Cointegration And The Causality Between Stock Prices And Exchange Rates Of The Korean Economy
Introduction

- The relationship between stock prices and exchange rates in Korea.
- Two time series are cointegrated by the Engle-Granger two-step cointegration test.
- Exchange rates may share many of the general behavioral characteristics of the prices of assets that are traded on organized exchanges, such as common stocks, long-term bonds.
- The prices of assets traded in organized markets suggest that there could be some common elements in the behavior of such prices.
Data

• Monthly data on the stock market indices obtained from Korean Stock Exchange Market and exchange rates of the won-dollar are obtained from International Financial Statistics.
• The period of 1980:1 to 1997:7.
• A sample of the 100 monthly stock market index and exchange rates.
Methodology and Results

Unit root tests
- ADF tests
- KPSS tests

Cointegration tests
- Engle-Granger two-step
### Table 1: Unit Root Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF test&lt;sup&gt;a&lt;/sup&gt;</th>
<th></th>
<th>KPSS test&lt;sup&gt;b&lt;/sup&gt;</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levels</td>
<td>First-differences</td>
<td>Levels</td>
<td>First-differences</td>
</tr>
<tr>
<td>EX</td>
<td>-1.782 (9)</td>
<td>-4.478 (2)&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.740&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.458*</td>
</tr>
<tr>
<td>SP</td>
<td>-1.265</td>
<td>-14.735&lt;sup&gt;***&lt;/sup&gt;</td>
<td>3.747&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.295</td>
</tr>
</tbody>
</table>

Notes: ***, * denote significance at the 1 percent and 10 percent level, respectively. EX is the exchange rate between won and the U.S. dollar and SP is the stock price in Korea. These variables are expressed in logarithm.

<sup>a</sup> ADF test: Numbers in the table are the pseudo-t-statistics for testing the **null hypothesis that the series is nonstationary**. The critical values of the ADF test statistic with a constant are -3.464, -2.876, and -2.574 at the 1 percent, the 5 percent, and 10 percent, respectively. Lag length $k$ in parentheses is selected such that the Ljung-Box Q-statistic fails to reject the null hypothesis of no serial correlation of the residuals.

<sup>b</sup> KPSS test: The **null hypothesis is that the series is stationary**. The reported test statistics are computed using lag length that equals 4. The 1 percent, 5 percent, and 10 percent critical values are 0.739, 0.463, and 0.347, respectively.
Table 2: Estimation Of Error-Correction Model

<table>
<thead>
<tr>
<th>Depend</th>
<th>Cor</th>
<th>EC</th>
<th>ΔE</th>
<th>ΔE</th>
<th>ΔE</th>
<th>ΔS</th>
<th>ΔS</th>
<th>ΔS</th>
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<tbody>
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</tbody>
</table>

Notes: *, **, and *** denote significance levels.

- Test result

Null hypothesis
- No heteroscedasticity
- No autocorrelation
- No structural breaks

The values in parentheses

FIGURE 1: CUSUM Test

The CUSUM test is based on the statistic

\[ W_t = \frac{1}{s} \sum_{r=k+1}^{t} \omega_r \quad t = k + 1, \ldots, T \]

where s is the standard error of the regression fitted to all T sample points. \( \omega_r \) is the recursive residuals.
### Table 3: Estimation Of Error-Correction Model With The FPE Criterion

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>$\Delta EX$</th>
<th>$\Delta SP$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0007 (1.26)</td>
<td>0.0120 (2.58)**</td>
</tr>
<tr>
<td>EC-term</td>
<td>-0.0126 (-2.23)**</td>
<td>0.1110 (2.21)**</td>
</tr>
<tr>
<td>$\Delta EXt-1$</td>
<td>0.3311 (4.80)***</td>
<td>-1.4262 (-2.69)***</td>
</tr>
<tr>
<td>$\Delta EXt-2$</td>
<td>0.1700 (2.36)**</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta EXt-3$</td>
<td>0.1670 (2.43)**</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta SPt-1$</td>
<td>-</td>
<td>-0.0887 (-1.25)</td>
</tr>
</tbody>
</table>

Notes: **, *** denote significance at the 5 percent and 1 percent level, respectively. t-statistics are in parentheses.
Conclusions

- Movements in exchange rate have great implications for stock prices in long-run as well as in short-run.
- In long-run, currency depreciation may have a positive influence on stock prices. The reason is that Korea is an export-dominant economy so currency depreciation can increase the exports of firms, and in turn affect the share price of the firm.
- In short-run, currency depreciation may have a negative effect on stock markets because of the expectation of high inflation, which may give a negative influence on the stock market.


7. Kwiatkowski, Denis; Phillips, Peter; Schmidt, Peter; Shin, Yongcheol. “Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root”, *Journal of Econometrics*, 54, 1992, pp. 159-78.


Thank you for your listening!