

Integration and Contagion of BRIC Stock Markets: An Empirical Analysis

Krishna Reddy Chittedi
PhD Scholar
Centre for Development Studies (CDS) -JNU
Trivandrum, Kerala, India.



2nd Edition Perm Winter School
On
Risk Management and Financial Markets Modeling

6-Feb-12

Introduction

- The stock market -credit and finance -business community (Gurley and Shaw (1955, 1960) and Goldsmith (1969)).
- Two major motivations- one -equity market integration issue – international finance- pricing of securities – different risk sources –higher return.
- Second, challenging context of emerging markets – change in market structure- time varying integration.

Theoretical underpinnings

The demand for Cross border borrowing and investment (Ayling (1986)).

- - Economist's point of view - the benefits of high level integration. For example: 'comparative advantage theory'.
- Traditionally, investors - borrowers - domestic financial opportunities - overseas possibilities.
- The world's stock markets have become increasingly attuned to international financial transactions.



Contd...

- The process of internationalization of global stock markets appears to be the result of four main forces.
 - a) The increased links between money and capital markets.
 - b) Moves towards deregulation.
 - c) Innovation in financial markets.
 - d) Breakthroughs in information and communication. (as illustrated in figure 1)

The main influences leading to the internationalization of stock markets

LINKS BETWEEN MONEY AND CAPITAL MARKETS

- (a) Between home and foreign sections of domestic markets
- (b) Between domestic markets

DEREGULATION

- (a) Of money market
- (b) Of capital market
- (c) Of exchange rates

INNOVATION

- (a) New trading techniques
- (b) New financial instruments
- (c) New markets

TECHNOLOGICAL DEVELOPMENTS

- (a) In communications
- (b) For information processing
- (c) For transferring funds electronically

STOCK MARKETS

INTEGRATION OF GLOBAL STOCK MARKETS ?

❖ A country is integrated into world stock markets if

- Capital is free to move into and out of the country.
- The country's assets are substitutes for those of the other countries.

❖ Capital flows to the emerging market economies- push and pull factors (Mohan et al (2010)).

Portfolio investment, equity (BoP, current billion US\$)

Country/ Year	Brazil	China	India	Japan	Russian Federation	United Kingdom	United States
1997	5.09	5.65	2.55	27.00	1.26	7.84	67.03
1998	-1.76	0.76	-0.60	16.11	0.71	63.17	41.95
1999	2.57	0.61	2.31	103.88	-0.28	103.35	112.28
2000	3.07	6.91	2.48	-1.28	0.15	191.74	193.60
2001	2.48	0.84	2.95	39.10	0.54	22.56	121.46
2002	1.98	2.24	1.06	-16.69	3.92	2.31	54.06
2003	2.97	7.72	8.21	87.77	0.42	32.60	33.98
2004	2.08	10.92	9.05	98.28	0.27	3.59	61.78
2005	6.45	20.34	12.15	131.31	-0.10	12.45	89.25
2006	7.71	42.86	9.50	71.43	6.48	-18.34	145.48
2007	26.21	18.51	34.98	45.45	18.67	25.24	275.63
2008	-7.56	8.72	-15.03	-69.69	-15.00	72.71	110.44

Stock Market Development Indicators

	Turnover Ratio (in %)			Market Capitalization Ratio (in %)			No. Of listed Companies		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
Japan	132	142	153	95	90	67	3,362	3,844	3,299
UK	124	270	227	167	157	75	2,913	2,588	2,415
USA	183	217	232	150	149	85	5,133	5,130	5,603
China	102	180	121	107	238	89	1,440	1,530	1,604
India	93	84	85	102	200	60	4,796	4,887	4,921
Russia	64	59	75	166	183	124	309	328	314
Brazil	43	56	74	107	154	53	392	442	432
USA as % of World	49.29	43.12	45.29	36.39	30.90	32.78	--	--	--
India as % of World	0.95	1.12	1.30	1.53	2.82	1.80	--	--	--

Importance of interdependence..

- Systematic risk –unsystematic risk – security as part of diversifiable portfolio.
- Corporate financial strategies- firms –capital –low cost –segmented market.
- Capital budgeting decisions –international capital – marginal cost –domestic sources.
- Complete integration –absence of arbitrage opportunities.

Review of Literature

- ICAPM as a measure of stock market integration which includes the studies such as Solink (1974), Stulz (1981), Jorion and Schwartz (1986) and Buckberg (1995).
- Errunza and Losq (1992) confirm the wide differences observed regarding integration issue of developed market.
- One of the idiosyncrasies of stock prices is that over long period they tend to move together and follow a common upward trend (Azman-Saini et al., 2002).

Contd....

- Ayuso and Blanco (1999) shown that during the 1990's, the linkages -national stock exchanges - increased. foreign assets in agents' portfolio increased - correlation.
- Gilmore (2002) short - long term US stock market - Central European markets - markets – not cointegrated - long-run.
- Guidi (2010) Indian and Asian developed (i.e. Hong Kong, Japan and Singapore) equity markets - integration.

Contd...

- Nath (2003) and Chittedi (2007) interlinkages of Developed stock markets – developing countries -co movement.
- Christiansen (2007) and Kim et al (2006) countries in the European Monetary union have been highly integrated after introducing Euro, but also the US markets are highly integrated with European markets.
- Caporale et al 2010, Gklezakou et al 2009, Syriopoulos (2007), Wong et al (2005), Bose (2005), Arouri et al (2007), Raj and Dhal (2009), Chittedi (2010b) used different cointegration approaches to measure stock market integration among global markets.

Research Gap

- Spilt the total sample period into two and there is no clear cut rule on how to split a sample - Studies based on simple correlation- Engle and Granger method.
- Confining the stock market of BRIC countries in general and India.
- Degree of integration among Indian equity market with rest of the BRIC countries and major developed countries

Significance of the study

- - Need to understand the forces behind the interdependence - potential risk and rewards of global diversification.
- International investors –policy makers.
- Confining the stock market of BRIC countries in general and India.
- Degree of integration among Indian equity market with rest of the BRIC countries and major developed countries

Objective and nature of data...

- To examine the integration and contagion of the stock market among the BRIC (Brazil, Russia, India and China) nations in general and their integration with the developed countries stock markets such as US, UK and Japan in particular.
- The data is collected from www.econstats.com period of January 1997 to June 2010.
- daily index values of the DJIA, FTSE-100, NIKKEI-225, Bovespa, RTS, Sensex and SSE composite for US, UK, Japan, Brazil, Russia, India and China respectively.

Empirical results

Unit Root Statistics

	Stock prices at Level			Stock prices at First difference			Conclusion		
	ADF	PP	KPSS	ADF	PP	KPSS	ADF	PP	KPSS
Brazil	A	A	A	R	R	R	1(1)	1(1)	1(1)
China	A	A	A	R	R	R	1(1)	1(1)	1(1)
India	A	A	A	R	R	R	1(1)	1(1)	1(1)
Japan	A	A	A	R	R	R	1(1)	1(1)	1(1)
Russia	A	A	A	R	R	R	1(1)	1(1)	1(1)
UK	A	A	A	R	R	R	1(1)	1(1)	1(1)
USA	A	A	A	R	R	R	1(1)	1(1)	1(1)

Summary of Descriptive Statistics

	Brazil	China	India	Japan	Russia	UK	USA
Mean	9.94	7.45	9.50	8.67	6.14	8.56	7.37
Median	9.76	7.35	9.53	8.46	6.18	8.58	7.35
Maximum	11.45	8.71	9.94	9.94	7.81	8.84	8.45
Minimum	8.46	6.91	8.86	7.86	3.65	8.09	6.66
Std. Dev.	0.66	0.39	0.25	0.58	0.98	0.16	0.35
Skewness	0.38	1.24	-0.32	0.63	-0.14	-0.44	0.68
Kurtosis	1.95	4.014	2.04	1.98	2.22	2.09	3.54
Jarque-Bera	192.30	821.28	151.86	297.92	76.22	181.83	247.78
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Sum	26994.50	20237.47	25792.94	23547.83	16679.15	23266.15	20030.52
Sum Sq. Dev.	1206.88	420.70	177.28	932.23	2618.04	73.05	338.55

Results of Granger causality tests

Country	Granger Causality between countries	Country	Granger Causality between countries
US →	India	BRAZIL →	Japan
US →	China	BRAZIL →	China
US →	Russia	INDIA →	Russia
UK →	China	INDIA →	Japan
UK →	India	INDIA →	China
UK →	Russia	JAPAN	No causal relation with any country
BRAZIL →	UK	RUSSIA →	India

Results of JJ cointegration

Country	Co integration Yes/No	Country	Co integration Yes/No
US/India	No	UK, Japan, India	No
UK/India	No	BRIC	Yes
Japan/India	No	US, UK, Japan, India	No
Brazil/India	Yes	US, UK, Japan, Brazil	Yes
China/India	No	US, UK, Japan, China	No
US, UK, India	No	US, UK, Japan, Russia	No
US, Japan, India	No	US, UK, Japan, BRIC	Yes

Results Error Correction Mechanism

- Brazil is appears to be exogenous i.e., shocks with in Brazil do not influence the other indices in the system.
- other six countries' indices found to be weekly exogenous or endogenous, that is shocks in those economies do destabilize the equilibrium in other economies.

Summary

- The results - somewhat mixed - BRIC economies partially - other developed countries - themselves.
- The lack of strong links among BRIC markets, and between their counterparts in developed economies presents an opportunity for portfolio diversification.



Part II

Contagion Effect of Global Financial Crisis on BRIC Stock Market



6-Feb-12

- The global transmission of financial shocks is not a new phenomenon.
- The terms and conditions of access to international markets for emerging markets are naturally influenced by events in both mature and emerging markets.
- The timing and virulence of the current crisis do not seem to be adequately explained by the fundamental problems facing many of the countries and markets concerned, particularly in Emerging economies.
- The so-called 'contagion' effect of the crisis drew a lot of attention to the linkages among emerging stock markets yet reducing volatility and contagion has been an important stated objective of recent reforms.

- The causes (both short- and longer-term) of the current global economic and financial crisis have been discussed in a number of contributions, including Aiginger (2009), Eichengreen and O'Rourke (October 2008), IMF (2008, 2009, 2010), Ormerod (2010), and Solow (2009).
- The financial crisis could be clearly felt in these economies at the end of 2008. The 'Emerging Markets Financial Stress Index' elaborated by the International Monetary Fund (2009a) reveals that the intensity of the crisis in these countries was deeper than in previous times.



Conclusion

- The empirical evidence confirms a contagion effect from the crisis country to all others, for each of the examined financial crises.
- Conditional volatilities of equity indices show widespread evidence of asymmetry, structural changes spread to other markets with a big order of magnitude, while increases in tail dependence imply that the probability of markets crashing together is higher during periods of financial turmoil.

- These results are in line with the existing but limited literature in the recently developed area of regime-switching copulas (Rodriquez, 2007; Okimoto, 2008).
- This evidence implies that policy responses to a crisis are unlikely to prevent the spread among countries, since cross-market correlation dynamics are driven by behavioural reasons.
- Furthermore, we provide evidence that emerging BRIC markets are more prone to financial contagion, while the industry-specific turmoil has a larger impact than the country-specific crises.

- Our findings have important implications for international investors, as the diversification sought by investing in multiple markets from different regional blocks is likely to be lower when it is most desirable. As a result, an investment strategy focused solely on international diversification seems not to work in practice during turmoil periods.



Thank you

contact

Email: krishna08d@cds.ac.in

Webpage: <http://people.cds.ac.in/krishna08d>

6-Feb-12

28