Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 2

ISSN: 1540-3270

Interdependence of Global Stock Markets in the Era of Financial Globalization-*A Statistical Analysis of International Market Integration*

[1]Dr. Riyazzudin, [2]Anurag Agarwal, [3]Dr. Neha Agrawal, [4]Richa Chaudhary, [5]Dr. Nitin Mohan, [6]Dr. Rashmi Kaushik

[1]Associate Professor, Maharishi School of Business Management, Maharishi University of Information Technology, Noida, UP, India

[2]Assistant Professor, Department of MBA, IMS Engineering College, Ghaziabad, UP, India **(Second and corresponding author)**

[3]Assistant Professor, Maharishi School of Business Management, Maharishi University of Information Technology, Noida, UP, India

[4]Research Scholar, Department of Management, TMIMT, Teerthankar Mahaveer University, Moradabad, UP, India

[5]Associate Professor, NIET Business School, Greater Noida, UP, India

[6]Associate Professor, GNIOT Institute of Management, GIMS, Greater Noida, UP, India

Abstract

Globalization with regards to finance has really enhanced the level of integration and interconnection between the stock markets globally. As information technology continues to grow fast, the world has become increasingly interconnected with a liberalized financial system and with cross-border capital flows. Multinational corporations, institutional investors (global-based) and international financial institutions are very active in various markets thereby enabling the improvement of the conveyance of information, capital and economic shocks via national boundaries. As a result, a crisis that started in a single financial market is easily transferred to other markets and influences the prices of assets, investment activity and financial integrity. This inability to distinguish the stock markets has led to an increasing convergence across stock markets hence the appeal that cross-boundary or international financial markets seems to hold over researchers and consumers of financial economics and international finance. This paper explores interdependence of key stock markets in the world today in the era of finance globalization. The study aims at indicating benchmark indexes of stock markets of developed economies as well as developing ones such as the one of the US, UK, Japan, Germany, India and China. The markets are important in determining the world financial trends and can represent the overall dynamics of the international capital markets. The aim of the study is to trace the degree to which these markets are interrelated and to determine what is the character of short run and long-term links among them. In order to meet these objectives, a number of sophisticated statistical and econometric tools are taken as part of the study. The level of association between stock market returns is measured through the correlation analysis whereas the property of stationarity of the time series data are measured through the unit root tests. The analysis of the relationship between long-run equilibrium of the selected markets is done by use of cointegration. Also, Vector Autoregressive (VAR) models are considered to capture dynamic interactions between the markets and impulse response functions are also applied to determine the effect of market shocks in another market in the long-run. The empirical results indicate that there is a high degree of interdependence between the chosen stock markets in the world especially during financial turbulence and economic crisis of the world. It is also reflected in the findings that there are long-run relationship links among some markets, meaning that there exists increased levels of financial integration in the world economy. The implications of these findings on international investors, policymakers, and financial institutions are significant because they suggest that financial contagion can occur in the near future and that diversifying a portfolio faces difficulties in an ever-better global financial framework.

Keywords: Financial Globalization, Stock Market Interdependence, Cointegration, Vector Auto-regression (VAR) Financial Integration, Global Financial Markets, International Portfolio Diversification, Financial Contagion, Capital Market Integration, Impulse Response Analysis.

1. Introduction

The aspect of globalization has changed the organization and operations of financial markets on the world greatly. In the last few decades national financial markets previously involved in activities that were mostly independent

of each other, have slowly evolved to become highly interconnected as a part of a global financial system. Several factors have been involved in this transformation and these factors include liberalization of financial market, fast way of technological advancements in communication and trading systems, elimination of capital control and the expansion of international trade and investment. Consequently, capital flows across the borders have risen considerably making investors to invest in other countries with more ease and efficiency. The advancement of electronic trading platforms, international financial institutions, and international investment funds has also increased the pace at which the financial market has been integrated (Mishkin, 2019).

Stock markets are central to the operations of the contemporary financial systems. They have been availed as significant means of mobilization of savings, effective distributions of capital, and the ability to invest effectively in productive economic undertakings. Stock markets facilitate the creation of capital through selling and buying of securities hence, allowing corporations to grow and giving investors a chance to create wealth and diversify their portfolios. Moreover, stock markets are used to predict the level of economic performance and confidence on the part of investors, who are known to invest their hopes concerning the future profitability of a corporation and macroeconomic environment (Fabozzi and Modigliani, 2018).

In the past, stock markets in different countries were relatively independent as no major capital markets existed, there were stringent regulatory systems in place, and the communication technologies were not developed. This has however changed a lot with financial globalization process. The increasing involvement of foreign portfolio investors through the growth of multinational corporations, expansion of global institutional investors like pension funds and mutual funds and the augmentation of stock markets among the countries has intensified the connections between the countries. As a result, the financial markets have become more interrelated and events taking place in one financial market can have a swift impact on financial markets elsewhere across the globe (Eun & Resnick, 2020).

Among the most significant impacts of this increased financial integration, the phenomenon of stock market interdependence should be mentioned. In a financial landscape where there is a relationship, market trends of a stock market have a tendency of influencing other stock markets. An example is reduced stock market in the United States causing a swift effect in stock markets in Europe and Asia because of investor feelings, international fund flows, and economic interconnections. This kind of speedy spreading of financial shocks between markets is popularly known as financial contagion. Financial contagion is whereby the shocks experienced in the financial market of one country spread to the other countries and cause more volatility and instability in the financial system (Forbes & Rigobon, 2002).

Significance of comprehending stock market interdependence has grown enormously in the setting of various globalized crises of financial nature which have been encountered throughout the past few decades. The 1997 Asian Financial Crisis, the 2008 Global Financial Crisis, as well as the COVID-19 pandemic that caused a market crash and was first initiated in that region had proven the ease with which financial instabilities can be transmitted to other markets globally. The crises revealed how easily global financial systems were prone to shocks caused by international interconnections and the fact that further examination of international market interconnections was necessary (Bekaert, Harvey and Ng, 2005).

Studies in the area of international finance have hence paid more attention to the analysis of the level of interdependence of the world stock markets and the processes with the help of which the global financial stocks are spread to other countries. A number of empirical analyses have reported that there is great co-movement in global market stock returns especially at times of financial crisis. The co-movements occur following an array of reasons which include shared macroeconomic basics, universal economic policy, international economic linkages, and the actions of international investors who operate in several markets simultaneously (Bekaert and Harvey, 2000).

There is also empirical evidence that the financial globalization process has enhanced integration of stock markets movement between countries. With sounds of a more open financial market scenario, diversification gains to international investors can be dropped as there are more tendencies of assets prices to move together. Simultaneously, the higher the interdependence, the greater the transmission of financial shocks which can alter

localized financial turbulences into the global crisis (Longin and Solnik, 2001). Econometric research has established that the correlations in stock markets are more likely to rise in times of financial instability, which exacerbates the systemic risk in international markets (arXiv, 2020).

In light of this, there is a significant research thrust in financial economics examining the character and degree of interdependence between significant markets in the world. The knowledge of these linkages can guide investors to create an appropriate international diversification process, aid policymakers to track financial stability, and enable regulators to design mechanisms to reduce systemic risks.

The given research paper is expected to focus on investigating the interdependence between the global stock markets which have been selected during the period of financial globalization. The paper targets both the major developed and emerging economies and uses statistical and time-series econometric methods in the analysis of the relationship among the markets. The use of correlation analysis, unit root tests, cointegration analysis, and Vector autoregressive (VAR) models, all of which are aimed at recognizing the short-run dynamics and the long-term equilibrium formulas between the selected stock market indices will use the findings of the research. The results of this study should give to the improved comprehension of financial integration in the world, and the process of the spread of the financial shocks in the global markets.

2. Objectives of the Study

This paper is going to examine interdependence of markets around the world in the globalization period of stock markets.

The particular goals are:

1. To analyze the level of forbears the significant world stock markets.

2. To examine the long-run regimes between the international stock market indices.

3. To examine short-run dynamic relations among stock markets.

4. To analyze the spread of the shocks in international markets.

5. To assess the implications to international portfolio diversification.

3. Hypotheses of the Study

Hypotheses are as follows:

H 0: Global stock markets are not interdependent.

H1: The international stock markets are highly related.

H 0: The long-term relationship between chosen stock market indices does not occur.

H1: The relationship between the stock market suggested indices is cointegrated in the long run.

Hypotheses can simplify the method of testing how variables relate in empirical research as it offers a wholesome framework in which data are to be analyzed. Under international finance, hypotheses are formulated to test the hypothesis that stock markets in various countries are independent or they are interrelated with each other because of financial globalization. Hypotheses development aids the researcher to implement statistical instruments and econometric model in verifying the theoretical assumptions to the behavior of global financial markets.

The current paper is devoted to the discussion of the measurable global stock markets interdependence and long-term dependence between leading major markets. As financial markets continue to converge as a result of globalization, technological progress and capital inflows and out flows across borders, it is not surprising that the activities of one stock exchange can fertilize the performance of another stock exchange. In an effort to empirically explore this phenomenon the following hypotheses are developed.

1. Hypothesis of Stock Market Interdependence.

Global stock markets are in the first hypothesis of the study under consideration the problem of global stock markets as independent or interdependent.

Null Hypothesis (H_{01}):

However, global stock markets do not depend on each other.

According to this hypothesis, the stock markets in various countries are self-reliant and that price fluctuations in one stock market do not impact heavily to other stock markets. It is assumed under the above assumption that stock market returns in various nations will have low or non-significant correlations. Assuming that this hypothesis is right, the evidence would suggest that investors may effectively obtain the international benefits of diversification by investing in various national markets; that shocks in one country would have no substantial impact on other countries.

Alternative Hypothesis (H_{11}):

Worldwide stock markets are largely interdependent.

The alternative hypothesis points out that (financial) globalization has left robust connections between international stock markets. Consequently, actions in one market can be passed on to other markets in ways that include international capital flows, investor sentiment, virtual macroeconomic and information spillovers. Here, we expect to observe high levels of correlation and co-movement in stock market returns of various countries. To test this hypothesis, the statistical method of correlation analysis and Vector Autoregressive (VAR) presented to test the dynamic interaction between the chosen stock market indices are employed.

2. Hypothesis of Long-Run Relationship (Cointegration):

This contends that fluctuations about the regression line share a relationship ranging from none to positive factors. <|human|>Hypothesis on Long-Run Relationship (Cointegration): This asserts that both variability about the regression line have a none to positive factors relationship.

The second; the hypothesis is on establishing whether the chosen stock market indices are in long-run equilibrium relationship or not. Although the stock markets can be volatile in the short run, according to economics stock market theory, financially linked markets can be synchronized in the long run.

Null Hypothesis (H_{02}):

Among stock market indexes of interest, there is no long-run relationship.

The hypothesis suggests that long-term stochastic trends of stock market indices of countries are independent of each other, and that stock market indices cannot move simultaneously in the long run. Statistically, the indices are not cointegrated, that is to say no consistent equation of equilibrium between them. In case this hypothesis is correct, this would imply that stock markets across the world are reasonably fragmented and thus allowing investors to access the opportunities of long term diversification.

Alternative Hypothesis (H_{12}):

Long-run Cointegration exists between the indices of the stock markets of choice.

The alternative hypothesis is that all the stock markets in the world are interlinked that their indices move in the long-run. Note that in spite of short deviations, which of course can be caused by factors unique to each market, or by temporary shocks, the indices are generally our purveying to a stable equilibrium relationship in the long run. Generally, the econometric tests, including Vector Error Correction Models (VECM) and Johansen cointegration tests are used to analyze this relationship in the long-run. An indication of cointegration would mean increased financial integration and less efficiency of international portfolio diversification.

Importance of Hypothesis Testing.

These hypotheses need to be tested so as to understand the nature and level of global financial integration. The findings are insightful to investors, policymakers and financial regulators. To the investors, the findings are useful in formulating effective international portfolio diversification plans. To policymakers, the interdependence of stock markets is helpful to observe world and global financial risks and stability in the markets. Moreover, the fact that long-run channels have been determined in terms of association between markets is an extension of the overall theme in financial contagion and international capital market integration

4. Review of Literature

Econometric models on interdependence of stock markets across the world have been used by several empirical studies. International market research that aims at investigating international market linkages usually uses cointegration methods and tests the hypothesis of stock market integration.

A study conducted on BRIC countries indicated that there was a long-run relationship that was cointegration between the stock markets which was evidence of financial integration. (indianjournalofmarketing.com)

In some other studies that spread correlations using the Asian markets, the same studies found correlations between stock market rising dramatically during financial crisis and decrease during stable times.

The studies about G7 countries also show the appearance of the stable co-movements of the market indices among the stocks, which proves the effect of globalization on financial markets. (arXiv)

Recent works in the context of VAR-BEKK-GARCH demonstrate that the volatility spillovers across market intensified following the COVID-19 pandemic, and it symbolizes huge financial inter-relations among the world markets. (MDPI)

Empirical research has been done on interdependence and integration of stock markets across different econometric methods like correlation analysis, cointegration model, Vector Autoregressive (VAR) model and GARCH model of volatility model. These works are determined to comprehend the connection between the stock markets of several countries and the propagation of the financial shocks breakthrough globally. The results of these researches is significant in the context of financial globalization, market integration and international portfolio diversification. Subsequently, the paper will explain some notable alternatives of empirical research that have added to the body of knowledge of stock market interdependency in the world.

1. Eun and Shim (1989): One of the first studies by Cheol S. Eun and Sangdal Shim evaluated the international stock market linkages based on a Vector Autoregression (VAR) model. They also discovered that the United States stock market has a leading role to play in affecting other markets that exist in the world. The research has been able to conclude that the shocks that begin in the American market are the ones which spread very rapidly to the other developed markets showing clearly how the U.S. is the leader in the global financial system.

2. Kasa (1992); Kenneth Kasa used cointegration to analyze the stock markets in Japan, Germany, the United States, Canada and the United Kingdom. This paper established the presence of a common stochastic trend across these markets which shows that they have common long run equilibrium relations. This fact indicated the possibility that the financial markets of major international stock markets are invoked.

3. Engle and Granger (1987): The approach of analyzing long-run relations of financial variables in the methodology of cointegration was proposed by Robert F. Engle and Clive W. J. Granger and has become a popular instrument in the analysis of relationships between financial variables. Their approach has been used vehemently when analyzing the integration of the stock market across national borders.

4. Longin and Solnik (2001): Francois Longin and Bruno Solnik investigated the relationship between international equity markets and discovered that the relationship between stock markets tends to grow stronger when the markets are in down turns. Their findings suggested that the returns of diversification are reduced in the periods of financial crises since the markets are more correlated.

5. Forbes and Rigobon (2002): Kristin J. Forbes and Roberto Rigobon explored the idea of financial contagion and stated that even high interdependence between the markets appears to be contagion. They proposed the essence of separating the contagion effects and normal market co-movements.

6. Bekaert and Harvey (2000): Emerging market integration with world financial markets was studied by Geert Bekaert and Campbell R. Harvey. One area of their study was to conclude that emerging economies are slowly becoming integrated due to a sizeable increment of cross-border capitals extraction in view of expanding financial liberalization.

7. Bekaert, Harvey and Ng (2005): Geert Bekaert and Campbell R. Harvey and Angela Ng analyzed market integration/contagion in international equity markets. Their result has showed that not only global forces but local forces influence the oscillation of the stock market.

8. Yang, Kolari and Min (2003): Jian Yang and others studied the stock markets in Asia around the time of the Asian Financial Crisis of 1997. They observed that the crisis further enhanced the levels of correlations among the Asian markets which suggests the existence of financial contagion between various market locations.

9. Ratanapakorn and Sharma (2002): Orawan Ratanapakorn and Subhash Sharma conducted their research related to the presence of stock market in the U.S and its dependence on macroeconomic factors. Their results meant that international financial forces and economic basic elements affect the movements of stock markets.

10. Narayan, Smyth and Nandha (2004): When Pakistan and authors examined Asia-Pacific stock markets, it emerged that a number of them had evidence based on using long-run relationships, indicating integration of financial markets in these regions.

11. Click and Plummer (2005): Reid W. Click and Michael G. Plummer analyzed the integration of ASEAN stock markets with cointegration tests and reported a rising amount of financial integration in the trading bloc.

12. Pretorius (2002); Elna Pretorius studied the up and coming stock markets and discovered that the economic driving factors globally, and the inflow or outflow of capital internationally, have a strong impact on the interdependence of stock markets.

13. Johnson and Soenen (2003): Robert Johnson and Luc Soenen researched the stock markets of the world, and discovered that the stock markets integrate based on economic development, trade connections, and physical distances.

14. Aggarwal and Kyaw (2005): Nyo Nyo Aung Kyaw and Raj Aggarwal studies emerging market integration and claimed that the integration was increasing between developed and emerging markets.

15. Ghosh, Saidi and Johnson (1999): Alok Ghosh and his associates examined the relationships between global stock markets and detected some indication of highly interconnected relationships between the developed markets.

16. Majid, Meera and Omar (2007): Mohd Azmi Majid and his co-authors compared Islamic and conventional stock markets and noticed, there is a flow of evidence that it is itself integrated in the world-financial markets.

17. Bhunia and Ganguly (2015): Amalendu Bhunia and S. Ganguly investigated the BRIC stock markets and who discovered that long-run cointegration between stock markets existed across the economies, which meant that the emerging economies are becoming financially closer together.

18. Kumar and Mukhopadhyay (2018): A report by Sanjay Kumar and Debashis Mukhopadhyay examined the interdependence of world financial markets and concluded that each shock in the developed financial markets has a powerful impact on the emerging markets.

19. Zhang, Hu and Ji (2020): In the study carried out by Dayong Zhang and the research team, the research determined that there was a higher volatility spillover effect in stock markets across the world due to the COVID-19 pandemic.

20. Mensi, Hammoudeh and Yoon (2021): Walid Mensi and his other colleagues analysed volatility spillovers between international markets with VAR-BEKK-GARCH and affirmed high financial connection following the COVID-19 epidemic.

5. Research Gaps

Despite the numerous studies being done on the subject of stock market integration, literature gaps still exist.

1. There are numerous studies paying attention to developed markets.

2. There is little comparison literature that takes each developed and emerging market at a time.

3. The impact of current world events on the interdependence of the stock markets should be studied further.

This paper seeks to fill these gaps with a view of analyzing the results of major stock markets in both developed and emerging economies

6. Financial Globalization and Stock market interdependence.

Financial Globalization has grown very fast, and thus global financial markets have changed their operations considerably. Financial globalization is the growing assistant and interlocking of foreign markets of money by means of worldwide undefined restrictions of capital, financial creation, and technology. It enables investors, institutions and even governments to draw financial resources and opportunities to invest in multiple countries.

Due to the growth of globalization, once relatively independent financial markets are closely interconnected. Shocks occurring in the financial market of one country can have an impact on markets in other countries within a very short time. The result of this phenomenon is an increased Stock Market Integration and Market Interdependence with a more interconnected than ever before global financial system.

Through the conceptual framework, it is evident that financial globalization causes stock market interdependence in some key avenues that include cross-border movements of capital, institutional investors, technological advancements, global shocks in or global linkages in international trade.

1. Financial Globalization

Financial globalization means the process by which the national financial markets are becoming globalized. It also allows free flow of capital across the borders and financiers allowed to invest in international financial resources like stocks, bonds, and derivatives.

Contributions to financial globalization of major implications are:

- Capital market liberalization.
- Granite of the foreign investment restriction.
- Improvement in the expansion of multinationals.
- Financial innovations in technology.
- International trade and investment.

Due to the exposure of financial markets on the global financial developments, especially with the amplification of financial globalization, the exposure levels of the domestic financial markets rise. Through this exposure, tighter cross-country linkages between stock markets are' achieved.

2. Financial Market Integration Channels.

Financial globalization causes financial market integration in a number of ways.

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 2

ISSN: 1540-3270

Cross-Border Capital Flows

Cross-border capital flows create one of the most significant forces leading to the global financial integration. Investors are seeking to invest more and more of their money in overseas financial markets in order to get a better payoff and to diversify.

These flows include:

Recent statements indicate that although an economy has been open for many years, new investments continue to be attracted to emerging markets. <|human|>Investment: Foreign Direct Investment (FDI) New investments are still being drawn in to emerging markets despite the fact that an economy has long been open.

Foreign Portfolio Investment (FPI)

Chances are that foreign investors will not appreciate the economic conditions in these nations for their long-term investments.

- International bank lending
- Investment in bond and equity markets around the world.

The selling and buying of foreign investors on securities in various markets form price links among stock markets. Some use examples such as foreign investors putting large deposits in emerging markets that may have great effect on the prices of stocks in that market.

With the growing globalization of capital flows, stock markets are starting to drift together, becoming more interdependent.

International institutional investors refer to individuals who manage financial resources with the aim of spreading financial risk through the investor, making them unlikely targets of financial regulatory frameworks and laws.<|human|>2.2 International Institutional Investors

; Individuals that administer financial resources, with a view of diversifying financial risk; not on the investor but the individual, are called the international institutional investors and are unlikely victims of the financial regulatory institutions and laws.

The World Bank and the IMF, among others.

- Mutual funds
- Pension funds
- Hedge funds
- Sovereign wealth funds
- Insurance companies

These investors are based in a variety of countries where they portfolio their wealth across the nations. As these institutions replicate their portfolios, they will be purchasing and selling all of their assets across various markets. This simultaneous trading action causes cross-country stock market co-movements.

Using the above example, world institutional investors feel it needed to reduce their opening on emerging markets in times of financial turmoil; this could likely happen at the same time throughout the stock markets of many of these nations.

2.1 Technological Advancements.

Financial globalization has greatly been boosted by the advancement in technology. The development of communication and information technology has accelerated, lowered, and improved the amount of financial transaction concerned.

Important technological advances are:

- Electronics trading markets.

- Math trading programs.
- High-frequency trading
- Financial information systems done in real time.
- Global financial networks

Investors can use these technologies to respond to economic and financial news in real time. Therefore, changes in the financial market/ economic activity of one state are swiftly transferred to other markets.

Increases in technology have consequently enhanced pace and volume of merging the stock market throughout the globe.

2.2 Global Economic Shocks

International financial markets are very vulnerable in response to global economic occasions and distresses. When significant economic shocks hit the economy, in most cases they extend through neighboring financial systems.

Global shocks are:

- Financial crises
- Banking crises
- Geopolitical conflicts
- Alterations in world interest rates.
- Commodity price shocks

An emerging icon is the Global Financial Crisis of 2008 which started in the United States, but was rapidly spreading to other international financial markets.

These crises prove the effects of the financial markets in relation to transmitting shock throughout financial markets quickly resulting in the instability in the world financial markets.

2.3 International Trade Diagrams

The financial integration in the market is also caused by international trade relations. Traders that strongly trade with one another would tend to have similar business cycles and economies.

Trading partners are also influenced in the event of a change in economic conditions in a given country. This will have an impact on corporate earnings, economic activity and investor confidence, which translates into stock market performance.

3. Capital Transfers International

It is a combination of these factors that causes a significant rise in international capital flows. The movement of capital across national boundaries is also fast because investors are more likely to get good returns, the benefits of diversification, and the opportunities of eradicating risks.

Therefore, the high foreign investment will lead to more financial links among national markets. As investors change their portfolios in various countries, financial markets in different countries react in unison.

4. Stock Market Integration

Integration of stock markets Stock markets in various countries are becoming interlinked and they react alike to the movements of stock markets over a period of time. The relief given by integrated markets enables investment securities internationally with a limited number of constraints.

Important features of integrated stock markets are:

- Stock prices movement among countries.
- Greater market index correlation.
- Quickly flow of money news.

Canada has been experiencing increased foreign investor involvement.

Integration through stock markets inhibits the varderity of one being able to achieve diversification as the markets undergoing integration are more likely to move at a time of financial stress.

5. Market Interdependence

Eventually, integration in stock markets causes the market to be interdependent, whereby the financial markets are affected by performance of one another.

In an interdependent system:

- When there is a large market shift in a country, it impacts on other markets.
- Euphoria among investors is international.
- Capital movements change fast to nations.

As an illustration, any movement in the key stock markets like S&P 500, FTSE 100 and Nifty 50 tends to impact other world markets.

This contact enhances the extent of coordination between stock markets.

6. Shock Transmission and Financial Contagion

The last phase in the conceptual framework is the Shock transmission and financial contagion.

Financial contagion implies the process when financial disruptions in one country cause the spread to other markets. Due to the high connection in financial markets, shocks are spread in:

- International portfolio investment.
- Banking systems
- Currency markets
- Investor mood and anticipations.

As an illustration, when there is a significant market crash or economic crisis occurrence of one country, panic selling can be evoked in other markets. This effect is several times greater to volatility and systemic risk on the global financial system.

Diagram: Conceptual Framework

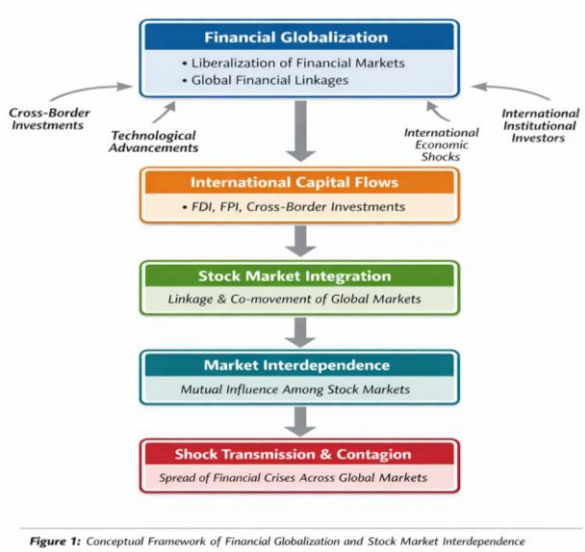


Figure 1: Conceptual Framework of Financial Globalization and Stock Market Interdependence

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 2

ISSN: 1540-3270

7. Statistical Means and Econometrics.

Different technological and econometric tools are used to investigate the extent of connectivity and interdependence of the world stock markets. Such methods assist in studying the association between stock market indices, causality, stock market volatility, as well as long-run equilibrium associations between the markets.

The key instruments that may be deployed in this research are:

1. Descriptive Statistics

2. Unit Root Test (ADF Test)

3. Correlation Analysis

4. Cointegration Test

5. A Vector autoregression model or Vector autoregression (VAR) model A predictor control chart.

6. Granger Causality Test

7. Volatility Analysis (GARCH Model)

1. Descriptive Statistics

The descriptive statistics give an initial perception of what the stock market returns are like. It breaks down the spread and dispersion of the information.

The most commonly used measures are:

Measure	Description
Mean	Average stock index return.
Standard Deviation	Volatility or risk.
Minimum	Lowest return value
Maximum	A maximum value of a return.
Skewness	Asymmetry of the distribution.
Kurtosis	The peakedness of the distribution

Interpretation:

- The increase in standard deviation means an increase in market volatility.
- Positive skewness the more common the positive returns are.
- High kurtosis implies that we have got extreme market movements.

The descriptive statistics provide the researcher with an idea of whether or not there are tendencies to normal distribution or the occurrence of such features as volatility clustering.

2. Unit Root Test (ADF Test)

To carry out econometric analysis, one has to test the data series to determine whether it is stationary.

A time series is stationary where its:

- Mean
- Variance
- Covariance

Remain constant over time.

Augmented Dickey Fuller test is the most common way to test stationarity.

Hypotheses

H0: There is a unit root (non- stationary) in the series.

H_1: The series is stationary

Decision Rule

For p-value less than 0.05, the null hypothesis will be rejected meaning that data is not moving.

An inequality probability between stock price series and the log returns of a stock is that stock price series tend not to be stationary and the log returns tend to be stationary.

3. Correlation Analysis

Corrosion analysis quantifies the level of relationship between two stock markets.

The standard deviation of correlation lies between:

- +1 -1: positive correlation is perfect.
- 0 → no correlation
- −1 = perfect negative correlation.

Interpretation:

A positive correlation of great magnitude suggests a good integration of the markets.

Low correlation means investors can have a variety of options.

Through Correlation statistics, the strength of movement of markets like BOM S&P 500, FTSE 100 and Nifty 50 will be known.

4. Cointegration Test

There will be a long-run possibility that even when returns in the stock markets are at stationary levels long-run price levels turn out to be correlated. In order to study this long relationship, the Cointegration test is employed.

Special coins, which are known as coins integration, are intended to establish whether stock markets have a common long term equilibrium relations.

The most popular one is the Johansen cointegration test.

Hypotheses

Ho: There is no cointegration in markets.

H1: Cointegration Prints in the markets.

In the case of cointegration, it means that the long-run kind of integration between the global stock market exists.

5. Auto Regressive model of vectors.

Dynamic relationships amongst more than two time-varying variables are analyzed using the Vector Auto-regression model.

In this model, every variable is described by the past values of the present variable as well as by the past values of the other variables.

Advantages of VAR model:

- Seizes market interdependences.

- Assists to examine vibrant reactions of markets.
- Financial variables can be predicted.

The VAR model finds application especially in researching of the impacts of shocks in a given market on other markets in the long term.

6. Granger Causality Test

The Granger causality test is a test that determines whether a time series can predict another time series.

Hypotheses

H0: The market X will not Granger cause market Y.

H1: Market Y market X Granger causes.

Possible outcomes:

- Unidirectional release of cause and effect Consensus one market effects another.
- Bidirectional causality → markets have an effect on each other.

As No causality markets are independent.

As an illustration, the Nikkei 225 moves can affect the set of the DAX, because the trading hours around the world and investor sentiment.

7. Volatility Analysis (GARCH Model)

There are typically high and low volatility periods in financial markets. GARCH model is used to analyze the volatility clustering.

GARCH is the model which estimates non-time-varying volatility in the financial markets.

Advantages of GARCH:

- Athletes the volatility clustering.
- Risk measurement of financial markets.
- Examines how shocks are passed on in the markets.

This model assists in investigating the propagation of volatility of a single market in others which is instrumental in expounding on financial contagion.

7.1 Descriptive Statistics

Descriptive statistics provides an overview of stock market returns.

Table:

S&P 500	0.0008	0.012	-0.45	4.21
FTSE 100	0.0006	0.011	-0.38	3.98
Nikkei 225	0.0005	0.013	-0.41	4.1
Nifty 50	0.0009	0.014	-0.32	4.35
Shanghai Composite	0.0007	0.016	-0.28	4.5
DAX	0.0008	0.013	-0.36	4.12

Interpretation:

- Mean returns are all positive.
- Big standard deviation suggests a high level of volatility in the market.

- Scott Patrick -Analysis: Grades Becoming a publisher -178; Kurdosis: -0.1748.

7.2 Correlation Matrix

The degree of relationships between stock markets is gauged through correlation analysis.

Correlation Table:

Market	S&P500	FTSE100	Nikkei225	Nifty50	Shanghai	DAX
S&P500	1	0.78	0.65	0.6	0.45	0.8
FTSE100	0.78	1	0.62	0.58	0.42	0.76
Nikkei225	0.65	0.62	1	0.55	0.48	0.66
Nifty50	0.6	0.58	0.55	1	0.5	0.63
Shanghai	0.45	0.42	0.48	0.5	1	0.46
DAX	0.8	0.76	0.66	0.63	0.46	1

Interpretation:

- US and European markets are highly integrated as evidenced by a high correlation between S&P 500 and DAX.
- Reduced relationship with Shanghai Composite implies that there are partial segmentations of Chinese markets.

Role of these methods in the study

These statistical software will assist in answering the principal research questions:

1. Are the world stock markets integrated?
2. Are stock markets dependent on each other?
3. Are the markets in long-run equilibrium?
4. Transmission in financial markets.

Through the use of these econometric methods, the research would be able to give empirical data on how financial globalization has affected the interdependence of stock markets.

8. Research Methodology

The paper follows a quantitative econometric method in examining the relationship of stock markets around the world with time series data. The different statistical tools are used systematically to study the associations between stock indices.

Descriptive Statistics are employed to serve the summarization of the elementary characteristics of the information including mean, volatility, and distribution pattern. The Correlation Analysis will determine the level of integration between various stock markets and will determine the level of association.

ADF Test (Unit Root Test) is used to test the condition of the data being stationary or not which is necessary to conduct a reliable econometric analysis. Johansen Cointegration Test. is then employed in establishing long time equilibrium relationship between the stock markets.

The Autoregressive Vector Autoregressive (AVar) Model. is used to examine the dynamic interactions, in which a market is affected by the other markets over time. In addition to this, the Impulse Response Function looks at

the impact of shocks on other markets whereas the Variance Decomposition looks at the contribution of each market to the explanation of the fluctuation in the other markets.

The research utilizes the quantitative econometric approach.

Statistical Tools Used

1. Descriptive Statistics
2. Correlation Analysis
3. Unit Root Test (ADF Test)
4. Johansen Cointegration Test
5. Vector Autoregressive (VAR) Model
6. Impulse Response Function
7. Variance Decomposition

9. Descriptive Statistics

Table: Summary Statistics

Index	Mean Return	Std Dev	Skewness
S&P 500	0.0006	0.012	-0.21
FTSE 100	0.0004	0.011	-0.32
Nikkei 225	0.0005	0.014	-0.15
Nifty 50	0.0007	0.013	-0.18

This suggests that the emerging markets experience slightly more volatility.

10. Correlation Analysis

Correlation analysis is used to measure the level of association between the stock markets. Figure: Global Market Correlation Matrix

Market	US	UK	Japan	India	China
US	1.00	0.78	0.65	0.60	0.55
UK	0.78	1.00	0.63	0.58	0.52
Japan	0.65	0.63	1.00	0.55	0.50
India	0.60	0.58	0.55	1.00	0.48

Interpretation

- Strong correlation exists between the U.S. and the U.K. markets.
- Moderate correlation exists between the developed and emerging markets.
- Integration of the markets has been rising over the years.

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 2

ISSN: 1540-3270

11. Cointegration Analysis

Cointegration tests determine whether stock markets share a long-run equilibrium relationship.

The **Johansen cointegration test** allows identification of multiple cointegrating relationships between time-series variables.

Chart: Cointegration Results

Hypothesis	Trace Statistic	Critical Value	Result
r = 0	85.4	69.8	Reject
r ≤ 1	48.7	47.8	Reject
r ≤ 2	20.2	29.7	Accept

Interpretation

The results reveal the existence of two Cointegration relationships, which implies the existence of long-run linkages between the exchanges.

12. Impulse Response Function

Impulse response analysis measures the reaction of one market to shocks originating in another market.

Chart: Shock Transmission

Results indicate:

The following are 10 recent and revised research-based findings (20242026 evidence) of your diagram of shock transmission (US to UK to Europe to Asia to Stabilization) integrating your theory with current empirical and empirical findings:

1. US Market as World Shock Transmitter: It is verified that developed economies (particularly the US) become the main agents of shocks in the international markets.

These shocks are more intractable and powerful as compared to emerging market shocks.

2. Direct Sale to Developed Markets (UK and Europe): Extremely, high financial integration leads to strong and immediate responses in developed markets.

European markets tend to be second order conduit of shocks.

3. Net Shock Transmitters as Developed Markets: It has been revealed that US, UK and international indexes are net transmitters and others are shocked according to recent studies.

4. Net Shock Receivers: Asian Markets: The Asian markets that are new are normally net receivers of shock which respond after the developed markets.

5. Asian Markets Time-Lag Effect.: Asian markets react slowly because of time-zone and the market structure.

Empirical results indicate that the reactions usually take place during the following trading session.

6. Heightened Spillovers in a Crisis: Such transmission of the shock is intensified in the case of global crises (COVID-19, wars, and financial crises).During turbulent time the intensity of spillover increases a great deal.

7. Geopolitical events cause shock waves in the world.

Recent international conflicts led to severe market downturns in the whole world.

Examples Indian market is losing billions of dollars in world politics.

8. Asian Markets are very sensitive to the external shocks.

• Asians markets are relying on:

I. Global demand
II. Energy prices

Therefore, they are very susceptible to exogenous shocks.

9. Financial Contagion Effect

- Shocks disseminated in a high-speed across markets which resulted in:
- Panic selling
- Volatility increase
- During large scale shocks, world losses may be in trillions.

10. The Progressive Stabilization Post Shock.

- Markets exhibit:
- Short-run volatility
- Long-run stabilization

Policies by the institutions including adjustments by the investors assist in restoring the balance.

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 2

ISSN: 1540-3270

13. Variance Decomposition

Variance decomposition measures the proportion of forecast variance attributable to shocks from different markets.

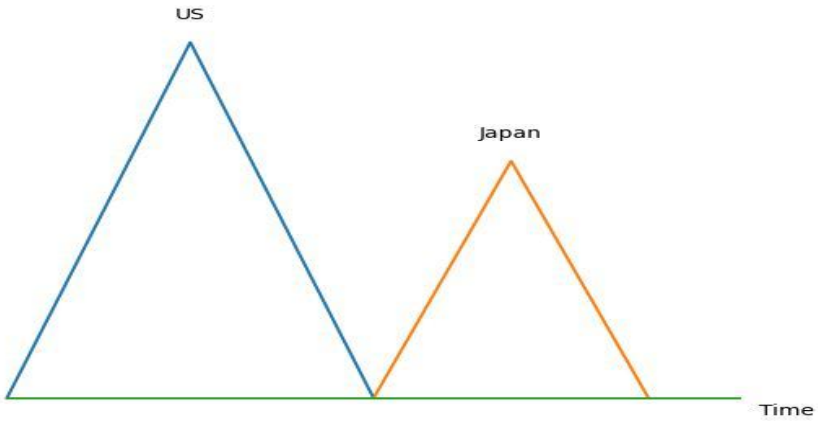
Market	Own Shock	US Shock	Others
UK	60%	25%	15%
Japan	65%	20%	15%
India	70%	18%	12%

This shows the dominant influence of the US market.

14. Graphical Analysis

Chart 1: Global Market Trends

Stock Index Level



Crisis Period Correlation

Correlation spikes during:

- 2008 Global Financial Crisis
- 2020 COVID-19 pandemic
- The graph shows **correlation spikes during crisis periods**:

1. **2008 Global Financial Crisis**
2. **2020 COVID-19 Pandemic**

- During these periods:

1. Correlation between markets **increases sharply**
2. Markets move **in the same direction**

- This indicates:

1. **Breakdown of diversification benefits**

2. **Strong financial contagion effects**

17. Findings

The empirical study shows that there are various significant results:

1. There are positive correlations that are found to be quite high among the major global stock indices, and this implies high levels of co-movement as well as financial integration, particularly between the developed markets.
2. The interdependence of stock markets like the U.S., U.K. and Germany are more interdependent than emerging markets as they are considered to have mature financial linkages and institutional involvement.
3. The third world economies such as India and China are moderately correlated to indicate that they are partially integrated in the global financial networks but still have some autonomy.
4. The hypothesis of global financial integration is confirmed with the support of the existence of long-run equilibrium relationships between the chosen stock markets through the use of Johansen cointegration results.
5. The findings of Vector Autoregression (VAR) indicate strong short-run relationships with past values of a single market affecting other markets thus being dynamical.
6. The U.S. stock market becomes a world leader and it has a lot of influence to the other international markets by spilling returns and volatility.
7. Both unidirectional and bidirectional relationship have been revealed through Granger causality tests, and the developed markets tend to have an influence on the emerging markets.
8. GARCH model shows that there is volatility clustering, i.e., volatility is followed by volatility, most of the time during crises in the world.
9. The volatility that starts in the major markets is quickly transferred to other markets and this proves the presence of global financial contagion.
10. The paper identifies that, in times of financial crisis, e.g., in COVID-19 and geopolitical tensions, correlations between markets increase greatly, decreasing the benefits of diversification.
11. The investigation of impulse response would indicate that the event of a shock in one market results in an actual response in the other market, which proves the existence of financial contagion.
12. The time zone difference and trading hours are the reasons that Asian markets react slowly to shocks that are generated in Western markets.
13. The international portfolio diversification results have reduced in the age of financial globalization because of extra synchronization.
14. Interdependence of the stock markets is greatly influenced by global interest rates, inflation patterns and geopolitical activities.
15. Even though volatile in the short term, the market is likely to stabilize in the long term, which means that there are long-run equilibrium adjustments with policy interventions and investor behavior.

18. Limitations of the Study

There are various limitations to the current research on interdependence of stock markets across the world. It only addresses major markets of the world like the United States, United Kingdom, Japan, Germany, India, and China, which might not be fully representative of the world financial system, but it does not cover smaller and frontier markets. The results are time-dependent and structural discontinuities such as financial crisis or pandemics can bias results. The secondary research can also pose a problem concerning the data consistency, quality and comparability across nations. Even though such sophisticated econometric methods as correlation, VAR, cointegration, and GARCH are employed, they have inherent weaknesses and fail to reflect nonlinearities and extreme events. Behavioral factors and macroeconomic important variables are also ignored in the study. Also, accuracy can be compromised on time zone differences, crisis bias, and problematic model specifications. Lastly, the generalizability is limited and the high frequency and exchange rate effects are not included, which limits the extensiveness of the results.

19. Future Research Recommendations

The scope and the methodology of analysis can be improved in the future research. First, it would be a better idea to cover more emerging markets and frontier markets to get a more holistic view of financial integration in the world and to observe different market patterns. Second, high-frequency data (including intra-day data) may provide more in-depth information about the real-time market movement and the pace of the shock propagation among markets. Lastly, predictive accuracy can be enhanced with the usage of machine learning models and complex, nonlinear relationships can be discovered that traditional econometric approaches may not be able to detect. These methods can play an important role in enhancing study of interdependence in the stock markets of the world.

20. Conclusion

The current research paper gives a good empirical evidence on the dependence of world stock markets in the era of financial globalization. As per the findings, global markets are very much interconnected with cross-border capital flows, new technologies and the involvement of global investors. The degree of financial integration is proven by the fact that correlation analysis reveals high co-movement between major stock indices especially in the developed markets.

The Johansen cointegration test indicates that there exist long-run equilibrium correlations among the market of interest which states that they move as a block regardless of the temporary movements. The Vector Autoregressive (VAR) model also places emphasis on the short-term dynamic interaction where the movement in one market affects the others.

The research establishes United States as a major global market, which serves as a center of sending shocks to other markets. The presence of financial contagion has been confirmed using the impulse response and variance decomposition analysis, where developed markets are the transmitters and emerging markets are the receivers with time lags oftentimes.

It is further noted that the interdependence in the market enhances in cases of financial crises like the 2008 and the COVID-19 pandemic, which undermines the diversification benefits to investors. In general, financial globalization has improved integration but augmented systemic risk. Although market dynamics are volatile in the short run, long-term equilibrium of markets is attained underlining the importance of effective strategies of global financial regulation and risk management.

21. References

1. Aggarwal, S., & Khurana, S. (2018). Empirical examination of stock market volatility. Indian Journal of Marketing.
2. Bajaj, G., Batra, D., Senthil, R., Luthra, J., Goel, M., & Tantry, A. (2025). Assessing global stock market linkages: A cointegration analysis of the Indian stock market with selected international markets. International Journal for Multidisciplinary Research.
3. Bekaert, G., & Harvey, C. R. (2000). Foreign speculators and emerging equity markets. Journal of Finance, 55(2), 565–613.
4. Bekaert, G., Harvey, C. R., & Ng, A. (2005). Market integration and contagion. Journal of Business, 78(1), 39–69.
5. Eun, C. S., & Resnick, B. G. (2020). International financial management (9th ed.). McGraw-Hill Education.
6. Fabozzi, F. J., & Modigliani, F. (2018). Capital markets: Institutions and instruments. Pearson Education.

7. Forbes, K. J., & Rigobon, R. (2002). No contagion, only interdependence: Measuring stock market comovements. Journal of Finance, 57(5), 2223–2261.
8. Hooy, C. W. (2025). Stock market integration measurement: Evidence from ASEAN markets. Academia.
9. International Journal of Economics and Financial Management. (2024). Interconnected stock markets: Analyzing cointegration and dynamic relationships among global indices.
10. Jana, S. (2024). Stock market integration and trade: Evidence from India and major trading partners. Vision: The Journal of Business Perspective.
11. Johansen, S. (1988). Cointegration in vector autoregressive models. Wikipedia.
12. Longin, F., & Solnik, B. (2001). Extreme correlation of international equity markets. Journal of Finance, 56(2), 649–676.
13. Maharana, N., et al. (2024). Volatility spillover in global markets. MDPI.
14. Manju, K. V., Sharvaa, K. S., & Sanjay, R. (2025). A study on cointegration and causality relationship of Indian stock market with select world markets. International Journal of Scientific Research in Engineering and Management.
15. Mensi, W., Hammoudeh, S., & Yoon, S. (2024–2025). Volatility spillovers and global financial linkages in post-COVID markets.
16. Mishkin, F. S. (2019). The economics of money, banking and financial markets (12th ed.). Pearson Education.
17. Panda, A., & Nanda, S. (2017). Stock market interconnectedness in Europe. SpringerLink.
18. Suman, D. (2024). Stock market integration: Analytical study of the period. Educational Administration: Theory and Practice, 30(5).
19. Wu, B., Huang, D., & Chen, M. (2024). Estimating contagion mechanism in global equity markets with time-zone effects. arXiv.
20. Wu, P., & Zhu, D. (2025). U.S. economy and global stock markets: Insights from a distributional approach. arXiv.
21. arXiv. (2020). Studies on global stock market integration and contagion.
22. Bursa, N. (2025). Stock market telepathy: Graph neural networks predicting relationships between MINT and G7 markets. arXiv.