

# INTEGRATION ANALYSIS OF THE MALAYSIAN STOCK MARKET

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## **ABSTRACT**

### **(BAHASA MALAYSIA)**

Kajian ini menggunakan teknik *cointegration* dan *causality* dalam mengkaji perhubungan jangka pendek dan panjang di antara lima sector utama yang disenaraikan di Papan Utama pasaran saham di Malaysia serta perhubungan di antara pasaran saham di Malaysia dengan pasaran saham dari negara yang menjadi rakan-rakan perdagangan utama. Kajian ini juga mengkaji perubahan kadar pergantungan di antara sektor-sektor dalam pasaran saham domestik dan juga di antara pasaran saham di Malaysia dengan pasaran saham dari negara yang menjadi rakan-rakan perdagangan utama selepas krisis kewangan pada tahun 1997.

Keputusan kajian mendapati bahawa integrasi di antara sektor-sektor di dalam pasaran saham domestik adalah lebih ketara berbanding dengan integrasi di antara pasaran saham di Malaysia dengan pasaran saham dari negara yang menjadi rakan-rakan perdagangan utama. Kajian juga menunjukkan bahawa pasaran saham di Malaysia tidak banyak dipengaruhi oleh pergerakan harga dalam pasaran saham daripada rakan-rakan dagangan utama dan juga dapat kembali kepada kedudukan *equilibrium* dalam masa yang singkat. Selain itu, pasaran saham di Malaysia juga dapat memberikan peluang kepada pelabur antarabangsa untuk mempelbagaikan pelaburan dalam mengurangkan risiko pelaburan.

Di samping itu, pelabur-pelabur di Malaysia juga boleh menggunakan pergerakan harga dalam sektor hartanah dalam meramal pergerakan harga di dalam sektor-sektor lain dalam pasaran saham di Malaysia. Kesan globalisasi dan juga peningkatan dalam pelaburan ekuiti dari satu negara ke negara yang lain didapati akan meningkatkan kadar integrasi di antara pasaran saham di negara tersebut. Oleh itu, pelabur-pelabur saham perlu mengambil kira faktor ini dalam mempelbagaikan pelaburan ekuiti mereka dari satu negara ke negara yang lain.

Keputusan ujian *variance decomposition* mencadangkan bahawa tiada kesan *contagion* di antara sektor-sektor di Malaysia mahupun di antara Malaysia dengan pasaran saham dari negara yang menjadi rakan-rakan perdagangan utama sebelum dan selepas krisis kewangan.

## **ABSTRACT**

### **(ENGLISH)**

This study employs the cointegration and causality techniques in examining the integration as well as the short-term and long-term dynamic causal linkages between the five major sectors' price indices listed in the main board of the Malaysian stock market and integration relationship among the stock market of Malaysia major trading partners. This study is also aims to investigate the contagion and interdependent relationship between the five major sectors' price indices in Malaysia and also between major trading partners before and after the financial crisis in July 1997.

The results in this study show that the integration relationship between the sectors in Malaysia is more pronounce than between the Malaysian stock market and its major trading partners. The results also suggest that the Malaysian stock market is robust to the influence of the price movement of its major trading partners and the speed adjustment processes in both sectors and stock markets is relatively fast. In addition, the Malaysian stock market provides better opportunity for diversification for the international investors in diversifying their overall risk.

Besides that, investors in the Malaysian stock market can used the price movement in the properties sector in predicting the price movement in other sectors in the Malaysian stock market since the properties sector is found to be a good predictor of other sectors' prices in the Malaysian stock market. The impact of globalisation and the increase in the equity investment by one country to another is shown to increase the lead lag relationship between the stock markets. Thus, the investors should take into the consideration of the equity investment of one country to another before diversifying their investment.

The results of variance decomposition suggest that there are no contagion effect between the major sectors in Malaysia and between the Malaysian stock market and its major trading partners before and after the financial crisis in July 1997 as the degree of cointegration and the number of stock markets being cointegrated decrease after the financial crisis.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 INTRODUCTION**

The aim of this study is to analyse the integration relationship between the five major sectors' price indices in Malaysian Stock Market and also the integration between Malaysian Stock Market and its major trading partners, namely the Philippines, Indonesia, Thailand, Hong Kong, Japan, China and the United States of America in order to determine the contagion effect due to the 1997 currency crisis. Vector Autoregression (VAR) models will be used in analysing the cointegration relationship between the sectors' stock prices in the Malaysian stock market as well as between Malaysian stock market and its major trading partners from the year 1994 to 2002.

Section 1.2 deals with the research statement in this study, while Section 1.3 discusses the objectives of the study. This is then followed by a discussion of the model employed in the study in Section 1.4. The justification for this study is presented in Section 1.5. An overview of the Malaysian stock market, which includes a brief account on the recent developments, will be discussed in Section 1.6. Next, the history of the stock markets for Malaysia major trading partners is presented in Section 1.7. This is followed by the discussion of the role of capital markets in Malaysia in term of funds raising in Section 1.8. Section 1.9 highlights the percentage of equity investment in and from Malaysia with the respective major trading partners. Finally, the organisational structure of the thesis is presented in Section 1.10.

The contents of  
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## REFERENCES

- Arshanapalli, B., & Doukas, J. (1993). International stock market linkages: Evidence from the pre- and post-October 1987 period. *Journal of Banking & Finance*, 17, 193-208.
- Bank Negara Malaysia (BNM). (1999). "The central bank and the financial system in Malaysia (1st edn)." Bank Negara Malaysia, Kuala Lumpur.
- Bank Negara Malaysia (BNM). (Various Issues). "Monthly Statistical Bulletin of Bank Negara Malaysia." Bank Negara Malaysia, Kuala Lumpur.
- Bekaert, G., & Harvey, C.R. (1995). Time-varying world market integration. *The Journal of Finance*, 50(2), 403-443.
- Bertero, E., & Mayer, C. (1990). Structure and performance: Global interdependence of stock markets around the crash of October 1987. *European Economic Review*, 34, 1155-1180.
- Bessler, D.A., & Yang, J. (2003). The structure of interdependence in international stock markets. *Journal of International Money and Finance*, 22, 261-287.
- Bierens, H.J. (1997). Cointegration analysis. In H. Christiaan et al. (Ed.), *System dynamic in economic and financial models*, (pp.217-245). Wesr Sussex: John Wiley & Sons.
- Blackman, S.C., Holden, K., & Thomas, W.A. (1994). Long-term relationships between international share prices. *Applied Financial Economics*, 4, 297-304.
- Byers, J.D., & Peel, D.A. (1993). Some evidence on the interdependence of national stock markets and the gains from international portfolio diversification. *Applied Financial Economics*, 3, 239-242.
- Cha, B., & Oh, S. (2000). The relationship between developed equity markets and the Pacific Basin's emerging equity markets. *International Review of Economics and Finance*, 9, 299-322.
- Chan, K.C., Gup, B.E., & Pan, M.S. (1997). International stock market efficiency and integration: A study of eighteen nations. *Journal of Business, Finance & Accounting*, 24(6), 803-813.
- Chen, G.M., Firth, M., & Rui, O.M. (2002). Stock market linkages: Evidence from Latin America. *Journal of Banking & Finance*, 26, 1113-1141.
- Cheung, Y.L., & Mak, S.C. (1992). The international transmission of stock market fluctuation between the developed markets and the Asian-Pacific markets. *Applied Financial Economics*, 2, 43-47.

- Choudhry, T. (1996). Interdependence of stock markets: evidence from Europe during the 1920s and 1930s. *Applied Financial Economics*, 6, 243-249.
- Chowdhury, A.R. (1994). Stock market interdependencies: Evidence from the Asian NIEs. *Journal of Macroeconomics*, 16(4), 629-651.
- Corhay, A., Rad, A.T., & Urbain, J.P. (1995). Long run behaviour of Pacific-Basin stock prices. *Applied Financial Economics*, 5, 11-18.
- Daly, K.J. (2003). Southeast Asian stock market linkages: Evidence from pre- and post-October 1997. *ASEAN Economic Bulletin*, 20(1), 73-86.
- Darbar, S.M., & Deb, P. (1997). Co-movements in international equity markets. *The Journal of Financial Research*, 20(3), 305-322.
- Diebold, F.X. (2001). *Element of Forecasting* (2<sup>nd</sup> ed). Ohio: South-Western.
- Engle, R., & Granger, D.W.J. (1987). Co-integration and error correction: Representation, estimation and testing. *Econometrica*, 50, 978-1008.
- Eun, C.S., & Shim, S. (1989). International transmission of stock market movements. *Journal of Financial and Quantitative Analysis*, 24(2), 241-256.
- Ewing, B.T., Paynes, J.E., & Sowell, C. (1999). NAFTA and North America stock market linkages. *North American Journal of Economics and Finance*, 10, 443-451.
- Finnerty, J.E., & Schneeweis, T. (1979). The comovement of international asset returns. *Journal of International Business Studies*, 10(3), 66-78.
- Forbes, K., & Rigobon, R. (1999). No contagion, only interdependence: Measuring stock market co-movements. Working Paper 7267, NBER.
- Füss, R. (2002). The financial characteristics between 'emerging' and 'developed' equity markets. Paper presented at Policy Modeling International Conference, Brussels.
- Ghosh, A., & Johnson, K.H. (1999). Who moves the Asia-Pacific stock markets – US or Japan? Empirical evidence based on the theory of cointegration. *The Financial Review*, 34, 159-170.
- Gonzalo, J. (1994a). Cointegration and aggregation. Unpublished Working Paper, Boston University, Boston.
- Gonzalo, J. (1994b). Five alternative methods of estimating long-run equilibrium relationships. *Journal of Econometrics*, 60, 203-233.
- Granger, C.W.J.(1969). Investing causal relations by econometric models and cross-spectral methods. *Econometrica*, 37, 424-439.

- Granger, C.W.J., Huang, B.N., & Yang, C.W. (2000). A bivariate causality between stock prices and exchange rates: evidence from recent Asian flu. *The Quarterly Review of Economics and Finance*, 40, 337-354.
- Grubel, M., & Fadner, K. (1971). The interdependence of international equity markets. *Journal of Finance*, 26, 89-94.
- Gujarati, D. N. (2003). *Basic Econometrics* (4th edn). McGraw Hill: United States.
- Hashmi, A.R., & Liu, X. (2001). Interlinkages among South East Asian stock markets (A comparison between pre- and post-1997-crisis periods. Paper presented at X International "Tor Vergata" Conference on Banking and Finance, University of Rome.
- Hassan, M.K., & Naka, A. (1996). Short-run and long-run dynamic linkages among international stock markets. *International Review of Economics and Finance*, 5(4), 387-405.
- Huang, B.N., Yang, C.W., & Hu, J. W. S. (2000). Causality and cointegration of stock markets among the United States, Japan, and the South China Growth Triangle. *International Review of Financial Analysis*, 9(3), 281-297.
- Hung, B.W.S., & Cheung, Y.L. (1995). Interdependence of Asian emerging equity markets. *Journal of Business, Finance & Accounting*, 22, 281-287.
- Johansen, J., & Juselius, K. (1993). Testing structural hypothesis in a multivariate cointegration analysis of PPP and the UIP for UK. *Journal of Econometrics*, 53, 211-244.
- Johnson, R., & Soenen, L. (2002). Asian Economic Integration and stock market comovement. *The Journal of Financial Research*, 25(1), 141-157.
- Kasa, K. (1992). Common stochastic trends in international stock markets. *Journal of Monetary Economics*, 29, 95-124.
- Koch, P.D., & Koch, T.W. (1991). Evolution in dynamic linkages across daily national stock indexes. *Journal of International Money and Finance*, 10, 231-251.
- Kwan, A.C.C., Sim, A.B., & Cotsomitis, J.A. (1995). The causal relationships between equity indices on world exchanges. *Applied Economics*, 27, 33-37.
- Leo, K.C., & Kendall, J.D. (1996). An empirical analysis of stock indices in three Southeast Asian countries. *Regional Issues In Economics*, 2, 91-116.
- Leong, S.C., & Felmingham, B. (2003). The interdependence of share markets in the developed economies of East Asia. *Pacific-Basin Finance Journal*, 11, 219-237.

- Longin, F., & Solnik, B. (1995). Is the correlation in international equity returns constant: 1960-1990? *Journal of International Money and Finance*, 14(1), 3-26.
- Masih, A.M.M., & Masih, R. (1999). Are Asian stock market fluctuations due mainly to intra-regional contagion effects? Evidence based on Asian emerging stock markets. *Pacific-Basin Finance Journal*, 7, 251-282.
- Masih, A.M.M., & Masih, R. (2001). Dynamic modeling of stock market interdependencies: An empirical investigation of Australia and the Asian NICs. *Review of Pacific Basin Financial Markets and Policies*, 4(2), 235-264.
- Moon, W.S. (2001). Currency crisis and stock market integration: A comparison of East Asian and European Experiences. *Journal of International and Area Studies*, 8(1), 41-56.
- Östermark, R. (2001). Multivariate cointegration analysis of the Finish-Japanese stock markets. *European Journal of Operational Research*, thirteen4, 498-507.
- Panton, D.B., Lessig, V.P., & Joy, O.M. (1976). Comovement of international equity markets: A taxonomic approach. *Journal of Financial and Quantitative Analysis*, 415-431.
- Phillips, P.C.B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75, 335-346.
- Ratanapakorn, O., & Sharma, S. C. (2002). Interrelationships among regional stock indices. *Review of Financial Economics*, 11, 91-108.
- Richards, A.J. (1995). Comovements in national stock market returns: Evidence of predictability, but not cointegration. *Journal of Monetary Economics*, 36, 631-654.
- Roca, E.D., Selvanathan, E.A., & Shepherd, W.F. (1998). Are the ASEAN equity market interdependent? *ASEAN Economic Bulletin*, 15(2), 109-119.
- Siklos, P.L., & Ng, P. (1999). Integration Among Asia-Pacific and International Stock Markets: Common Stochastic Trends and Regime Shifts, *Economic Working Papers*. Wilfrid Laurier University.
- Solnik, B., Boucrelle, C., & Yann, L. F. (1996). International market correlation and volatility. *Financial Analysts Journal*, 52(5), 17-34.
- Yang, T. (2002). Crisis, contagion, and East Asian stock markets. *Economics and Finance*, 1, 1-34.

### Online References:

Busetti, G., & Manera, M. (2003). STAR-GARCH models for stock market interactions in the Pacific Basin region, Japan and US. Social Science Research Network Electronic Paper Collection. Retrieved August 23, 2003, from [http://papers.ssrn.com/abstract\\_id=xxxxxxx](http://papers.ssrn.com/abstract_id=xxxxxxx)

Kuala Lumpur Stock Exchange (2003). *Industry Profiles*. Retrieved August 23, 2003, from Kuala Lumpur Stock Exchange web site: <http://www.klse.com.my>

Kuala Lumpur Stock Exchange (2003). *Listing Statistics*. Retrieved August 23, 2003, from Kuala Lumpur Stock Exchange web site: <http://www.klse.com.my/website/listing/listingstats.htm>

Stock, J.H., & Watson, M.W. (2001). *Vector autoregressions*. Retrieved March 01, 2004, from: [www.wlu.ca/~wwwsbe/faculty/psiklos/econ655/stock\\_watson\\_jep2001vars.pdf](http://www.wlu.ca/~wwwsbe/faculty/psiklos/econ655/stock_watson_jep2001vars.pdf)