

## Investigation of the Effect of Economic Freedom on Stock Market Volatility

**Mohammad Hosein Setayesh**

Associate Prof. of Accounting Department, Shiraz University, Shiraz, Iran  
[setayesh.mh@gmail.com](mailto:setayesh.mh@gmail.com)

**Shahrokh Sheidaee**

Ph.D. Student of Accounting Department, Shiraz University, Shiraz, Iran  
[Sh\\_sheidaee347@yahoo.com](mailto:Sh_sheidaee347@yahoo.com)

### Abstract

*This paper investigates the relationship between economic freedom and stock market volatility in twelve Asian and pacific countries. The period for the study has been taken from 2002 to 2012 using annual indices. In order to assess the volatility, we use autoregressive conditional heteroskedasticity specifications known as GARCH model. In addition, The statistical method used to test the hypotheses of relationship between economic freedom and stock market volatility is panel data method. Significance level of Phillips-Peron (1998) unit root test shows that the variables are reliable. The results indicate that there is no relationship between economic freedom and stock market volatility. Additionally, the study indicates that there is a relationship between legal structure and security of property rights, access to sound money and freedom of international trade with volatility of stock markets.*

**Keywords:** Economic freedom, equity market, volatility and macroeconomic variables.

## 1. Introduction

Globalization is a process that has resulted in an increase in free trade and international investment which has led to the integration of national economy. By increasing economic freedom and providing access to information, globalization has empowered and entitled people to be in charge of firms, resulting in more accountability and responsibility (Akhter, 2004). Economic globalization is synonymous with economic liberalization in both national and international level. National liberation means privatization, the reduction of government intervention in the economy and moving towards a free-market and international liberation implies reducing trade barriers of goods and services, capital flows and technology transfer (Dadgar and NajjMeydani, 2003). One of the benefits of economic freedom is freedom of investment in various markets and this advantage will enable investors to increase their efficiency and reduce risk through diversification of their portfolios. In this regard, the importance of emerging equity markets in the context of investment portfolios and international diversification has received considerable attention (Jon et al. 2003). The interdependence of emerging stock markets has serious implications for both investors and policy-makers. Investors have increasingly turned to the emerging stock markets in their search for international diversification, but the interdependence between these markets may have reduced the scope for diversification possibilities. At the same time, policy-makers in most emerging economies have gone to great lengths in recent years to open up their economies, especially their financial markets, in the hope of sharing in the benefits and efficiencies of an integrated world financial market. It is therefore crucial to understand to the factors that influence the level of interdependence (Pretorius, 2002). Emerging market stocks are characterized in early studies by large average returns but low correlation with developed markets, and are promoted on their ability to improve mean variance efficiency for investors pursuing portfolio diversification (Barkley et al. 2010).

The effect of stock market liberalization on return volatility in particular is an important issue that emerging market economies must consider before their decision to liberalize and perhaps even after. This is because volatility is an unattractive feature that has adverse implications for decisions pertaining to the effective allocation of resources and, therefore, for investment. For instance, volatility makes investors more averse to holding stocks due to uncertainty. Investors in turn demand a higher risk premium in order to insure against the increased uncertainty. A greater risk premium results in a higher cost of capital, which then leads to less private physical investment. In addition, greater volatility may increase the value of the option to wait thereby delaying investment. Also, weaker regulatory systems in developing markets reduce the efficiency of market signals and the processing of information, which further magnifies the problem of volatility (Jayasuriya, 2005).

The main objective of this study is to investigate the role of economic freedom on the equity market returns. This goal can be achieved by providing guidelines based on the research results, which helps law makers, policy makers, and macroeconomic decision makers of the country as well as investors and those who use the annual statements for financial decision making. Another objective of this study is to compare the role of economic freedom on equity market returns of Iran with those of other countries of the statistical population.

## **2. Literature Review**

### **2.1. Economic Freedom**

The index published in Economic Freedom of the World (EFW) (2014) is designed to measure the consistency of a nation's institutions and policies with economic freedom. The key ingredients of economic freedom are

- Personal choice
- Voluntary exchange coordinated by markets
- Freedom to enter and compete in markets
- Protection of persons and their property from aggression by others.

The index measures the degree of economic freedom present in five major areas:

#### **1- Size of Government: Expenditures, Taxes, and Enterprises**

The four components of Area 1 indicate the extent to which countries rely on the political process to allocate resources and goods and services. When government spending increases relative to spending by individuals, households, and businesses, government decision-making is substituted for personal choice and economic freedom is reduced. The first two components address this issue. Government consumption as a share of total consumption and transfers and subsidies as a share of GDP are indicators of the size of government. When government consumption is a larger share of the total, political choice is substituted for personal choice. Similarly, when governments tax some people in order to provide transfers to others, they reduce the freedom of individuals to keep what they earn.

#### **2- Legal Structure and Security of Property Rights**

Protection of persons and their rightfully acquired property is a central element of economic freedom and a civil society. Indeed, it is the most important function of government. Area 2 focuses on this issue. The key ingredients of a legal system consistent with economic freedom are rule of law, security of property rights, an independent judiciary, and an impartial court system. Components indicating how well the protective function of government is performed were assembled from three primary sources: the International Country Risk Guide, the Global Competitiveness Report, and the World Bank's Doing Business project.

#### **3- Access to Sound Money**

Money oils the wheels of exchange. An absence of sound money undermines gains from trade. As Milton Friedman informed us long ago, inflation is a monetary phenomenon, caused by too much money chasing too few goods. High rates of monetary growth invariably lead to inflation. Similarly, when the rate of inflation increases, it also tends to become more volatile. High and volatile rates of inflation distort relative prices, alter the fundamental terms of long-term contracts, and make it virtually impossible for individuals and businesses to plan sensibly for the future. Sound money is essential to protect property rights and, thus, economic freedom. Inflation erodes the value of property held in monetary instruments. When governments finance their expenditures by creating money, in effect, they are expropriating the property and violating the economic freedom of their citizens.

#### **4- Freedom to Trade Internationally**

In our modern world of high technology and low costs for communication and transportation, freedom of exchange across national boundaries is a key ingredient of economic freedom. Many goods and services are now either produced abroad or contain resources supplied from abroad. Voluntary exchange is a positive-sum activity: both trading partners gain and the pursuit of the gain provides the motivation for the exchange. Thus, freedom to trade internationally also contributes substantially to our modern living standards.

#### **5- Regulation of Credit, Labor, and Business**

When regulations restrict entry into markets and interfere with the freedom to engage in voluntary exchange, they reduce economic freedom. The fifth area of the index focuses on regulatory restraints that limit the freedom of exchange in credit, labor, and product markets. The first component reflects conditions in the domestic credit market. The first two sub-components provide evidence on the extent to which the banking industry is dominated by private firms and whether foreign banks are permitted to compete in the market. The final two sub-components indicate the extent to which credit is supplied to the private sector and whether controls on interest rates interfere with the market in credit. Countries that use a private banking system to allocate credit to private parties and refrain from controlling interest rates receive higher ratings for this regulatory component.

#### **2.2. Volatility**

The popular explanation for the presence of volatility in stock markets is leverage effect. According to Black (1976) and Christie (1982), a stock price fall reduces the value of equity and hence increases the debt-to-equity ratio. This increase in leverage raises the riskiness of the firm and an increase in volatility is observed. Under these circumstances, shareholders who bear the residual risk of the firm to recognize their future cash-flow stream as being relatively more risky or volatility (P. Oskooe, 2010). There is another explanation for volatility which is known volatility feedback. In this sense, increases in stock returns volatility raise required stock returns and cause an immediate price decline. In other words, since volatility is a measure of risk, an increase in volatility signals a higher risk and also higher expected future risk. To bear this risk, investors will require higher returns thus be willing to pay less for the corresponding equity. The selling activity is proposed as another reason to the asymmetric effect (Avramov et al, 2004).

Considerable research has focused on stock market liberalization and stock market volatility and the empirical evidence is mixed. Bekaert and Harvey (1997) generally find that volatility decreases after liberalization. De Santis and Imrohoroglu (1997) also find evidence that volatility decreased after liberalization in a subset of countries, such as Argentina. However, Huang and Yang (1999), using the dates of financial liberalization from De Santis and Imrohoroglu (1997), show that the unconditional volatility of the stock markets in three of the countries analyzed (South Korea, Mexico and Turkey) increased after liberalization, whereas it decreased in another four countries (Argentina, Chile, Malaysia and the Philippines) (Cunado et al, 2006).

#### **3. Data & Methodology**

We use EFW report (2014) published by Economic Freedom Network to measure economic freedom as the independent variable. Also, we use GARCH model to evaluate stock market

volatility. These statistical specifications have been successfully applied to financial data and have become a popular tool to study financial market volatility. The basic ARCH (q) model has two equations, a conditional mean equation and a conditional variance equation. Both equations must be estimated simultaneously, since the variance is a function of the mean. A simple ARCH (1) with an autoregressive first order mean equation and first order variance equation look as follows,

$$y_t = a_0 + a_1 y_{t-1} + \varepsilon_t, \text{ where } \varepsilon \sim D(0; h_t) \quad (1)$$

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 \quad (2)$$

Since the variance represents the second moment of the process, it follows that the two equations constitute a system. In this case the mean is an AR (1) process, and the variance process is also an autoregressive process of the first order. Notice that the distribution of the error term is left to be decided. The presence of ARCH means that the normal distribution is not always the best approximation to use.

The mean equation estimates the conditional mean of the variable. It is important to get the mean equation correctly specified before estimating the ARCH/GARCH model. The mean equation typically can be modelled as an AR process, AR in combination with other explanatory variables, just as a function of other explanatory variables. It is important to test for no autocorrelation in the residuals before estimating the GARCH process.

The ARCH model represents a type of moving average in the variance process, which explains the notation of q in ARCH (q). Like for AR and MA model we can use the duality to find a simpler specification by combining the two processes into an ARMA type of process. Thus if the ARCH process gets long, a GARCH process will typically offer a better fit. For a variance process we have the Generalized Auto Regressive Conditional Heteroscedasticity model of order q, p, GARCH (q, p) model

$$h_t = \omega + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i h_{t-i} \quad (3)$$

The most typical model in empirical work is the GARCH (1, 1) model. Quite often the coefficients of the GARCH (1, 1) will sum to near unity.

Considering the research carried out in Iran and other countries, in this study, the controlling variables of the present study are as follow. GDP growth as studied in Smimou and Karabegovic's (2010); population growth and inflation as mentioned in Fifield et al. (2000), Chan (2009) and Abbasi et al. (2009); total exports and imports as a percentage of GDP as studied in Pilinkus (2010) and R. Roodpooshti et al.'s studies (2005); and the GDP.

The statistical population of this study consists the stock market in 12 countries in Asia and the Pacific (Australia, Indonesia, Iran, Turkey, China, Japan, Singapore, Philippines, South Korea, Malaysia, India and Hong Kong) from 2002 to 2012. Also, this study does not use statistical sampling; the entire statistical population is examined. This data is based on actual figures of the stock market. In this study, data was collected using the library approach. The variables are collected through the website of the International Federation of Stock Exchange and the Fraser Institute and the World Bank report.

Considering the data type and the present methods of analysis, panel data has been used. In order to investigate the relationship between economic freedom and stock market volatility, the dependent and independent variables are evaluated from two different aspects. On the one hand, these variables are from different countries and on the other hand, the eleven-year period 2002-2012 is tested.

Table 1 provides descriptive statistics on the variables that will be employed in our model. As expected, all the variables in Table 1 appear to exhibit a reasonable mean value, but with extreme values for the minimum and maximum. For instance, a mean volatility of 11.37% is somewhat low, but still reasonable for that period of time. The wide gap between the maximum (75.82%) and minimum (0.04%) gives support to the high variability in stock markets. Positive skewness of volatility means that the stock returns distribution skewed to the right of its mean and has a long right tail. This means that in stock markets large positive returns tend to occur more often than large negative ones. In other words, large positive movements in stocks prices are not usually matched by equally large negative movements. Accordingly, the distribution of stocks return series is non- symmetric. In other words, the stock returns distribution is the asymmetric to the right with few extreme and positive values. At the same time, the kurtosis or degree of excess, in the stocks volatility series is bigger than the normal value of 3. As a result, the distribution of stock volatility is peaked\_ leptokurtic. In the case of the kurtosis measure, it can be noted that the unconditional distribution of stock return series is “fat-tailed” (relative high probability for extreme value).

Table 1: Descriptive statistics

Variables	No. of observations	Mean	Median	Max.	Min.	Standard Deviation	skewness	kurtosis
volatility	132	0.1137	0.0831	0.7582	0.0004	0.1132	2.8497	14.5081
Economic Freedom	132	6.9348	6.7000	9.1000	5.5000	0.8420	1.2046	3.8144
1 <sup>st</sup> Factor	132	6.7212	6.7200	9.4000	3.2800	1.4264	-0.2175	3.0828
2 <sup>nd</sup> Factor	132	6.1546	6.2700	8.4300	3.6900	1.2228	-0.1990	2.2219
3 <sup>rd</sup> Factor	132	8.1237	8.1800	9.9000	4.1000	1.3756	-0.6569	2.6775
4 <sup>th</sup> Factor	132	7.1672	7.0900	9.6000	5.0600	0.9642	1.1397	4.3778
5 <sup>th</sup> Factor	132	6.5305	6.5000	9.1000	3.9000	1.1654	0.2130	2.5768
GDP Growth	132	5.5174	5.6926	14.2000	-5.5300	3.4582	-0.5604	3.9440
Population (x 1000)	132	341,000	80,789	1,350,000	6,730	496,000	1.2735	2.7176
Inflation	132	5.4055	4.0217	37.4248	-6.1525	6.8090	1.8610	8.3764
GDP	132	46,300	111	996,000	70	172,000	4.2062	20.487



(Billion Dollars)								7
Exports	132	56.671 2	32.217 0	225.5611	11.363 0	58.2256	1.8098	5.0162
Imports	132	53.505 3	30.746 7	224.4305	10.058 0	54.6021	1.9805	5.7369

Based on the test for unit root of Phillips-Peron's test (1998), if the significance level of the statistics is lower than 0.05, independent, dependent and controlled variables of the study are reliable. The reliability of the results was obtained using these test variables and is presented in Table 2.

Table 2: Results of Phillips-Peron's reliability test

Variables of the Study	Statistics	Significance level
Economic Freedom	129.306	0.0000
1 <sup>st</sup> Factor	113.120	0.0000
2 <sup>nd</sup> Factor	106.293	0.0000
3 <sup>rd</sup> Factor	107.417	0.0000
4 <sup>th</sup> Factor	91.2989	0.0000
5 <sup>th</sup> Factor	131.642	0.0000
GDP Growth	169.532	0.0000
Population (x 1000)	70.0997	0.0000
Inflation	152.445	0.0000
GNI (Billion Dollars)	35.2892	0.0186
Exports	86.2560	0.0000
Imports	103.191	0.0000
volatility	78.0586	0.0000

As it can be seen, for all the independent, dependent and control variables, significance level of Phillips-Peron (1998) unit root test is less than 0.05, which indicates that the variables are reliable. This means that the mean and variance of the variables have been fixed over time, and the covariance of the variables has been fixed over different years. In conclusion, the use of these variables will not lead to false regression model.

### 3.1 Estimation of GARCH model

### 4. Empirical Result

According Panel data and as the Table 3 shows, the P-value of all variables except GDP growth and population are bigger than 0.05, which indicates the insignificance of the coefficients of the model. In other words, there is no a relationship between economic freedom and volatility of stock markets. Also, coefficient of the variables of GDP growth and population affect the stock market volatility. In this model  $R^2 = 0.6498$ , which means %64.98 of the changes of dependent variables are explained by the independent variable.

Moreover, the Durbin-Watson model is 0.9175, which shows the absence of autocorrelation errors in the model.

Table 3: Results of the first main hypothesis

Variables	Coefficients	Std. Error	t-Statistic	Prob.
Economic Freedom	-0.0321	0.0642	-0.5002	0.6186
GDP Growth	-0.0121	0.0050	-2.4040	0.0189
Population	0.0000	0.0000	3.4946	0.0008
Inflation	0.0011	0.0026	0.4310	0.6678
GNI	0.0000	0.0000	-1.6446	0.1047
Exports	0.0012	0.0049	0.2496	0.8036
Imports	-0.0016	0.0047	-0.3392	0.7355
Constant	-0.0435	0.5105	-0.0852	0.9324
Sig. of F: 0.0000		F: 4.8546		
Durbin-Watson test: 0.9175		R-squared: 0.6498		Adjusted R- squared: 0.5160

To understand the differences of economic freedom index and its 5 factors, we run panel data for each

factor. Table 4 shows the results. The P-value of all factors except first and fifth factors are lower than 0.05, which indicates significance of coefficients of the model for second, third and fourth factors.

Table 4: Results of sub- hypotheses related to the first main hypothesis

Item	Relation	Coefficients	Prob.
1 <sup>st</sup> Factor	The relationship between government size and stock market volatility	0.0220	0.3254
2 <sup>nd</sup> Factor	The relationship between legal structures and security of property rights and stock market volatility	0.0534	0.0167
3 <sup>rd</sup> Factor	The relationship between access to sound money and stock market volatility	0.0326	0.0234



4 <sup>th</sup> Factor	The relationship between freedom to trade internationally and stock market volatility	0.0600	0.0426
5 <sup>th</sup> Factor	The relationship between regulation of credit, labor, and business and stock market volatility	0.0373	0.2442

## 5- Conclusion

This research empirically examines the relationship between the economic freedom and volatility of twelve stock markets (Australia, Indonesia, Iran, Turkey, China, Japan, Singapore, Philippines, South Korea, Malaysia, India and Hong Kong) during the 2002 to 2012. To begin with, absolute values of data were converted to log normal. Stationary of the two series was checked with Phillips-Peron's test and the results showed stationary at level forms for both the series. Then, the coefficient of correlation between the two variables was computed, which indicated no correlation between economic freedom and volatility. Also, correlation between economic freedom factors and volatility was tested. Among the five factors, second, third and fourth factors had significance correlation. In other word, there is relationship between legal structure and security of property rights, access to sound money and freedom of international trade with volatility of stock markets.

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