



Review of Economies in Transition

Idäntalouksien katsauksia

1998 • No. 4

12.6.1998

Reprint in PDF format 2002

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Bank of Finland
Institute for Economies in Transition, BOFIT

ISSN 1235-7405
Reprint in PDF format 2002

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The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the Bank of Finland.

Hanna Pesonen

Assessing Causal Linkages between the Emerging Stock Markets of Asia and Russia

Abstract

This paper examines the driving forces in stock market fluctuations in Russia. We found no evidence of a causal relationship running from the emerging stock markets of Asia to Russia. Instead, US and Japanese share price movements seem to have strong implications for Russian share prices.

Keywords: Russia, stock markets, causality testing

1 Introduction

The large fluctuations in the Russian financial markets between October 1997 and February 1998 are usually explained by the turmoil in the Asian financial markets that started in Thailand in May 1997. It is often argued that the connection between Russia and the Asian economies is in the eyes of foreign investors who consider Russia as one of the emerging markets. Thus it would be expected that the exit of foreign investors from the Asian markets would be accompanied by their exit from the Russian financial markets. It in fact appears that the sharp declines in stock prices in several Asian economies during the crises were followed by a decline in Russian stock prices.

This paper investigates the possibility of a relationship existing between stock prices in Russia and seven Asian economies. The US and UK stock markets are also included in the study. We conducted Granger causality tests in order to reveal the existence of possible short-run lead-lag relationships between these stock markets. The results however suggest that the effects of the Asian crises on the Russian stock market may not have been as straightforward as is often suggested. The tests did not find clear evidence that stock market events in the Asian emerging markets led to immediate declines in Russian share prices. In other words, Russian share prices could not be predicted by Asian share prices for the time period studied. On the other hand, Russian share prices were found to follow in particular US and also Japanese share prices.

2 Data and Testing Procedure

The countries included in the study were Russia, Thailand, Indonesia, South Korea, Malaysia, the Philippines, Hong Kong, Japan, the US and the UK. The study was conducted using daily observations on stock indices (figure 1). We worked with first differences of the variables in order to obtain stationarity (figure 2). In each of case of a missing observation, we excluded the whole day from the data. The

results from the causality tests are presented in tables 1-5.

The Granger causality tests were conducted for four time periods. First, the whole period from 8 January 1997 to 26 February 1998 was studied. Then the time period was divided into two subperiods covering the time before and after the crises actually started (8 Jan 1997 – 30 Apr 1997 and 6 May 1997 – 26 Feb 1998). We also ran the tests for the period during which the Russian stock market experienced a sharp downtrend (30 Sep 1997 – 26 Feb 1998).

The tests were performed with different lag lengths and in both directions to check the presence of bi-directional causality. Tables 1-5 present pairwise probability values from the standard Granger F-tests, with the first value being the probability of a non-Russian country (cause) Granger-causing Russia (consequence) and the second giving the reverse probability. A statistically significant F-test result for the first (second) value indicates that information on share prices in that non-Russian country (Russia) is useful in predicting stock prices in Russia (that non-Russian country). If, at the same time, the results from the Granger causality test for the reverse direction show no sign of causation, we have evidence of unidirectional Granger causality, meaning that the Asian (or US or UK) markets contain some information beyond that contained in the historical prices series for the Russian stock market and that there is no clear feedback from Russia to these countries.

3 Empirical Results

In general, some evidence was found that the pre-crisis stock market linkages were somewhat different from post-crisis linkages. Otherwise, the results remained qualitatively unchanged over the different testing periods.

Let us start by reviewing the results for the whole time period, 8 Jan 1997 – 26 Feb 1998. We found evidence of a significant causal relationship running from US to Russian share prices, indicating that the Russian stock market followed the US stock market during the time period studied. It should be noted that in the US case the results are significant at the

1 per cent significance level for all lag lengths except in the period before the crises. Furthermore, the causation seems to run only from the US to Russia; no significant evidence was found of a two-way relationship, ie of a causal link from Russia to the US.

It also appears that Japanese share prices predict Russian share prices fairly well even though the results were less clear than in the US case especially for the pre-crises period and the Russian crisis period. On the other hand, the UK stock market did not seem to contain additional information for Russia.

However, the view that the Russian stock market is instantaneously influenced by signals from the emerging stock markets of South Korea, Indonesia, Thailand, Malaysia and the Philippines was not supported by the data. According to the test results, none of the stock indices of these countries could be used to predict share prices in Russia (at the 5 per cent significance level). In fact, in some cases Asian stock markets could be explained by Russian stock market events and not the other way around.

In the case of South Korea vs Russia, there seemed to be no clear causal relationship in either direction. Furthermore, considering the Philippines, Malaysia and Thailand, the results seem to suggest that it was actually the Russian stock market that preceded the stock markets of these three Asian economies. This was also the case with Indonesia, albeit less clearly. In contrast to this result, some causal influence of Indonesia on Russia could be detected for the time period preceding the crises. Also changes in Hong Kong seemed to have had some effect on Russia before the crises, but it should be noted that significant short-run linkages seem to run in the opposite direction, from Russia to Hong Kong, in all the other test periods.

The results obtained give rise to some problems in interpretation and thus further studies are needed in order to find a good explanation for the propagation mechanism of signals between the stock markets. One possible explanation is that there is a third factor behind the results that affects the causality tests between the stock indices of Asia and Russia. That third factor could be the US stock

market, which was found to have strong implications for share price behaviour in Russia. Thus Russia could act as a proxy for share price movements in the US so that it only seems that Russia is Granger causing Asia.

In fact, there is some evidence of the leading role of the US markets in driving fluctuations in the Asian newly industrializing countries (see eg Masih-Masih 1997). Our results also show causality from share prices in the US to Hong Kong at the 1 per cent significance level (table 5).

4 Concluding Remarks

The question has been raised whether the Asian crises have been driving stock market fluctuations in Russia in 1997 and early 1998. In this empirical study, we examined the behaviour of stock prices in order to gain insight into the causal relationships among the stock markets of Asia and Russia. Analysis of the lead-lag relationships between the emerging stock markets was carried out using standard Granger F-tests.

The empirical findings suggest that share price movements in the US have strong implications for share price behaviour in Russia. Moreover, the Russian stock market can be explained by the Japanese stock market to a significant degree. This study did not however find support for the view that the Asian emerging stock markets are the leading factor behind Russian share prices. In fact, the evidence tends broadly to suggest that Russia could be Granger causing the Asian stock market. But a more plausible explanation is that there is a third factor, which could be the US, that is the driving force for share prices in Asia and that Russia merely acts as a proxy for the US stock market.

The results obtained are preliminary and can serve only as a starting point for a more thorough analysis of interdependencies across national stock markets. We need to improve our understanding of the interactions between the global stock markets and of the transmission mechanisms underlying global stock market fluctuations in order to obtain a more com-

plete explanation for the results obtained in this study.

Moreover, this study focused on short-run signals between the stock exchanges in order to capture short-run causality. The analysis

could be extended by considering stock market returns in a single currency or by studying long-run relationships between different stock markets.

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Figure 1 Stock Price Indices, 8 January 1997 – 26 February 1998

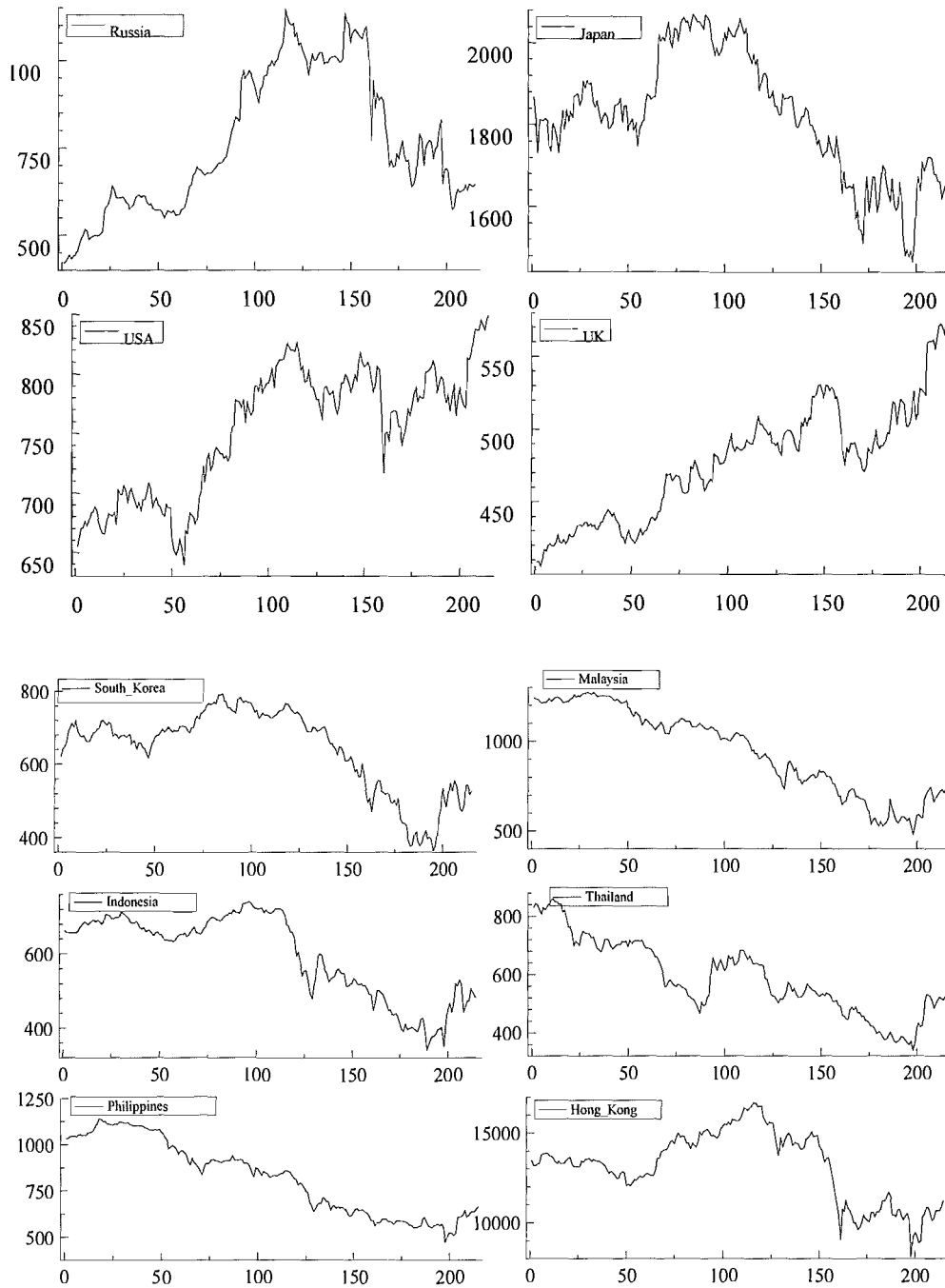


Figure 2 The First Differences of the Stock Price Indices

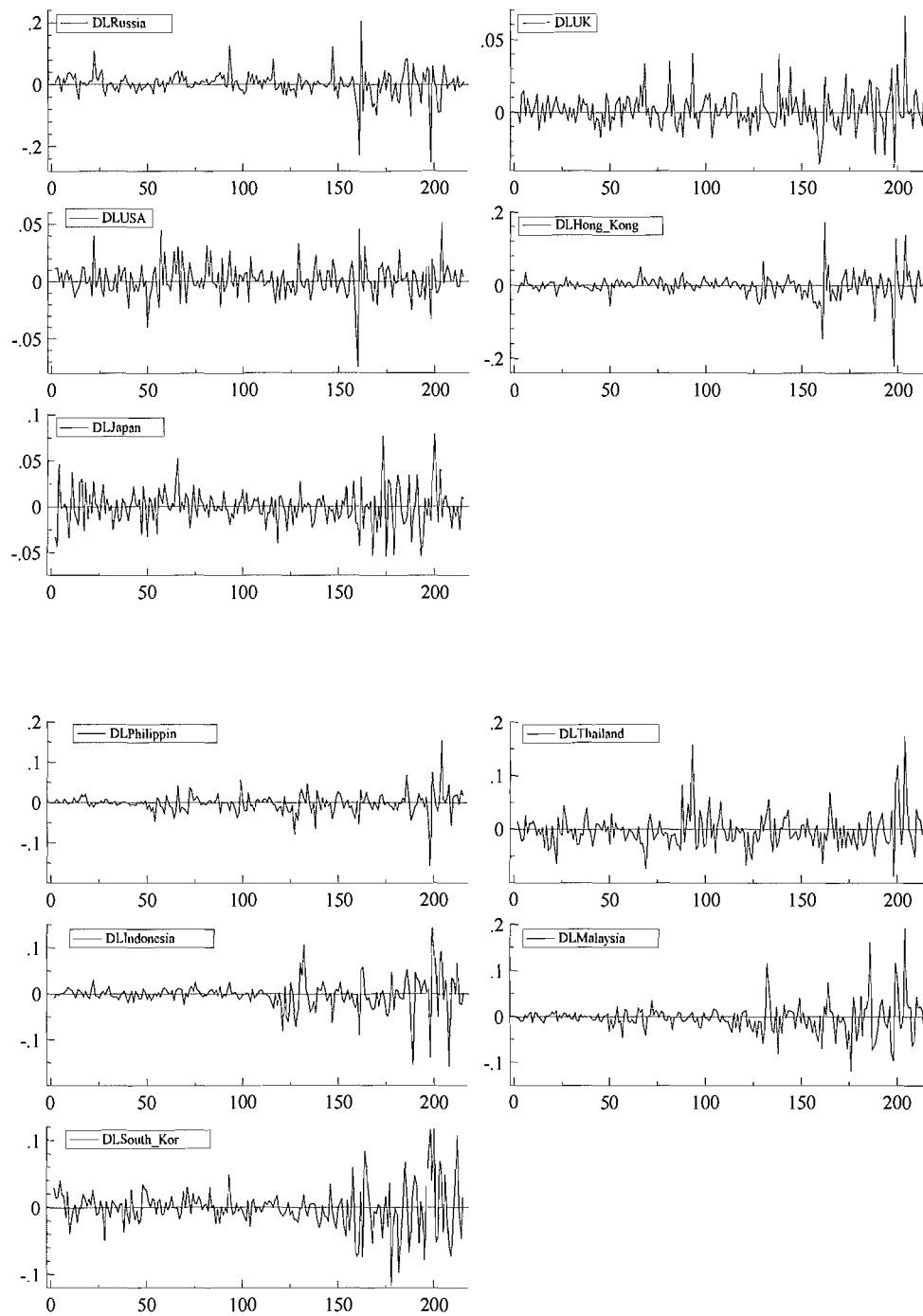


Table 1 F-test probability value for different lag lengths
(8 January 1997 – 26 February 1998)

Consequence <= Cause		1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	1 - 10
Russia	Japan	0.02	0.09	0.08	0.03	0.02	0.03
Japan	Russia	0.77	0.72	0.58	0.50	0.65	0.54
Russia	South-Korea	0.32	0.26	0.16	0.28	0.39	0.20
South-Korea	Russia	0.30	0.51	0.55	0.64	0.56	0.35
Russia	Indonesia	0.49	0.75	0.66	0.63	0.69	0.70
Indonesia	Russia	0.50	0.13	0.08	0.12	0.19	0.01
Russia	Thailand	0.56	0.75	0.33	0.48	0.55	0.82
Thailand	Russia	0.30	0.01	0.03	0.07	0.15	0.30
Russia	Malaysia	0.20	0.40	0.64	0.78	0.65	0.58
Malaysia	Russia	0.03	0.10	0.09	0.15	0.23	0.01
Russia	Philippines	0.77	0.76	0.94	0.85	0.78	0.93
Philippines	Russia	0.01	0.03	0.06	0.03	0.0531	0.09
Russia	Hong Kong	0.87	0.26	0.38	0.24	0.02	0.11
Hong Kong	Russia	0.00	0.00	0.00	0.00	0.00	0.00
Russia	USA	0.00	0.00	0.00	0.00	0.00	0.00
USA	Russia	0.10	0.41	0.30	0.41	0.45	0.22
Russia	London	0.11	0.27	0.47	0.40	0.26	0.36
London	Russia	0.07	0.03	0.08	0.06	0.03	0.12

Table 2 F-test probability value for different lag lengths
(8 January 1997 – 30 April 1997)

Consequence <= Cause		1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	1 - 10
Russia	Japan	0.25	0.46	0.51	0.24	0.31	0.68
Japan	Russia	0.46	0.78	0.85	0.92	0.79	0.85
Russia	South-Korea	0.93	0.95	0.49	0.11	0.31	0.94
South-Korea	Russia	0.76	0.22	0.34	0.17	0.27	0.38
Russia	Indonesia	0.08	0.13	0.25	0.30	0.17	0.049
Indonesia	Russia	0.96	0.89	0.95	0.93	0.51	0.75
Russia	Thailand	0.42	0.64	0.51	0.07	0.18	0.15
Thailand	Russia	0.20	0.42	0.51	0.63	0.47	0.36
Russia	Malaysia	0.66	0.76	0.91	0.98	0.81	0.90
Malaysia	Russia	0.56	0.53	0.51	0.31	0.56	0.73
Russia	Philippines	0.50	0.52	0.70	0.76	0.33	0.79
Philippines	Russia	0.25	0.53	0.72	0.79	0.80	0.54
Russia	Hong Kong	0.31	0.36	0.17	0.33	0.42	0.69
Hong Kong	Russia	0.87	0.74	0.87	0.92	0.83	0.90
Russia	USA	0.04	0.13	0.14	0.17	0.30	0.36
USA	Russia	0.88	0.94	0.88	0.79	0.80	0.88
Russia	London	0.22	0.33	0.33	0.25	0.16	0.56
London	Russia	0.65	0.86	0.996	0.995	0.99	0.90

Table 3 F-test probability value for different lag lengths
(6 May 1997 – 26 February 1998)

Consequence <= Cause		1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	1 - 10
Russia	Japan	0.04	0.11	0.07	0.06	0.0467	0.02
Japan	Russia	0.51	0.41	0.28	0.16	0.21	0.33
Russia	South-Korea	0.37	0.29	0.14	0.19	0.21	0.19
South-Korea	Russia	0.36	0.65	0.63	0.73	0.67	0.64
Russia	Indonesia	0.50	0.75	0.67	0.72	0.80	0.86
Indonesia	Russia	0.52	0.16	0.10	0.16	0.26	0.0466
Russia	Thailand	0.86	0.95	0.67	0.69	0.73	0.92
Thailand	Russia	0.23	0.02	0.06	0.10	0.18	0.42
Russia	Malaysia	0.24	0.50	0.73	0.85	0.73	0.65
Malaysia	Russia	0.0456	0.12	0.12	0.17	0.27	0.054
Russia	Philippines	0.56	0.61	0.88	0.79	0.74	0.86
Philippines	Russia	0.02	0.04	0.28	0.04	0.09	0.12
Russia	Hong Kong	0.86	0.33	0.50	0.30	0.06	0.18
Hong Kong	Russia	0.00	0.00	0.00	0.00	0.00	0.00
Russia	USA	0.00	0.00	0.00	0.00	0.00	0.00
USA	Russia	0.10	0.54	0.13	0.18	0.20	0.08
Russia	London	0.14	0.35	0.66	0.65	0.57	0.66
London	Russia	0.07	0.02	0.03	0.04	0.03	0.19

Table 4 F-test probability value for different lag lengths
(30 September 1997 – 26 February 1998)

Consequence <= Cause		1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	1 - 10
Russia	Japan	0.15	0.36	0.30	0.19	0.28	0.27
Japan	Russia	0.52	0.65	0.49	0.44	0.59	0.80
Russia	South-Korea	0.57	0.65	0.48	0.52	0.55	0.82
South-Korea	Russia	0.44	0.74	0.87	0.93	0.88	0.96
Russia	Indonesia	0.60	0.89	0.74	0.79	0.88	0.93
Indonesia	Russia	0.68	0.23	0.08	0.11	0.20	0.18
Russia	Thailand	0.83	0.96	0.52	0.55	0.72	0.88
Thailand	Russia	0.20	0.03	0.08	0.13	0.24	0.50
Russia	Malaysia	0.38	0.67	0.91	0.97	0.88	0.92
Malaysia	Russia	0.17	0.26	0.14	0.19	0.30	0.24
Russia	Philippines	0.35	0.39	0.69	0.70	0.65	0.95
Philippines	Russia	0.03	0.07	0.14	0.04	0.0514	0.33
Russia	Hong Kong	0.65	0.46	0.56	0.43	0.19	0.58
Hong Kong	Russia	0.00	0.00	0.00	0.00	0.00	0.00
Russia	USA	0.00	0.00	0.00	0.00	0.00	0.00
USA	Russia	0.14	0.56	0.22	0.21	0.27	0.27
Russia	London	0.14	0.30	0.67	0.70	0.58	0.64
London	Russia	0.04	0.07	0.0531	0.04	0.0542	0.44

Table 5 F-test probability value for different lag lengths
(8 January 1997 – 26 February 1998)

Consequence <= Cause		1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	1 - 10
Hong Kong	USA	0.00	0.00	0.00	0.00	0.00	0.00
USA	Hong Kong	0.57	0.26	0.39	0.16	0.06	0.15

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