Developing markets are nations with social or business activity in the process of rapid growth and industrialization. Developing countries, that are neither part of the least developed countries, nor of the newly industrialized countries. In the 1970s, "less economically developed countries" (LEDCs) was the common term for markets that were less "developed" (by objective or subjective measures) than the developed countries such as the United States, Western Europe, and Japan. These markets were supposed to provide greater potential for profit, but also more risk from various factors. This term was felt by some to be not positive enough so the emerging market label was born.

The economic growth rate and the export growth rate of the developing economies have been significantly higher than those of the developed economies and this trend is expected to continue in the future. It is expected that the global economic share of the developing countries will increase and they will play an increasingly important role in international business. A number of developing countries are now among major exporter of the world. Some developing countries, including India, also have large foreign exchange reserve. The increasing attractiveness of the developing countries capital market is also reflected in their faster market capitalization. All these indicate the growing importance of developing countries in the globalizing world economy.

Individual investors can invest in emerging markets either through ADRs (American depository Receipts - stocks of foreign companies that trade on US stock exchanges) or through exchange traded funds (exchange traded funds or ETFs hold basket of stocks). The exchange traded funds can be focused on a particular country (e.g., China, India) or region (e.g., Asia-Pacific, Latin America).

In recent years, new terms have emerged to describe the largest developing countries such as BRIC that stands for Brazil, Russia, India, and China, along with BRICET (BRIC + Eastern Europe and Turkey), BRICS (BRIC + South Africa), BRICM (BRIC + Mexico), BRICK (BRIC + South Korea), Next Eleven (Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey, and Vietnam) and CIVETS (Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa). These countries do not share any common agenda, but some experts believe that they are enjoying an increasing role in the world economy and on political platforms. The Big Emerging Market (BEM) economies are (alphabetically ordered): Brazil,
China, Egypt, India, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, South Korea and Turkey.

Goldman Sachs argues that the economic potential of Brazil, Russia, India and China is such that they could become among the four most dominant economies by the year 2050. The thesis was proposed by Jim O'Neill, global economist at Goldman Sachs. These countries encompass over 25% of the world's land coverage and 40% of the world's population and hold a combined GDP (PPP) of 18.486 trillion dollars. On almost every scale, they would be the largest entity on the global stage. These four countries are among the biggest and fastest growing emerging markets.

According to the research conducted by the Goldman Sachs in 2003, If the things go right given sound political decision making and good luck the BRIC economies together could become largest than those of the world’s six most developed nations in less than 30 years. The same thing has been depicted by the Figure 1.

**FIGURE 1.1: FUTURE OF BRICS**

Source: www.thepicky.com
Mexico and South Korea were the only other countries comparable to the BRICs, but their economies were excluded initially because they were considered already more developed, as they were already members of the OECD. In its revised report in 2005 Goldman reported the Mexico is also a potential country which can join BRIC on the economic growth ground. If we try to see the Mexican economy it is the thirteenth largest in the nominal terms and eleventh by purchasing power. Mexico has been one of the Latin American nations most affected by the 2008 recession with its Gross Domestic Product contracting by more than 6%. Moody's (in March 2000). According to the Forbes Global 2000 list of the world's largest companies in 2008, Mexico had 16 companies in the list.

On December 2010 China was the most growing country among the BRICM as per the figure shown in the below mentioned table 1.1. In China growth rate is 10.46 which is highest among all. China is followed by the India and Brazil. In Russia GDP growth rate lowest and inflation is highest.

Table 1.1

<table>
<thead>
<tr>
<th>Country(→)</th>
<th>Brazil (in $ trillion)</th>
<th>Russia (in $ trillion)</th>
<th>India (in $ trillion)</th>
<th>China (in $ trillion)</th>
<th>Mexico (in $ trillion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (in $ trillion)</td>
<td>2.09</td>
<td>1.47</td>
<td>1.53</td>
<td>5.88</td>
<td>1.00</td>
</tr>
<tr>
<td>GDP Growth Rate (%)</td>
<td>7.50</td>
<td>4.00</td>
<td>8.60</td>
<td>10.46</td>
<td>5.50</td>
</tr>
<tr>
<td>Foreign Reserve (in $ billions)</td>
<td>328.60</td>
<td>497.00</td>
<td>314.00</td>
<td>305.00</td>
<td>128.30</td>
</tr>
<tr>
<td>Inflation (%)</td>
<td>4.44</td>
<td>8.70</td>
<td>8.66</td>
<td>4.90</td>
<td>3.60</td>
</tr>
</tbody>
</table>

1.1.1 Brazil Economy

The economy of Brazil is the world's seventh largest by nominal GDP and eighth largest by purchasing power parity. Brazil has moderately free markets and an inward-oriented economy. In Brazil the service sector is the largest component of GDP at 66.8 percent, followed by the industrial sector at 29.7 percent (2007 est.). Agriculture represents 3.5 percent of GDP (2008 est.). Brazilian labor force is estimated at 100.77 million of which 10 percent is occupied in agriculture, 19 percent in the industry sector and 71 percent in the service sector. Among measures recently adopted in order to balance the economy, Brazil carried out reforms to its Social security (state and retirement pensions) and Tax systems. These changes brought with them a noteworthy addition: a Law of Fiscal Responsibility which controls public expenditure by the Executive Branches at federal, state and municipal levels. At the same time, investments were made towards administration efficiency and policies were created to encourage exports, industry and trade, thus creating "windows of opportunity" for local and international investors and producers.

1.1.2 Russian Economy

The economy of Russia is the eleventh largest economy in the world by nominal value and the sixth largest by purchasing power parity (PPP). Russia has an abundance of natural gas, oil, coal, and precious metals. It is also rich in agriculture. Economic reforms in the 1990s privatized most industry, with notable exceptions in the energy and defense-related sectors. Nonetheless, the rapid privatization process, including a much criticized "loans-for-shares" scheme that turned over major state-owned firms to politically connected "oligarchs", has left equity ownership highly concentrated. As of 2011, Russia's capital, Moscow, now has the highest billionaire population of any city in the world. In late 2008 and early 2009, Russia experienced the first recession after 10 years of rising economy, until the stable growth resumed in late 2009 and 2010. Despite the deep but brief recession, the economy has not been as seriously affected by the global financial crisis compared to much of Europe, largely because of the integration of short-term macroeconomic policies that helped the economy survive.
1.1.3 Indian Economy

The Economy of India is the tenth largest in the world by nominal GDP and the fourth largest by purchasing power parity (PPP). Following strong economic reforms from the post-independence socialist economy, the country's economic growth progressed at a rapid pace, as free market principles were initiated in 1991 for international competition and foreign investment. Social democratic policies governed India's economy from 1947 to 1991. The economy was characterised by extensive regulation, protectionism, public ownership, pervasive corruption and slow growth. Since 1991, continuing economic liberalisation has moved the country towards a market-based economy. A revival of economic reforms and better economic policy in first decade of the 21st century accelerated India's economic growth rate. In recent years, Indian cities have continued to liberalise business regulations. By 2008, India had established itself as the world's second-fastest growing major economy.

However, as a result of the financial crisis of 2007–2010, coupled with a poor monsoon, India's gross domestic product (GDP) growth rate significantly slowed to 6.7% in 2008–09, but subsequently recovered to 7.2% in 2009–10, while the fiscal deficit rose from 5.9% to a high 6.5% during the same period. India’s current account deficit surged to 4.1% of GDP during Q2 FY11 against 3.2% the previous quarter. The unemployment rate for 2009–2010, according to the state Labour Bureau, was 9.4% nationwide, rising to 10.1% in rural areas, where two-thirds of the 1.2 billion population live.

India's large service industry accounts for 57.2% of the country's GDP while the industrial and agricultural sectors contribute 28.6% and 14.6% respectively. Agriculture is the predominant occupation in India, accounting for about 52% of employment. The service sector makes up a further 34%, and industrial sector around 14%. However, statistics from a 2009-10 government survey, which used a smaller sample size than earlier surveys, suggested that the share of agriculture in employment had dropped to 45.5%.
1.1.4 China Economy

Since the initiation of economic reforms and trade liberalization 30 years ago, China has been one of the world’s fastest-growing economies and has emerged as a major economic and trade power. China’s rapid economic growth has sharply improved Chinese living standards and helped raise hundreds of millions of people out of extreme poverty. Trade and foreign investment flows have been major factors in China’s booming economy. In 2008 China, was the world’s second largest merchandise exporter and third largest importer. Over half of China’s trade is conducted by foreign-invested firms in China. In 2008, foreign direct investment (FDI) in China totaled $92 billion, making it the destination for FDI among developing economies. The combination of large trade surpluses, FDI flows, and large-scale purchases of foreign currency (especially dollars) has helped make China the world’s largest holder of foreign exchange reserves at $2.3 trillion.

1.1.5 Mexico Economy

The economy of Mexico is the 13th largest in the world in nominal terms and the 11th by purchasing power parity, according to the World Bank. Since the 1994 crisis, administrations have improved the country's macroeconomic fundamentals. Mexico was not significantly influenced by the recent 2002 South American crisis, and maintained positive, although low, rates of growth after a brief period of stagnation in 2001. However, Mexico was one of the Latin American nations most affected by the 2008 recession with its Gross Domestic Product contracting by more than 6%. Moody's (in March 2000) and Fitch IBCA (in January 2002) issued investment-grade ratings for Mexico's sovereign debt. In spite of its unprecedented macroeconomic stability, which has reduced inflation and interest rates to record lows and has increased per capita income, enormous gaps remain between the urban and the rural population, the northern and southern states, and the rich and the poor.[6] Some of the government's challenges include the upgrade of infrastructure, the modernization of the tax system and labor laws, and the reduction of income inequality.
1.2 Financial System and Economic Development

Financial support is the life line of any production and distribution activity and it plays an important role among the factors of production, the need of capital arises not only at the beginning of a venture but also throughout the life span of the venture. The funds required for industrial and infrastructural developments are supplied by the financial systems of a country. Financial systems are of crucial significance to capital formation. The main function of the financial systems is the collection of savings and their distribution for industrial investment, thereby stimulating the capital formation and, to the extent, accelerating the process of economic growth.

Figure 1.2: Relationship between Financial System and Economic Development

```
Financial System

\[ \text{Incomes} - (\text{Consumption} + \text{Own Investment}) \]

\[ \begin{align*}
\text{Surplus spending} & : \text{Economic unit} \\
\text{Deficit spending} & : \text{Economic unit} \\
\text{Surplus or savings} & \\
\text{Deficit or negative savings} & \\
\end{align*} \]

\[ \text{Savings} \& \text{investment} \rightarrow \text{Economic development} \]
```
Financial markets are the most important component of the organization of the financial system. They are not the source of finance but they are link between the savers and investors, both individual as well as institutional. Based on the nature of funds which are their stock-in-trade, the financial markets are classified into money market and capital market.

**Money Market** is the market for dealing in monetary assets of short term nature, generally less than one year. Money market structure comprises of a number of interrelated sub-markets, that is, call market, treasury bill market, commercial paper market, certificates of deposits market, repo market and soon.

**Capital Market** is a market for long term funds. Its focus is on financing of fixed investment. The main participants in the capital market are mutual fund, insurance organization foreign institutional investors, corporate and individuals. The capital/securities market has two segments: Primary market and Secondary market/stock exchange market.

Financial intermediaries play a vital role in economic development. They make one type of contracts with the lender and another type with the borrowers. This arrangement permits them to tailor contract to the preference of both the lenders and borrowers. The financial system also promotes financial product innovation. The financial assets includes direct, indirect and derivatives.

### 1.3 Major Stock Exchanges and their Indices of Developing Countries

The stock exchange is a market for old/existing securities, that is, those already issued. It plays only an indirect role in industrial financing by providing liquidity to investment already made. It has a physical existence and is located in a particular geographical area. The brief overview of the stock exchange and their indices of selected developing countries are mentioned below.

#### 1.3.1 BM&FBOVESPA Stock Exchange

BM&FBOVESPA is a Brazilian company, created in 2008, through the integration between the São Paulo Stock Exchange (Bolsa de Valores de São Paulo) and the Brazilian Mercantile & Futures Exchange (Bolsa de Mercadorias e Futuros). It is the most important Brazilian institution
to intermediate equity market transactions and the only securities, commodities and futures exchange in Brazil. BM&FBOVESPA further acts as a driver for the Brazilian capital markets. As of January, 2011 it had a market capitalization of 1476950.7 USD millions, making it one of the largest in the world and 373 companies were listed.

Founded on August 23, 1890 by Emilio Rangel Pestana, the "Bolsa de Valores de São Paulo" (São Paulo Stock Exchange, in English) has had a long history of services provided to the stock market and the Brazilian economy. Until the mid-1960s, Bovespa and the other Brazilian stock markets were state-owned companies, tied with the Secretary of Finances of the states they belonged to, and brokers were appointed by the government. After the reforms of the national financial system and the stock market implemented in 1965/1966, Brazilian stock markets assumed a more institutional role.

BM&FBOVESPA Indices: - are performance indicators of a set of securities showing the appreciation of a given group of assets over the time. Securities' prices may vary due to either corporate related factors or external factors such as the country's growth, employment and interest rates. Accordingly, the securities of a given index may evidence different behaviors within the same time period, resulting in either appreciations or depreciations. These are the following Brazilian stock market indices:

Bovespa Index - Ibovespa, Brazil Index 50 - IBrX-50, Brazil Index - IBrX, Brazil Broad-Based Index - IBrA, Mid-Large Cap Index - MLCX, Small Cap Index - SMLL Corporate Sustainability Index - ISE, Carbon Efficient Index - ICO2, Electric Power Index - IEE, Industrial Sector Index - INDX, Consumption Index - ICON, Real Estate Index - IMOB, Financial Index – IFNC, Basic Materials Index - IMAT, Public Utilities Index - UTIL, Valor BM&FBOVESPA Index - IVBX-2, Special Corporate Governance Stock Index - IGC, Corporate Governance Trade Index – IGCT, Special Tag Along Stock Index - ITAG, Dividend Index - IDIV.

**Bovespa Index - Ibovespa**

The *Bovespa Index* is the main indicator of the Brazilian stock market’s average performance. Ibovespa’s relevance comes from two facts: it reflects the variation of BM&FBOVESPA’s most
traded stocks and it has tradition, having maintained the integrity of its historical series without any methodological change since its inception in 1968. Ibovespa’s reliability comes from its simple calculation methodology, and also from the availability of its data to the investor public. The market recognizes the index’s positive characteristics, and this recognition is expressed by the fact that Ibovespa is the only performance indicator of the Brazilian stocks that has a liquid future market (one of the biggest index future market of the world). BM&FBOVESPA is responsible for Ibovespa’s management, calculation, disclosure and maintenance. This responsibility assures the strict compliance with the rules and technical procedures contained in the index methodology.

1.3.2 RUSSIAN TRADING SYSTEM STOCK EXCHANGE (RTS)

Established in 1995, as the first regulated stock market in Russia, RTS Stock Exchange now trades the full range of financial instruments from cash equities to commodity futures. The RTS Index first calculated on September 1, 1995, has since become the main benchmark for the Russian securities industry and is based on the Exchange’s 50 most liquid and capitalized shares. RTS Group operates the central counterparty, the settlement securities depository and the settlement house for rubles and foreign currencies. International members of RTS include Deutsche Bank, CSFB, UBS, and Morgan Stanley etc. Both the RTS Stock Market and the FORTS market are traded on robust international standard electronic platforms which allow for direct market access and algorithmic trading. The core of the RTS Group is Open Joint Stock Company RTS where the trading is facilitated. The key shareholders include global investment banks, like UBS, Credit Suisse, Deutsche Bank.

The RTS Stock Exchange Indices-The RTS Stock Exchange calculates the following stock market indices:

RTS Index (Index symbol – RTSI) ,RTS Standard Index (Index symbol – RTSSTD), Russian Volatility index (Index symbol – RTSVX), RTS-2 Index (Index symbol - RTS2), RTS Siberia Index (Index symbol - RTSSIB) ,Sectoral Indices.

Index code of the RTS Index is RTSI. It is a Capitalization-weighted type of index, with free-float coefficients .50 preferred and common shares are listed on the RTS index.
Bombay Stock Exchange is the oldest stock exchange in Asia. What is now popularly known as the BSE was established as "The Native Share & Stock Brokers' Association" in 1875 and the first in the country to be granted permanent recognition under the Securities Contract Regulation Act, 1956. Today, BSE is the world's number 1 exchange in the world in terms of the number of listed companies (5047). It is the world's 5th most active in terms of number of transactions handled through its electronic trading system. And it is in the top ten of global exchanges in terms of the market capitalization of its listed companies (as of January, 2011). The companies listed on BSE command a total market capitalization of USD Millions 1436567.0 as of January 2011. BSE is the first exchange in India and the second in the world to obtain an ISO 9001:2000 certifications. It is also the first Exchange in the country and second in the world to receive Information Security Management System Standard BS 7799-2-2002 certification for its BSE On-Line trading System (BOLT). Presently, we are ISO 27001:2005 certified, which is an ISO version of BS 7799 for Information Security.

The journey of BSE is as eventful and interesting as the history of India's securities market. In fact, as India's biggest bourse, in terms of listed companies and market capitalization, BSE has played a pioneering role in the development of the Indian securities market. It is surely BSE's pride that almost every leading corporate in India has sourced BSE's services in capital raising and is listed with BSE. Even in terms of an orderly growth, much before the actual legislations were enacted, BSE had formulated a comprehensive set of Rules and Regulations for the securities market. It had also laid down best practices which were adopted subsequently by 23 stock exchanges which were set up after India gained its independence. With its tradition of serving the community, BSE has been undertaking Corporate Social Responsibility (CSR) initiatives with a focus on Education, Health and Environment. BSE has been awarded by the World Council of Corporate Governance the Golden Peacock Global CSR Award for its initiatives in Corporate Social Responsibility (CSR).

BSE indices: Bombay Stock Exchange calculates the following indices.
Sensex, BSE-100, BSE-200, BSE-500, Dollex-200, BSE-PSU Index, Dollex-30, BSE Teck Index

**Sensex Index - The Barometer of Indian Capital Markets** :- SENSEX, first compiled in 1986, was calculated on a "Market Capitalization-Weighted" methodology of 30 component stocks representing large, well-established and financially sound companies across key sectors. The base year of SENSEX was taken as 1978-79. SENSEX today is widely reported in both domestic and international markets through print as well as electronic media. It is scientifically designed and is based on globally accepted construction and review methodology. Since September 1, 2003, SENSEX is being calculated on a free-float market capitalization methodology. The "free-float market capitalization-weighted" methodology is a widely followed index construction methodology on which majority of global equity indices are based; all major index providers like MSCI, FTSE, STOXX, S&P and Dow Jones use the free-float methodology.

The growth of the equity market in India has been phenomenal in the present decade. Right from early nineties, the stock market witnessed heightened activity in terms of various bull and bear runs. In the late nineties, the Indian market witnessed a huge frenzy in the 'TMT' sectors. More recently, real estate caught the fancy of the investors. SENSEX has captured all these happenings in the most judicious manner. One can identify the booms and busts of the Indian equity market through SENSEX. As the oldest index in the country, it provides the time series data over a fairly long period of time (from 1979 onwards). Small wonder, the SENSEX has become one of the most prominent brands in the country.

**1.3.4 SHANGHAI STOCK EXCHANGE (SSE)**

The Shanghai Stock Exchange (SSE) was founded on Nov. 26th, 1990 and in operation on Dec.19th the same year. It is a membership institution directly governed by the China Securities Regulatory Commission (CSRC). The SSE bases its development on the principle of "legislation, supervision, self-regulation and standardization" to create a transparent, open, safe and efficient marketplace. The SSE endeavors to realize a variety of functions: providing marketplace and facilities for the securities trading; formulating business rules; accepting and arranging listings; organizing and monitoring securities trading; regulating members and listed companies;
After several years' operation, the SSE has become the most preeminent stock market in Mainland China in terms of number of listed companies, number of shares listed, total market value, tradable market value, securities turnover in value, stock turnover in value and the T-bond turnover in value. January 2011 ended with 899 listed companies and the total market capitalization of SSE hit USD 2,724,037.1 millions. A large number of companies from key industries, infrastructure and high-tech sectors have not only raised capital, but also improved their operation mechanism through listing on Shanghai stock market.

Entering the new century, SSE is faced with great opportunities as well as challenges to further boost the market construction and regulation. Combining the cutting-edge hardware facilities, favorable policy conditions in Pudong, exemplary role of Shanghai economy, SSE is fully committed to the goal of State-owned industrial enterprises reform and developing Shanghai into an international financial center with great confidence.

List of SSE Indices: SSE Constituent Indices, SSE Composite Indices, SSE Sector Indices, SSE Style Indices, SSE Thematic Indices, SSE Fund Indices, SSE Bond Indices, Other Indices.

SSE Composite Index: Constituents for SSE Composite Index are all listed stocks (A shares and B shares) at Shanghai Stock Exchange. The Base Day for SSE Composite Index is December 19, 1990. The Base period is the total market capitalization of all stocks of that day. The Base Value is 100. The index was launched on July 15, 1991.

1.3.5 MEXICAN STOCK EXCHANGE

The Mexican Stock Exchange, or Bolsa Mexicana de Valores (BVM), is Mexico's only stock exchange. It is the second largest stock exchange by market capitalisation in Latin America. BMV is now itself a public company which is listed on its own stock exchange following a 2008 IPO. The Mexican Stock Exchange actively trades stocks, debentures, debt instruments (government and corporate bonds), and warrants and other derivatives. Trading is conducted on a fully electronic trading system, called the BMV-SENTRA Equities System. Many of Mexico's
well known companies are listed on the Mexican Stock Exchange, such as Cemex, Telmex, America Movil, Televisa, TV Azteca, and Walmex. Some of the major Mexican Stock Exchange listed companies also trade on US stock markets as ADRs. As on January, 2011 market capitalization and no. of listed companies were 448,635.0 USD millions, 428 respectively.

The BMV calculates 13 indices of stock prices. Each index can be used as an underlying value for derivative products listed on specialized markets. The main benchmark stock index is called the IPC, which stands for Índice de Precios y Cotizaciones, and is the broadest indicator of the BMV's overall performance. It is made up of a balanced weighted selection of shares that are representative of all the shares listed on the exchange from various sectors across the economy, and is revised twice a year. Weight is determined by market capitalization. The IPC's value is related to the previous day's value, rather than the base date of October 30, 1978. Since February 2009 the IPC index has included BMV's own A shares. Indice Mexico (INMEX) is a market capitalization weighted index of 20 to 25 of the BMV’s most highly marketable issuers, using their most representative series. The sample is limited to issuers with a minimum market value of $100 million and is revised every six months. The weighting cannot be greater than 10% at the start of each calculation period.

The Mexican Stock Exchange Main Indices are:

<table>
<thead>
<tr>
<th>Index Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prices &amp; Quotations Index (IPC)</td>
</tr>
<tr>
<td>Mexico Index (INMEX)</td>
</tr>
<tr>
<td>Medium Capitalization Index (IMC 30)</td>
</tr>
<tr>
<td>Housing Index (HABITA)</td>
</tr>
<tr>
<td>Stock Market Composite Index (IPC CompMx)</td>
</tr>
<tr>
<td>Dividends Index (IDiv)</td>
</tr>
<tr>
<td>Mexico-Brazil Index (IMeBz)</td>
</tr>
<tr>
<td>BMV-Brasil 15</td>
</tr>
</tbody>
</table>

**Prices and Quotations Index (IPC)-** The Prices and Quotations Index is the main indicator of the Mexican Stock Exchange, it expresses the yield of the stock market based on the prices variations of a balanced, weighted and representative group of stocks of the ones that are listed in the Stock Exchange. The IPC comprises a reliable indicator of the stock market fluctuations considering two fundamental concepts:

- Representativeness: Its constituent list reflects the trading behavior and dynamics of the Mexican market.
- Investability: The stock series that are part of it count with the trading and liquidity qualities to facilitate the buying and selling transactions in order to respond to the Mexican market needs.

The Prices and Quotations Index (IPC, based on October 1978), has as its main objective to constitute itself as a representative indicator of the Mexican market and be useful as an underlying asset for financial products.

**Table 1.2**

<table>
<thead>
<tr>
<th>Stock indices(→)</th>
<th>BM&amp;FBOVESPA</th>
<th>RTSI</th>
<th>BSE</th>
<th>SSE</th>
<th>IPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Capitalisation(USD Millions)</td>
<td>1 476 950.7</td>
<td>1 436 567.0</td>
<td>2 724 037.1</td>
<td>448 635.0</td>
<td></td>
</tr>
<tr>
<td>Number of Listed Companies</td>
<td>373</td>
<td>5 047</td>
<td>899</td>
<td>428</td>
<td></td>
</tr>
</tbody>
</table>

Source: World Federation of Exchanges

Table 1.2 shows that as on January 2011 market capitalization is highest in the country China among the selected developing countries whereas it is lowest in the country Mexico. India (BSE) represents the highest number of listed countries and lowest is in Brazil.

**1.4 Risk and Return:**

The concept of risk return is essential for every investor. The relationship between risk and return is unique as well as critical. All business activities depend upon the risk and return tradeoff of the investments made. The risk/return tradeoff is the balance between the desire for the lowest possible risk and the highest possible return. This is demonstrated graphically in the chart below. A higher standard deviation means a higher risk and higher possible return.
Figure 1.3: Relationship between Risk and Return

Whether it is the corporate world or the individual retail investor. The essence of the decision to invest rests upon the concept of risk and return associated with it. The general rule is the greater the risk, the greater will be the returns associated with it.

The risk and return of every investment is different depending upon the nature of investment made, investors generally prefers that the investments they make. Whether it is a single or a portfolio, must have both low risks and high expected return rates. However the choice of investment depends upon the attitude of the investor. Some investors prefer risky investments and some prefers risk free investments. Hence, the risk return relationship is the unique for every investment.

However in real world, one cannot always achieve high return without incurring high risk simultaneously. Thus, as a rule of finance, a higher expected return rate is generated at the cost of incurring more risk.

Therefore, investment decisions require estimation of expected return and risks, expected rate of return is the weighted average of all possible returns multiplied by their respective probabilities. Thus, the probabilities of various outcomes are used as weights. The expected returns are calculated as follows:
Risk refers to the dispersion of returns around an expected value. The most common statistical measures of risk of an asset are the variance and its square root, the standard deviation, from the expected value of return. It may be noted here that variance as a measure of dispersion takes into account the possibility of returns deviating from the expected return on either side – both above and below. However, risk is generally related to possibility of returns falling below the expected return. Investors are concerned with downside risk alone. The correct measure of risk therefore should be the variance of returns on the downside, but it is complicated, Variance or standard deviation, On the other hand, is simpler, more common and more suitable for further statistical use.

Given an asset's expected return, its variance can be calculated using the following equation:

\[ \text{Var}(R) = \sigma^2 = \sum_{i=1}^{N} p_i (R_i - E[R])^2 \]

Where
- \( N \) = the number of states,
- \( p_i \) = the probability of state \( i \),
- \( R_i \) = the return on the stock in state \( i \), and
- \( E[R] \) = the expected return on the stock.

The standard deviation is calculated as the positive square root of the variance.

\[ \text{SD}(R) = \sigma = \sqrt{\sigma^2} = \left( \sigma^2 \right)^{\frac{1}{2}} \]

1.5 Conceptual Framework of Volatility:

The emergence of globalization, leads to stock market booms and the volume of transactions multiplies its previous quantum, which put the investors, technical
analysts, economists and academicians on high alert for deep studies and understanding the behavior of stock market minutely. The stock market development in a nation represents the optimistic behavior of investors over there and hence the economic development of the nation. With the liberalization, more and more countries provided access to investors in their markets; a no. of opportunities comes up for investment in their domestic and foreign markets.

Development of stock markets provides investors with lucrative opportunities to invest in diversified portfolios across the world. Global investment decisions are taken depending upon several aspects but the knowledge of volatility of market is a vital aspect for making smart decisions to get maximum return with minimum risk. Globalization enables investors to make better portfolios in global markets as volatility remains high in a single nations portfolio in comparison to that of a international portfolios in global markets as volatility remains high in a single nations portfolio in comparison to that of a international portfolio because the risk level is less in international market than that of a single nations market due to variations in different aspects affecting volatility like economic and political environments, industrial and business growth rates and inflationary conditions.

1.5.1 The concept of volatility:

To measure the extent of risk involved in an investment, one has to check for the extent of volatility. It could be said that volatility is the most basic statistical measure of risk. It can be used to measure the market risk of a single instrument or an entire portfolio of instruments. The volatility of an asset indicates the variability of its returns. In day to day practice, volatility is calculated for all sorts of random financial variables such as stock prices, interest rates, exchange rates, the market value of a portfolio, etc. stock market volatility means different things to different people. Most academics studies have defined volatility in term of statistical measure of the variability of the stock price changes. These measures are useful because they correspond to standard measure of risk in theories of portfolio selection and asset pricing. Many investors seems more apt to define volatility as episode of extreme or rapid price movements within certain days –even if these
incident do not noticeably affect measure of volatility calculated over longer time periods.

Volatility is defined in term of statistical measure of the variability of percentage price changes or rate of return. The most commonly used statistical measure of the volatility is the standard deviation or variance of return. The standard deviation measure the dispersion of return or the degree to which they vary from period to period, the period being a month, day and even hour or minute. Thus volatility can be calculated for month to month returns, day to day returns and even minute to minute returns.

1.5.2 Volatility and Direction:

Volatility is immune to the directional change it measures merely their dispersion. This is because when calculating standard deviation (or variance), all differences are squared, so that negative and positive differences are combined into one quantity. Two instruments with different volatilities may have the same expected return, but the instrument with higher volatility will have larger swings in values over a given period of time.

1.5.3 Volatility over time:

It's common knowledge that types of assets experience periods of high and low volatility. That is, during some period prices go up and down quickly, while during other times they might not seem to move at all. Periods when prices fall quickly (a crash) are often followed by prices going down even more, or going up by an unusual amount. Also, a time when prices rise quickly (a bubble) may often be followed by prices going up even more, or going down by an unusual amount. The converse behavior, 'doldrums' can last for a long time as well. Most typically, extreme movements do not appear 'out of nowhere'; they're presaged by larger movements than usual. This is termed autoregressive conditional heteroskedasticity. Of course, whether such large movements have the same direction, or the opposite, is more difficult to say. And an increase in volatility does not always presage a further increase—the volatility may simply go back down again.
1.5.4 Volatility for Investors:

Investors care about volatility for five reasons which are mentioned as follows:

1) The wider the swings in an investment's price the harder emotionally it is not to worry.

2) When certain cash flows from selling a security are needed at a specific future date, higher volatility means a greater chance of a shortfall.

3) Higher volatility of returns while saving for retirement results in a wider distribution of possible final portfolio values.

4) Higher volatility of return when retired gives withdrawals a larger permanent impact on the portfolio's value.

5) Price volatility presents opportunities to buy assets cheaply and sell when overpriced.

In today's markets, it is also possible to trade volatility directly, through the use of derivative securities such as options and variance swaps.

1.6 Benefits of Volatility:

Volatility is often viewed as a negative in that it represents uncertainty and risk. However, volatility can be good in that if one short on the peak and buys on the lows, one can make money, with greater money coming with greater volatility. The possibility for money to be made via volatile market is how short term market players like day traders hope to make money, and is in contrast to the long term investment view of buy and hold. The dispersion (volatility) may be in any direction, it’s going to benefit the one and harm the other out of the buyer and the seller, now it is the intelligence of the investor that how he keeps himself as the beneficiary out of the act of buying or selling. Some of the importances of volatility are as follows:

✓ The importance of volatility in financial markets is much more than a measure of investor’s sentiment. Volatility is important because it dramatically affects banks and
hedge funds' value-at-risk (VaR). VaR estimates the maximum a bank or hedge fund can expect to lose over a specific time period at a given confidence interval. VaR is the primary tool of risk management. Low volatility leads to low VaR, and high volatility leads to high VaR. Banks and hedge funds' leverage ratios are generally tied to VaR—the lower an institution's VaR, the more it can lever up. More importantly for right now, the higher an institution's VaR, the less leverage it can use.

✓ The importance of volatility is that it has the single biggest effect of the amount of extrinsic value in an option's price. When volatility goes up (increases), the extrinsic value of both the calls and the puts increase. This makes all the option prices more expensive. When volatility goes down (decreases), the extrinsic value of both the calls and the puts decrease. This makes all of the option prices less expensive.

✓ Mobilizing funds from savers and regulating it up to investors is one of the key functions of financial markets and institutions of an economy. Some volatility in the prices of financial assets is a normal part of the process of allocating investible funds among competing users. However, excessive or extreme volatility of stock returns, interest rates or exchange rates may be detrimental because such volatility may impair the smooth functioning of the financial system and adversely affect the economic performance of economy.

✓ Volatility has become a matter of concern because when the asset prices fluctuate sharply over time periods as short as one day, investors may find it difficult to accept that the explanation for changes lies in information about fundamental economic factors, and hence they may associate pure speculation and irrationality with the market. This can lead to general erosion of investor confidence and flow of capital away from equity markets.

✓ The rise in volatility will tend to raise the risks faced by market makers, leading them to charge correspondingly more for the liquidity they provide.

✓ Volatility is perceived as an indicator of market inefficiency and a potential threat to the very integrity of the market mechanism.

The wide spread concern in the market place has underlined the importance being able to measure and predict stock market volatility to market participants.
1.7 Causes of Volatility:

A high frequency of crisis is closely associated with higher macroeconomic volatility and is just another aspect of higher macro-financial risks and vulnerabilities. In addition to output forgone during these crises, which entails major welfare losses, there is significant evidence than such crises have lasting effects on growth because of irreversible losses of physical, organizational, and human capital. Stock prices are established in the marketplace, but what exactly causes them to behave the way they do? Here are several factors that influence their movements.

1) Latest Information on Stock Prices

Information is a crucial factor in the movement of stock prices as it is what the market uses to put a value on a stock at a certain price level. These are usually based on all data that the public has been made aware of. As the information is updated, the market adjusts the prices up or down depending on the way the market interprets that the information will affect the company's future earnings ability.

2) Inflation and Stock Prices

Inflation is another influential factor that affects the motion of stock prices. History indicates that there had been a strong inverse correlation between low inflation and valuations. This is because low inflation propels high multiples, and high inflation drives low multiples.

3) Economic Strength of Market and Peers

Company stocks have the propensity to track with the market, as well as with their sector or industry contemporaries. A lot of leading investment firms put significant importance on overall market and sector movements as major factors involved in the movement of prices. An example would be when a negative outlook for one stock affects other similar ones due to mere association with each other, dragging the demand for the whole sector along the way.
4) Psychological Issues on Stock Prices

These prices are also greatly influenced by human behavior. Greed is one trait that can cause stock prices to increase more than it should. New information can elicit a frantic market, may cause an increase in prices, and may make investors disregard rational valuation, preferring instead to buy the stock to ensure they are not left behind. Fear can cause significant decreases in stock prices when investors rush for the exit in an effort to avoid losses. This factor is probably the most important factor in determining the volatility of the market at any given time.

5) Supply and Demand

Stocks that trade smaller volumes of shares do not have the liquidity of the more popular stocks. So, prices for these smaller ones are prone to fluctuations because of supply and demand. When a large shareholder wants to sell a large quantity of shares into a market with weak liquidity, that shareholder can considerably move share price.

6) Uncertainty

The movement of stock prices is also affected by a vague future. Prices do tend to bounce around a bit due to market apprehension and the unpredictable future. Because of the ambiguity of a company's future, volatility in stock prices is possible even without new information.

7) Trading Volume

Trading in any financial asset is induced by the arrival of new information. As the information is unobserved, price changes or/and trading activity can be used as proxy of information. Trading volume is supposed to reflect information about aggregate changes in the expectations of the market participants. Understanding the informational role of trading volume and its relationship with price changes may help in devising short-term price forecast, trading and hedging strategies and regulations. The issues like whether positive price changes (volatility) is associated with higher volume as compared to negative price changes, whether trading volume is leading the price change or price change is driving the trading volume in a financial asset, are important
from both theoretical as well as practical point of view. The higher the volume, the narrower are the spreads, as a result there is less slippage, and less volatility.

8) Business condition

It is widely said that stock volatility increase during economic recession because during recession there is excess capacity and unemployment. Fixed cost for the economy would have the effect of increasing the volatility of stock returns during period of low demand. Therefore business condition are the main cause of high and low volatility.

9) The Media

The media including newspaper, magazine, news channels are the main source of information which provide the financial news, views and advice of experts to the public. These information and advice may influence the decision of investors and fund managers which could lead to herd-type behavior and stock price fluctuation. Media comment may influence the timing of prices changes with or without influencing longer term movements.

10) Market Industry Concentration

Modern portfolio theory predicts a significant relationship between market industry concentration and market volatility. High industry concentration in a market means less diversification. Therefore, high industry concentration would lead to high market volatility.

11) The Average Education Level of Investors

Investors typically exhibit a strong “home bias. Given the existence of these bias, local investors collective behavior could be decisive in shaping stock market movements in a country. Thus, the collective characteristics of investors that may influence their behavior should not be neglected when one examines stock market fluctuations. We choose the average education level of investors, which itself is represented by the school life expectancy in a country, as a proxy for the collective characteristics of all investors in a market. Since better-educated people may have better cognitive and analytical capability and thus behave more rationally, we therefore expect
that the average education level of investors is negatively related to market volatility.

12) International Integration

Increased integration has resulted in the removal of controls on the international movement of capital by the government. The stocks of leading companies are now quoted on foreign stock markets. Movements of one country stock prices are affected by the movement of stock prices on overseas markets. Even the stock prices of one country are influenced by the international events of their global counterparts, statement made by the US president, international development and financial crises.

13) Computerized Trading

The remarkable advances in information technology have made it much easier for large number of people to learn about and react to information very quickly. They have also made it possible for financial markets to provide liquidity to investors around the world. Since new information spread more quickly, the rate at which price change in response to information would also accelerate.

14) The Relative Size of the Equity Market

The relative size of the equity market in a country is defined as:

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\text{CAP / GDP *100}
\]

Where CAP is the total market capitalization of all listed firms in a market and GDP is the gross domestic production (GDP). Harvey (1995a) argues that, in a larger market, noise trading is probably offset more completely by one another and thus is less influential. Therefore, market size would be related to market volatility. The larger the market size, the more stable the market could be.
15) The Number of Listed Firms

On the one hand, the total number of listed firms may be positively related to market industry concentration. It might be the case that the more firms listed, the more diversified the market. On the other hand, it could also be true that the more firms listed, the larger the relative market size. In either case, the number of listed firms could be negatively related to market volatility.

16) Other Factor

One of the major reason of volatility in stock market may be change in the macroeconomic policies regarding different variable like interest rate, money supply, industrial production, foreign institutional investment, national income, exchange rate etc. if there is any change in these variable then stock price will adjust accordingly. Other factor which may influence volatility is attitude of the investor regarding risk.

**1.8 Measurement of Volatility:**

Volatility is measured by variance or the standard deviation of stock returns around their average value. When measuring the volatility, stock returns are taken rather than stock prices because mean must be stable at the different time period while measuring the dispersion around an average value. Another reason behind using return is that absolute price changes are dependent on the price level. In order to symmetrically treat the up moves and down moves, returns are calculated as the logarithmic difference of closing prices at the beginning and end of one measurement period. In order to compare the volatilities over different periods and over different countries, volatility is expressed as an annualized percentage. To annualize the volatility the number of trading days in a year must be used. Also volatility scales with the square root of time. So annualization factor would be square root of the number of trading days in a year.
1.9 Modeling of Volatility:

Modeling and forecasting of volatility of asset returns is important in various applications related to financial markets such as valuation of derivatives, risk management, etc. Extensive research has been done world over in modeling volatility for estimation and forecasting. There are broadly four possible approaches for estimating and forecasting volatility. These are:

**Traditional Volatility Estimators** — These estimators assume that ‘true’ volatility is unconditional and constant. The estimation is based on either squared returns or standard deviation of returns over a period.

**Extreme Value Volatility Estimators** — These estimators are similar to traditional estimators except that these also incorporate high and low prices observed unlike traditional estimators which are based on closing prices of the asset.

**Conditional Volatility Models** — These models (ARCH/GARCH type models) take into account the time-varying nature of volatility. There have been quite a few extensions of the basic conditional volatility models to incorporate ‘observed’ characteristics of asset/ stock returns.

**Implied Volatility** — In case of options, most of the parameters relevant for their valuation can be directly observed or estimated, except volatility. Volatility is, therefore, backed out from the observed option values and is used as volatility forecast.

Uncertainty plays an important role in economic theory. Many economic models assume that the variance, as a measure of uncertainty, is constant through time. However, empirical evidence rejects this assumption. Financial time series such as stock returns or exchange rates exhibit so-called volatility clustering. This means that large changes in these series tend to be followed by large changes and small changes by small changes. The technical term given to this behaviour is autoregressive conditional heteroskedasticity (ARCH). As variance (or standard deviation) is often used as a risk measure in risk management systems, accurate modeling and forecasting of the variance has received a lot of attention in the investment community for the last two decades. In a seminal paper, Engle (1982), for the first time, proposed to model time-varying conditional variance with the ARCH process that uses past disturbances to model the variances of the series and allows the variance of the error term to vary over time. Bollerslev (1986) generalized the
ARCH process by allowing the conditional variance to be a function of prior period’s squared errors as well as its past conditional variances. Following the introduction of models of ARCH by Engle (1982) and their generalization by Bollerslev (1986), there have been numerous refinements of the approach to modeling conditional volatility to better capture the stylized characteristics of the data. Empirically, the family of GARCH (generalized ARCH) models has been very successful in describing the financial data. Of these models, the GARCH (1, 1) is often considered by most investigators to be an excellent model for estimating conditional volatility for a wide range of financial data.

Though, in most of the cases, the ARCH and the GARCH models are apparently successful in estimating and forecasting the volatility of the financial time series data, they cannot capture some of the important features of the data. The most interesting feature not addressed by these models is the ‘leverage effect’ where the conditional variance tends to respond asymmetrically to positive and negative shocks in errors. To solve this problem, many nonlinear extensions of the GARCH model have been proposed. Nelson (1991) proposed an exponential GARCH (EGARCH) model based on a logarithmic expression of the conditional variability in the variable under analysis. Later, a number of modifications were derived from this method. One of them is the Threshold ARCH (TARCH) method which was introduced by Zakoian (1994). The model developed by Glosten, Jagannathan and Runkle (GJR, 1993) has been considered the best in estimating the impact of positive and negative shocks on volatility (Engle and Victor, 1993).
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