} \delta_i X_{t-i} + \upsilon_t,$$

where X is a stock market development indicator, Y is economic growth and the subscripts t and t-i denote the current and lagged values. The lag length is determined based on Akaike (AIC), Schwarz (SIC), Hannan-Quinn (HQC) criteria.

Based on the previous studies, a multivariate model is adopted with some changes in order to take into consideration the specifics of Kazakhstan's economy and start testing the long-run relationships between the model variables [1, 4]. The stock market variables [(tv), (lc) and (mc)] in equation 3 are entered into the model.

$$EG = \beta_0 + \beta_1 \pi + \beta_2 ir + \beta_3 sr + \beta_4 (tv) +$$
$$+\beta_5 (lc) + \beta_6 (mc) + \beta_7 cf + \beta_8 cpr + \varepsilon_t.$$

The model includes the following variables:

Economic Growth (***EG***)/GDP growth (annual %): it is measured by the rate of change in real GDP. According to the demand-driven hypothesis, economic expansion will create new demand for financial services. An increase will stimulate setting up the larger and more sophisticated financial institutions to satisfy new demand for their services.

Macroeconomic Stability (***π***, ***CPI***)/Inflation, consumer prices (% per annum): it is measured as the consumer price level, CPI (inflation). It is known that a low inflation can stimulate investors to pay more attention to economy.

Investment Ratio (***ir***)/Gross fixed capital formation (% of GDP): it is calculated as gross fixed capital formation divided by nominal GDP. According to the endogenous economic theory, investments are positively related to economic growth.

Savings Ratio (***sr***)/Gross savings (% of GDP): it is calculated as gross domestic savings as a percentage of GDP. Gross savings are calculated as gross national income less total consumption, plus net transfers. Usually, larger savings lead to higher availability of capital that could flow through stock market.

Turnover velocity (***tv***): it is the ratio of turnover to market capitalization. It is necessary to find the market development indicators that are independent of stock prices. Given that the market role is to reallocate capital among its most productive users, such an indicator would be appropriate.

Change in the number of listed companies (%) (***lc***): it is calculated as annual percentage of increase/decrease in the number of listed domestic companies. It would be an indication of financial deepening for country.

Market capitalization of listed companies (% of GDP) (***mc***): it is the stock price times the number of outstanding shares of the companies listed in the country's stock exchanges except for investment companies, mutual funds or other collective investment.

Capital flows/Foreign direct investment, net inflows (% of GDP) (***cf***): it is measured using foreign direct investment as a percentage of GDP. It is associated with institutional and regulatory reforms, adequate disclosure, listing requirements and fair trading procedures.

Banking sector development/Domestic credit provided by the financial sector (% of GDP) (***cpr***): it is the value of domestic credit provided by the banking system to the private sector in relation to GDP. It measures the banking system activity in one of its main function: directing savings.

The expectations for the variables are presented as:

$\beta_1 < 0; \beta_2; \beta_3, ..., \beta_8 > 0.$

Augmented Dickey-Fuller (ADF) specification for unit root involves the estimation of one of the following equations (4, 5 and 6) respectively [8]:

$$\Delta X_t = \beta X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-j} + \varepsilon_t,$$

$$\Delta X_t = \alpha_0 + \beta X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-i} + \varepsilon_t,$$

$$\Delta X_t = \alpha_0 + \alpha_1 t + \beta X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-i} + \varepsilon_t.$$

In order to ensure that the errors are uncorrelated, the additional lagged terms are included. The allowed maximum lag length is four and proceeds to the appropriate lag by checking the mentioned information criteria. The null hypothesis is that the variable X_t is a non-stationary series (H_0: $\beta = 0$) and is rejected when β is significantly negative (H_a: $\beta<0$). If the calculated ADF statistics is higher than critical values, then the null hypothesis (H0) is rejected and the series is stationary or integrated of order zero I(0). Alternatively, non-rejection of the null hypothesis implies non-stationarity leading to the test for the difference of the series until stationarity is reached and the null hypothesis is rejected.

The cointegration tests are conducted using the maximum likelihood framework [5]. The point is to find whether the long-run relationship exists between the variables. The appropriate optimal lag-length is determined in order to get standard normal error terms. Whereas quarterly data are used, six lags are initially allowed. In the test, SIC is preferred due to its more strict theoretical support.

If the variables of economic growth equation are cointegrated, it is necessary to estimate the short-run dynamics within VEC model for capturing the adjustment speed to equilibrium in the case of any shock to any of the independent variables.

The generalized specification framework of VEC model is expressed and extended for the three models in equation:

$$\Delta EG = \beta_0 + \sum_{i=1}^{k-1}\beta_i \Delta eg_{t-i} + \sum_{i=0}^{k-1}\alpha_i \Delta \pi_{t-i} +$$

$$+\sum_{i=0}^{k-1}\chi_i \Delta ir_{t-i} + \sum_{i=0}^{k-1}\delta_i \Delta sr_{t-i} + \sum_{i=0}^{k-1}\phi_i \Delta (tv)_{t-i} +$$

$$+\sum_{i=0}^{k-1}\varphi_i \Delta (lc)_{t-i} + \sum_{i=0}^{k-1}\gamma_i \Delta (mc)_{t-i} +$$

$$\sum_{i=0}^{k-1}\eta_i \Delta cf_{t-i} + \sum_{i=0}^{k-1}\kappa_i \Delta cpr_{t-i} + \Omega ecm_{t-1} + \varepsilon_t,$$

Δ is the first difference of the series.

β_0, β_i, α_i, χ_i, δ_i, ϕ_i, φ_i, γ_i, η_i, κ_i and Ω is the model estimated parameters.

Results

Table 1 shows the summary statistics for the variables. The means range from 0.021505 for *cf* to 6.7500 for *cpr*. It indicates that the variables exhibit significant variation in runs of magnitude, suggesting that estimation at the levels may introduce some bias in the results. The Jarque — Ber statistics is significant except for *ir EG*, *sr* and *cf*. The refore, the null hypothesis that the series are normally distributed can be rejected.

The numbers in *Table 2* demonstrate that there is an inverse relation between *lc* and the rest of variables. They also indicate that *mc* and *tv* variables are positively related to other variables except for *lc*.

Causality tests in context of the standard VAR procedure with the null hypothesis of that stock market does not cause *EG*, find some causations in the proposed models. The estimates are presented in *Table 3*. Model C with *mc* included indicates notable results: there is rather strong positive causality between *mc*, *cpi*, *ir*, *sr* and *cpr* especially. Another causality for *cpr* is related to Model A with *tv* included. It is worth noting that *mc* and *tv* can influence economic growth through other variables.

The results of the ADF test presented in *Table 4* show that *ir*, *sr*, *lc* and *cpr* are stationary at the levels while the rest of variables are non-stationary at the levels (I(0) series). However, the second group of variables becomes stationary after the first difference. It indicates they are I(1) series.

Based on the figures from *Table 5* representing unrestricted rank of cointegration test results, it can

Table 1

Summary Statistics of Variables

Indicator	CF	CPI	CPR	EG	IR	LC	MC	SR	TV
Mean	*0.021505*	*2.2737*	*6.7500*	*1.6953*	*5.7812*	*0.11344*	*0.050573*	*6.0938*	*2.0199*
Median	0.020982	1.9271	5.0902	1.7945	5.7494	0.039810	0.028387	6.0023	1.4072
Minimum	0.005634	0.64638	0.82161	–0.51431	2.0224	–0.22623	0.0068799	1.7696	0.0000
Maximum	0.047523	6.5636	20.587	4.0344	11.311	1.3534	0.20336	12.066	6.5211
Std. Dev.	0.009806	1.2230	4.8676	1.1894	2.2003	0.31163	0.045594	2.4416	1.7875
Skewness	0.057367	1.7105	0.96733	0.038724	0.39501	3.1166	1.4449	0.49117	1.0197
Kurtosis	–0.28831	3.2417	0.24416	–0.85142	–0.28031	9.0483	1.6371	–0.26265	0.078599
Jarque–Ber	3.73206	59.2323	10.1402	1.94909	1.87388	321.929	*29.4151*	*2.75724*	*11.1069*
5% percentile	0.0086477	0.84123	1.3926	–0.43569	2.2752	–0.11163	0.0094415	2.6168	0.0000
95% percentile	0.038889	5.0406	15.839	3.6856	10.463	1.1466	0.15389	10.934	5.8303
Interquartile range	0.014465	1.0684	7.7413	1.9368	2.9542	0.11568	0.064539	3.4921	2.2102
Observations	64								

Table 2

Correlation Matrix

Indicator	CF	CPI	CPR	EG	IR	LC	MC	SR	TV
CF	1.0000	0.4901	0.5219	0.3734	0.7499	*–0.2151*	*0.4067*	0.6484	*0.4682*
CPI	0.4901	1.0000	0.2812	0.0902	0.4342	*–0.0047*	*0.1734*	0.4553	*0.1240*
CPR	0.5219	0.2812	1.0000	0.0996	0.6835	*–0.3123*	*0.7651*	0.7628	*0.3049*
EG	0.3734	0.0902	0.0996	1.0000	0.5751	*–0.3918*	*0.1245*	0.5689	*0.5281*
IR	0.7499	0.4342	0.6835	0.5751	1.0000	*–0.1884*	*0.6404*	0.9452	*0.6013*
LC	–0.2151	–0.0047	–0.3123	–0.3918	–0.1884	*1.0000*	*–0.2404*	–0.2384	*–0.1950*
MC	0.4067	0.1734	0.7651	0.1245	0.6404	*–0.2404*	*1.0000*	0.6050	*0.2326*
SR	0.6484	0.4553	0.7628	0.5689	0.9452	*–0.2384*	*0.6050*	1.0000	*0.5397*
TV	0.4682	0.1240	0.3049	0.5281	0.6013	*–0.1950*	*0.2326*	0.5397	*1.0000*

Table 3

Causality Test in the Context of VAR

Direction	F-Value	Causality	Lag	Obs
Model A				
TV Causes EG	0.00053231	N	1	63
TV Causes CPI	1.4616	N	1	63
TV Causes IR	2.0226	N	2	62
TV Causes SR	2.1482	N	2	62
TV Causes CF	1.2574	N	2	62
TV Causes CPR	3.5652*	Y	2	62
Model B				
LC Causes EG	1.4686	N	2	62
LC Causes CPI	0.57362	N	2	62
LC Causes IR	0.92161	N	2	62
LC Causes SR	0.65551	N	2	62
LC Causes CF	0.96829	N	2	62
LC Causes CPR	0.0098679	N	2	62
Model C				
MC Causes EG	0.00026627	N	1	63
MC Causes CPI	4.3359*	Y	1	63
MC Causes IR	3.3160*	Y	2	62
MC Causes SR	3.8832*	Y	2	62
MC Causes CF	0.042388	N	1	63
MC Causes CPR	5.0434**	Y	2	62

Note: **, * represents 1% and 5% level of significance.

Table 4

ADF Unit Root Test

Variable	Level	1st Difference	Remarks
EG	–2.8406	–3.89341**	I(1)
CPI	–3.32439	–4.24127**	I(1)
IR	–4.47917**		I(0)
SR	–4.21533**		I(0)
TV	–2.91025	–4.56586**	I(1)
LC	–3.80284**		I(0)
MC	–2.97444	–4.2563**	I(1)
CF	–3.39101	–4.2563**	I(1)
CPR	–3.18065*		I(0)

Note: **, * represents 1% and 5% level of significance.

be concluded that there is the long-run relationship between the variables. It is indicated with at least one existing cointegrating vector in the models. The long-run in economic growth equitation can be interpreted by normalizing the estimates of the unconstrained cointegrating vector to economic growth. The parameters of the cointegrating vectors for the long-run economic growth are presented in the *ecm* equations for each model.

Table 6 presents the *ECMs* for the models with *tv*, *lc* and *mc* included as measures of stock market development demonstrating that the previous quarter's disequilibrium gets adjusted up to the long-run equilibrium from 5.81 percent (Model A) to 367.09 percent (Model C) within a quarter. In other words, the coefficient of the error correction which measures the speed of adjustment back to equilibrium whenever the system is out of equilibrium indicates that an adjustment can be both relatively slow and notably fast. The R^2 measures indicate that the variation in economic growth is explained by the final variables that entered into the model and ranges between 64–71 percent. The F-test statistics shows that the overall model fit is significant at around 1.0 percent. The error correction run in the economic growth equation is statistically significant with a correct negative sign.

Conclusions and Policy Implications

The stock market development and economic growth of Kazakhstan over the period from 1997:Q1 to 2012:Q4 have been examined. The three stock market variables in the short- and long-run are not always significantly related to the economic growth variables. Whereas the stock market is a tool for economic growth for purposes of the study, I would recommend integrating the stock market into the entire economic system of the country while designing economic policies. The key policy implication is that the country needs a well-organized stock market so to accelerate and maintain economic growth. Therefore, Kazakhstan's authorities should make consistent efforts to create such a stock market because a more efficient market attracts investors. It

Table 5

Cointegration Tests

Rank (H_0)	Trace Statistics	p-value	Rank (H_0)	Max Eigen Stat	p-value
Model A (1 lag)					
r = 0	94.071	0.5980	r = 0*	47.546	0.0103
r ≤ 1	46.525	0.9812	r ≤ 1	21.122	0.8277
r ≤ 2	25.403	0.9965	r ≤ 2	8.6205	0.9989
r ≤ 3	16.783	0.9696	r ≤ 3	6.6446	0.9928
r ≤ 4	10.138	0.8402	r ≤ 4	5.6619	0.9090
r ≤ 5	4.4763	0.6368	r ≤ 5	2.8422	0.2355
*ECM*1 = *EG - 1.3102tv - 15.339cpi + 7.4008ir — 7.4735sr + 738.51cf + 1.1648cpr*					
Model B (1 lag)					
r = 0	96.333	0.3178	r = 0*	49.920	0.0045
r ≤ 1	46.413	0.9818	r ≤ 1	15.078	0.9903
r ≤ 2	31.336	0.9595	r ≤ 2	12.746	0.9638
r ≤ 3	18.589	0.9345	r ≤ 3	7.9067	0.9763
r ≤ 4	10.683	0.8043	r ≤ 4	2.8263	0.8067
r ≤ 5	4.3639	0.6525	r ≤ 5	1.5376	0.2513
*ECM*2 = *EG — 2.3903lc — 3.5009cpi + 1.3705ir — 1.1219sr + 162.06cf + 0.057920cpr*					
Model C (1 lag)					
r = 0*	120.45	0.0117	r = 0*	57.228	0.0003
r ≤ 1	63.218	0.5909	r ≤ 1	28.904	0.3113
r ≤ 2	34.314	0.9054	r ≤ 2	14.746	0.8998
r ≤ 3	19.568	0.9072	r ≤ 3	8.1368	0.9716
r ≤ 4	11.431	0.7501	r ≤ 4	6.9071	0.8134
r ≤ 5	4.5238	0.6302	r ≤ 5	2.8335	0.8057
*ECM*3 = *EG — 128.25mc — 7.5849cpi + 9.7202ir — 7.4483sr — 1.9577cf +1.5539cpr*					

Note: r — number of cointegrating vectors. Tests find either 1 cointegating equation in trace test at the 0.05 level or 1 cointegrating equation in max-eigen test. *denotes rejection of the hypothesis at the 0.05 level.

Table 6

Estimates of Error Correction Models

Variable	Coefficient	Std. Error	t–Statistics	p–value
Model A				
const	0.615985	0.479098	1.286	0.20871
d(EG(–3))	–0.501082	0.219728	–2.2805	0.03011**
d(CPI(–3))	0.542735	0.266746	2.0347	0.05112*
ECM1	–0.058143	0.0551256	–1.0547	0.30025
*R*I = 0.681642; *F-test* = 12.8891				
Model B				
const	0.0160957	0.160596	0.1002	0.92086
d(EG(–2))	–0.504508	0.24254	–2.0801	0.04646**
d(EG(–3))	–0.644194	0.236085	–2.7287	0.01069**
d(CPI(–1))	–0.491831	0.276411	–1.7793	0.08567*
d(CPR(–3))	–0.224105	0.128328	–1.7464	0.09134*
ECM1	–0.221882	0.489755	–0.453	0.65389
*R*I = 0.714166; *F-test* = 13.94212				
Model C				
const	5.52631	6.60074	0.8372	0.40909
d(EG(–3))	–0.467279	0.220545	–2.1187	0.0425**
d(CPI(–3))	0.591244	0.334585	1.7671	0.08739*
d(IR(–4))	–0.656624	0.385112	–1.705	0.09853*
d(CPR(–3))	–0.300717	0.167125	–1.7994	0.08203*
ECM1	–3.67092	4.90158	–0.7489	0.45973
*R*I = 0.641432; *F-test* = 12.79586				

Note: **, * represents 5% and 10% level of significance.

can be achieved through stimulating trading activities in the local stock exchange.

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