# The Impact of Seasonal Anomalies on MSCI's Selected Economies' Stock Index Returns

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**ABSTRACT**

**Purpose:**
This article explores the effect on four developing Asian financial markets on the day of this week (volatility).

**Methodology:**
Regular market return data are gathered in their specific index from MSCI's selected economies, such as China, India, Malaysia and Pakistan. Yahoo's financial platform gathered index info. The selected sampling duration is between 2 May 2013 and 29 November 2017. The observational study was undertaken and the findings were concluded by the usage of a regression model to analyze day of consequence and the GARCH model to monitor conditional variance.

**Findings:**
These findings suggest that all stock returns and volatility are substantially impacted by the day of the week in three nations, but both the return and the volatility result in each of the four cases are not similar. An investor may make abnormal gains by betting on a previously accessible information-based approach and investors may obtain invaluable insights into investment decisions.

**Conclusion:**
If investors are conscious of this, they will adjust their investments in view of these shifts in stock returns.

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# 1. Introduction

The aim of investing in bonds is to achieve returns on investment money. Many of the investors aim to receive larger profits by spending money to do so in terms of better benefit than other investors. There is a condition on the market in which values in a particular market reflect data and change their prices accordingly. The details will vary in various degrees such as that, if the information is really strong, the price cannot change and the demand cannot be outstripped (Fama, 1970). If there is no improvement in stock price on the announcement of the information, the EMH is important. Thanks to the strong knowledge, investors will not be able to deliver higher returns than the fair value of the inventory (Die Messe, 2002) and will not be able to hold to the fair value of their stocks(Marquereing, 2002). Until investing EMH would not offer any additional details to investors in the sector to anticipate market shifts, so that investors can evaluate all the criteria to forecast price fluctuations. The same knowledge would prevail in the business for both buyers. The fluctuations in the economy would be volatile and cannot be assessed for other past trends. The traditional thought-school of EMH or spontaneous price spectrum contributes to a lack in investment that will beat the competition. Some functions on the capital exchanges are to be distinguished from the EMH laws.

Anomalies of this type are documented. Anomaly happens once and can vanish, or frequently happen. There are several examples of deviations in numerous financial markets worldwide such as calendar anomalies, fundamental anomalies and technological anomalies. Many experts have seen the occurrence of such occurrences. The irregular phenomenon or abnormality in the steady trend of the stock market is focused on the behavioral financial abnormalities. The presence of irregularities in the numerous stock markets worldwide is shown by researchers such as (Agrawal & K.Tandon, 1994)), Gultekin and Gulterkin (1983) and Ariel (1984). However, however, these phenomenon signs are dubious. However, Morgan's first inclusive Emerging Market Index consists from investors or other stakeholders intended to gain strong returns on assets and to threaten greater. Often, Stanley Capital international (MSCI) rich countries, which became a significant component of global equity fund allocation, are part of the global index supplier. The Americas has five economies, the Middle East & Africa continents have eight and the Asian continents have eight markets. The paper analyses weekly type efficiency or anomaly days occur in five emerging Asian markets as described by Morgan Stanley Capital International (MSCI). The analysis uses day-to-day return data from the composite stock market indexes for Asian emerging markets. Shanghai, NSE, Nifty (India), KSE100 (Pakistan) and KLSE (Malaysia) will be included in the sector indices.

In an effective hypothesis, consumers have valid and essential knowledge that is readily accessible and citizens compete to reasonable benefit maximization through estimating potential market prices. According to (Chuvakhin, 2009), the inventory prices automatically represent a new condition when the business is productive, and if there is an unexpected occurrence it requires time for the market to adjust according to the last details. The stock prices are inefficient. In a shell shell, EMH has a commodity price principle that mirrors the true valuation of stocks, and in an economy there is no arbitration opoturity of entities or agents that aim to maximize fair advantage (Raquib,

2015) In the event of an effective market and predictable event rates will grow or increase before the event takes place (Fama, 1970).
Past information, publicly accessible information and private information might be appropriate. The competition is categorized into vulnerabilities, semi-strengths and intensity in three ways, according to essential knowledge quality.

## 1.1 Financial Market Anomalies

- Anomaly is an odd or peculiar phenomenon. It is characterized as irregularity or deviation from the standard or general order or an outstanding condition. (George & Elton, 2001)as an irregularity or deviation from the typical or natural order, or as an abnormal condition.
- The business anomaly (Tversky & Kahneman, 1986) is characterized by not being overlooked because it is too widespread or too dim as a spontaneous accident, because it is too structural and too important for the relaxation of the normative structure to be admitted. In the financial sector paradox, the efficiency of the inventory or category of inventories is different from the predictions of successful market theories. This trends or occurrences cannot be explained by an effective theory of economy are regarded as irregularities in the financial markets (Silver 2011).
- Seasonality effects were observed in 10 Asian Pacific countries in the period January 2000 to March 2005, and were also found to be the optimal period for calculating the impact, because of the consistent effect, but without being affected by any financial c, on foreign markets such as the Australian (OfficeR, 1975) in the Italian Tokyo stock exchange (Ziemba, 1991). The Chinese equity market had strong turnover, yet throughout the new year the market was higher than in January (J., Jiangd., & D., 2009).

## 1.2 Impact on Monday

- The average return on Mondays is negative (Starks, 1986). On Monday, stock values are forecast to decline. This means that Monday's closing price is cheaper than the last Friday closing price

## 1.3 Weekdays affect

In this calendar effect difference in return of days of week can be observed. It is found that Monday has the lowest returns while high returns on Fridays than other days of week (Hess 1981).According to experts, on Monday there is the highest disparity and on Fridays the lowest deviation exists. On Monday and Friday, the biggest gap is the lowest. Mixed outcomes are visible. Found in European countries, Hong Kong and Canada have lower returns at week-end but not on Monday (Dubois &louvet, 1995). In 19 countries there were negative returns from Monday, in nine countries and a negative return on Tuesday, in eight countries, according to research (Agrawal & KTandon, 1994). More Tuesday returns are lower than those from Monday. It has been observed that no Harmful Monday and good Friday impacts were slightly higher in India (Kumari) than other days. The time began on Monday and ended on Friday in India, that is to say for 14 days. (Agrawal & K.Tandon, 1994)the weekend impact in half the countries is concluded. The lowest return is on Tuesday in the other nations.

## 1.4 Impact of January • Month of the year

This phenomenon impact is representative of the variance in return in multiple monthly sales each year (Gultekin & Gultekin 1983). This effect in January applies to the scale of small companies that outweigh big businesses.

## 1.5 End Effect of Year

The key explanation for the end-of-year impact (Agrawal & K.Tandon, 1994) is that the institution and pension fund management have been able to change inventory. T his paradox clarified that in the final week of December and in the first half of January equity rates and market exchange volumes were increasing.

## 1.6 Impact of the month

In the early days of the month the total returns are greater than the other month due to this calendar anomality (Nosheen et al. 2007). The monthly turnover impact is important in 14 (Agrawal & K.Tandon, 1994) countries on the last day of the month's selling month. The price of stocks is expected to grow in the next month's last trading day and in the first three days of next month. This is attributed to investors' psychological behavior, as they sell their stock at the end of the month and reveal fresh details at the end and beginning of new month, they hope to see positive improvements. Investors will profit immensely by selling in late month and buying back at the beginning of the new month to have the new details accessible (Nosheen et al. 2007).

## 1.7 Economies Developing

Emerging nations are countries like agriculture or produce raw materials. They are also recognized as emerging countries. Representatives in developing countries are less effective in attempting to improve their businesses by embracing hybrid economies to allow citizens in their own country to have a decent life.

It is not impossible, though, to render a successful organisation of markets by market actors who are not well-informed and unreasonable. Prices may not be expected to represent all of Availa, especially in capital markets, for instance transaction costs, lack of timely information, costs of accessing fresh information, and likely greater uncertainty concerning The future (Taylor, 1956; Goldsmith, 1971; Mason, 1972; Wai And Patrick, 1973 According to Samuel,1981). The firm has more ability to affect its own stocks price, and its price can be pushed in an unjustified way by the knowledge available.

23 countries have been listed as the MSCI Emerging Market Ranking. They involve Brazil, China, Hungary, India, Indonesia, Greece, Morocco, Columbia, Qatar, Peru, South Africa, South Korea, Russia, Taiwan, Thai, Turkey, Cyprus, Turkey, the Philippines, and the United Arab Emirates. Cypruses, South Korea, Greece. This index monitors each business listed on the stock exchanges of the countries.Another eight countries are classified as well. Argentina, Hong Kong, Jordan, Kuwait, Vietnam, and Saudi Arabia. China and India are the largest emerging markets. The two nations combined combine for 40% of the world's workers and economy.

## 1.8 Emerging Markets Investing

Recently, analysts and investors concentrated extensively on global capital markets. Because of local and foreign globalisation, as well as investors' participation, the inflow of FDI, the emerging markets have opened up their global investor-attractive economy. Therefore, separate studies focus on profitability and the predictability of trust for buyers, but most analyze the random course of action in emerging markets (Raquib, 2015).

### 1.9 Problem Statement

Investors now have additional alternatives, take their investments into account and participating in global markets instead of relying only on the stock markets of their own region, but must recognize if markets are interconnected or not and there's a chance to maximize investment prospects if the market is not integrated. Then if no seasonality occurs, there would be no inclusive capital markets where there is no potential for an individual to make abnormal benefit. There can be no instability in foreign exchanges. It should be recalled that the investment prospects in foreign markets are contingent on whether or not these markets are interconnected or segmented (Caro, Apolinario, Santana, & Sales, 2006)

### 1.10 Research Objective

To examine the nature of weekly type efficacy, or there is a weekly phenomenon occurring in four Asian emerging markets as described by Morgan Stanley Capital International (MSCI) The analysis would use day-to-day return details of the composite stock market indices of the respective emerging market margins. Market indexes will be used from 2 May 2013 to 29 November 2017 in the Shanghai Stock Exchanges Composite Index (China), NSE Nifty (India).

We are not only researching return, but also uncertainty. Literatures have not gained much focus on the day of the week impact in a sense of uncertainty. The aim of this paper is to establish increasing partnerships and syncing between the capital markets of the numerous countries in the the phase of convergence of the distinct world economies and European economies.

## 2. Literature Review

### 2.1 Random Walk Model

This comparison has in financial terminology been extended to series of serially independent returns (a more precise definition is provided in Fama, 1965, reviewed below). At the beginning of the 1950s, scientist was first able to research the actions of the long price spectrum using electronic machines. In economics it was believed that a long term motion or pattern may be "analysed by extracting from it a separate analysis for short-term oscillation and random fluctuations," which would cause the remainder of the students to be studied (Kendall, 1953). However, Kendall was shocked by the findings as he analyzed 22 stocks in UK and product prices. He argued that the spontaneous variations from one word to the next are so broad in a sequence of prices observed at very small intervals that any systemtic effects that might occur are compromised. The

evidence were more like a sequence of wanderings.' The close to null serial association between prices shifts was not compatible with economists' views. However, the 'river walk model' or the 'river walk hypothesis' are marked as these observational findings. When values wander at random, so business researchers who are attempting to forecast potential protection prices will find it a huge challenge. Roberts (1959) has shown that a time series created from a sequence of the random numbers cannot differentiate between a record of the US stock price – the primary material used by market technicians to estimate future level rates. Based on Kendall's work and on earlier studies by Works (1934, he said, "the main aim of this paper is to draw attention to empirical findings from the financial analysts, for some cause, which seem to have been overlooked in the past, and to suggest a few methodological consequences of these results on the analysis of securities.' Osborne reveals that common inventory values have properties close to molecular movement. He employs mathematical techniques in the stock market by examining in depth the changes in stock markets from a physicist's point of view. Given the recent proof of random shifts in inventory values, often anomalous pricing activity persisted in certain situations where predictable pathways tended to be taken. This involves an inventory and product price series, which Operating (1934), Cowles and Jones (1937) and Kendall reviewed (1953). In 1960, however, it was recognised that the usage of time averaged protection prices caused autocorrelation in return sequences. This was found independently by Working (1960) and Alexander (1961). Once returns are dependent on market averages at the end of the contract, rates tend to fluctuate spontaneously. Working has established the issue of time average for the first time in the thin trade sector (see Dimson, 1979) as a precursor to business microstructure analysis (see Section 5 below). In the mid-1960s the random character of equity markets was a turning point in science. In 1964 Cooter published his series of articles on this topic, while in the Fama Ph.D. d. (1965), he analyzed the propagation and serial dependency of stock-market returns in his entirety, surveyed the current stock price literature, and concluded that "the paper seems fair to claim has provided clear and voluminous data to support this subject.

## 2.2 Market Efficiency

Business Efficiency The random walking model was seen as a series of findings, which can be compatible with the effective market theory, with an improved understanding of the price creation on competitive markets. The shift of focus started with statements like those of Samuelson (1965), whose 'Evidence of Pricing Properly Anticipated to Arbitrarily Flap' began by mentioning that there is a 'purchaser for any seller on open markets. Samuelson asserted: 'This is the explanation why the competitive prices would reflect market increases... If we would be sure that a price will grow, it will still have increased.' Samuelson says that 'we would expect market actors to regard certain pieces, which in a certain context may be seen as throwing their shadows before them in the search of avid and intellectual self-interest.' By posing his facts in a widespread manner, Samuelson applied strictness to our notion of a well-being. We do not know if these findings can be regarded as apparent or impressive, nor did Samuelson who wrote, 'the theorem is so general that I must accept that over the years I have oscillated between the fact that it is trivially obvious (and almost trivially void) and that I regard it as strikingly sweeping. This is possibly a feature of the main findings.' Fama (1970) compile a

thorough analysis of the theory and proof of market performance on the basis of Samuelson's microeconomic method along with a taxonomy proposed by Harry Roberts (1967). Although his paper is from theory to empirical work, he observes that most empirical work prevailed before the theory was established. The principle requires the concept of an effective market as one where there is no abnormal gain from selling on accessible knowledge. Consequently, a market may only be called productive if we set up a return model. Business performance assessments would become a joint measure of market activity and asset valuation models from this stage forward.

## 2.3 Days of the Week Anomaly

In the last 30 years there have been thorough investigations of abnormalities in the conduct of capital markets that seem to have contradicted the Productive Theory of the Sector. However, the proof is not yet definitive. Based on the results and the methodology used, various assumptions were drawn. While the market is unsuccessful, correlations are uncovered that can help investors in exceptionally high returns on stocks by fixed and measured market policy. After (Fama, 1970), influential work on calendar effects has also been carrying out much further study to show calendar effects. (Cross, 1973) He found the S&P 500 Index return on the US market from 1953-1970, researching the phenomenon of weekly days that is the most prominent calendar anomaly without any mathematical model. According to him, Friday's return was -18% higher than Monday's;

The Monday return was similarly noticed by research studies in the Dow Jones Industrial Index (French, 1980), which found that the return of US stocks on Monday was lower than on every other day, but also reported that on a weekly regularity with higher than average returns on Wednesday and Friday. The first to implement the regression procedure F and T statistics of the OLS and find that returns on Monday are negative, but not statistically significant. (Rogalski, 1994) The discrepancy between non-trading days and trading days was shown, which prompted him to point out that the negative return on Monday is the average Monday returns open and Friday returns closed. In addition (Dyl, 1986), businesses posted mostly poor news on Fridays. Their analysis has showed that asset values are growing on Fridays and dropping on Mondays, and that negative returns on Mondays are induced by the delaying of declaring bad news.((((Olson, 2011)) (Kazemi, 2011) and (Sias, 1995), also. The reported weekend impact (Chang 1993) is significant. In certain foreign markets it is often noted, however, that stocks display an irregular conduct on the third trading day, which is on Tuesday rather than on Monday (Guo & Wang, 2007).

Proven as the latest weekly effect in shares, US Treasury bill, and derivatives markets, along with the equity trends (Campbell, JY, Lo, AW, MacKinlay, & AC, 1997). However, there has been very little concern on calendar irregularities in Saudi Arabia Stock Exchange. Studies that observed the effects on other Arab emerging markets on the week day, such as the Egyptian (Al-Rjoub & SAM, 2004), Egypt (Aly, H, Mehdian, Perry & MJ) and the UAE ( (Al-Khazal & OM, 2008). However, heterogeneity in outcomes is observed for each nation.

In several US markets we can even find weekday trends. The forthcoming bond prices and the demand for treasury bills demonstrate that the market is close to that of equities (Cornell,1985); (Dyl & Maberly,1986). The results of the analysis of these four established markets indicate the presence of a weekend effect in Australia, Canada, Japan and Great Britain (Jaffe& Westerfield 1985). The lowest average return on Tuesday was seen in Japanese and Australian stocks. (Solnik&Bousquet, 1990) investigated the days of the influence for the Paris week, they reported that there was a negative impact on Tuesdays; this research was in conjunction with the studies of Australia & Japan(Barone, 1999). The distribution of the return is modified by days of week in various countries; (Agrawal & k. tandon, 1994); (Alexakis & xanthakis, 1995); (Balaban,1995) checked and analyzed on a day-by-day basis.

## 2.4 ARCH AND GARCH

The reality that it has been studied and observed in many countries and diverse business styles all days of the week in stock return. However, few have studied this impact on stock market volatility and analyzed it. In terms of stability Several experiments that have been studied by Garch Model ((French, 1980);Shwret & Stambaugh, 1987);Akgiray, 1989);Bailliean DeGennaro, 1990);(Hamao,Masuls and Ng, 1990); (Nelson, 1991);(Campbell and Hentschel, 1992); (Glosten, Jagannathan and Runkle, 1993) (Schwerte and Stambaugh studied relationship between the two)(Franc, 1980) (Schwerte and Stambaugh studied relationship between the two. They spoke about the need for equity return changes as stock market uncertainty increases, thereby reducing stock values. On the other hand(Nelson,1991) (Glosten, Jagannathan and Runkle;1993), there was no proof that there is no connection between mean stock returns and changes in returns, whereas the (Baillie, De Gennao,1990) evidence showed that negative, unforeseen returns are causing upward movement. In both experiments, it has been observed that the market price activity is subject to significant conditional heterogeneity. No connection has been found between fluctuations in stocks market and anticipated returns. In addition to weekly trends, neither of the above studies found a difference in stock market volatility. Any volatility dynamics are positive and beneficial for hedging and speculation and in several respects they can benefit. The uncertainty expected can be used for valuing such properties such as equity indices.

According to Chris Brooks & Gita Persand(2010), two of the stock repayment sequence of South Korea and the Philippines did not reveal any significant signs of the occurrence of this calendar phenomenon, examining the prevalence of day-of-the-week consequences in south-eastern Asia. The remaining three markets saw a slightly favorable or negative average return at least one day of the week. Most of this is expressed in the investment danger captured by the stock price index of the planet. If the presumption is that each economy has a constant chance for the world market over the week, some of the remaining consequences of the day are clarified. There are however several relevant irregularities in the calendar.

### 2.5 Asian Emerging Stock Markets

The GARCH paradigm is used in Asian emerging markets. Using the data from the developing markets in Asia and the GARCH model, this paper is unique in terms of equity market anomalies. Both the mean and the variance of inventory performance (volatility) are analyzed in the paper on the day of the week. Regular stock returns from India, Indonesia, Malaysia, South Korea of the Philippines, Taiwan and Thai were subjected to analytical work in January 1990 and revealed an important presence on the day of the week in some of the markets considered. This supports the belief that day of week and day of impact are not just traits of the US and other industrialized countries' financial markets, but of the developing economies as well. Nothing can be clarified regarding the important day of the week's effects on the returns contained in this article based on the settlement process, but the findings suggest a potential spill from the Japanese sector. But the critical day of the week's uncertainty impact could be in alignment with the principle of information supply. In order to research the everyday impact in 21 emerging markets, Basher & Perry Sadorsky (2015) has researching both unconditional and conditional risk analyzes. Furthermore, the danger will differ during the week. Different models show different outcomes but average effects for the weeks are present even after changing the business danger for the Philippines, Pakistan and Taiwan. Four of the versions display day-of-the-week results in other nations, such as Malaysian, Thailand and Turkey. The findings of this analysis indicate that although the impacts on everyday life are not present in most emerging stock markets surveyed, even after conditional market risk has been considered, some emerging stock markets have strong day-to-week effects.

## 3. Methodology

While the EMH is current, there is still significant work to be done in developing countries such as China, Pakistan, Malaysia and India, on the regular week impact of stock market action. If Monday's average stock return is considerably smaller than other days' average stock returns, the week-end impact is registered. This will subtract our strategy. The approach used to solve this issue is the dummy variable method based on a linear regression of 5 dummy variables each of the days of the week. The model of regression is based on one or more continuous variables of estimation. Regression is generally used to estimate and forecast. It is often used to look at which different variable is correlated with the dependent variable. Thus the regression model shall be used in the last span 2013 to 2017 to investigate the nature of the day-of-week impact on the stock market indices in China, India, Malaysia and Pakistan. The Arch and Garch models can assess the uncertainty while there is a big day-of-week methodology. For this reason a sampling duration is chosen between 2 May 2013 and 29 November 2017 ( a total of 1131 observations has been taken).

### 3.1 Time Series Data

Our statistics are time series data, since it has several measurements of the same unit of time observation. Time series data can be consistent or retained over all observations, measuring at successive time intervals and a standardized time interval.

Univariate regression involves (one variable only) and how this variable varies over time. It is used to figure out what kind of trend a vector is in data and to predict. The action of the relevant variable. Multivariable regression analyzes are univariate analyzes during time series.

## 3.2 Research Model

A regular return result was obtained from the MSCI economies picked from their individual index. Yahoo's financial platform gathered index info.

LN(cl/cl-1)*100

"cl" is the daily closing share price index at a particular time t,
"cl-1" is the daily closing share price index for the preceding period and
"ln" is the natural logarithm

## 3.3 Stationary & Non Stationary Series

If the joint likelihood of a sequence does not shift over time and the mean and variance are stable over time, then regardless of time, the distribution of the general chance implies that the same series will not change or replicate. The requirement is that if z>1 or all polynomial roots need to be more than 1 if one root is equal to 1, the unit must be root

If the mean and deviation shift or the return to sequence does not take a long time (the principle of economic long-term balance then does not apply. There is no concept of balance.

$$yt = y{-}_1 + \mu\varepsilon$$

με is white noise
Covariance is dependant on lag, taken into consideration rather time period directly.
If μ>0 then yt will be increasing,evidence that random walk is case od AR where b=1
How we determine that time series is non stationary:
The mean and variance are function (variable)of time .
Like E(Yt)=f{time(t)}
Variance= f{time(T)}

Our data here are not stationary due to weekends. The special case of non-stationary is pure random walk or white noise. The method is distributed separately and naturally with zero average and constant variable. The coefficient of special case random walk is β=1
But stationary require |β|<1.

$$Yt = \beta yt - 1 + \mu 2$$

Here we consider log. We may transform data to a stationary non-stationary vector by taking log.

## 3.4 Dummy Variable Approach

Dummy variable is not true and we build it to represent something other than it. Weekdays are categorical independent variables. We need number so the model will function. To assign just every number implies and the command and control relationship which normally doesn't make sense. Dummy Variable models are used to determine the

seasonal behavior of the economy and use a basic regression formula, which applies to a single dummy variable with an excess return on a given trading day. This model cannot therefore be calculated if the dummy variables along with the constant word are all present. This would contribute to optimal multi-linearity. In order to resolve this issue, a vast number of researchers delete either one or the constant word from the regression equation. However, this prevents perfect multi-linearity by reversing the dependent variable from the separate dummy variables. The variable used in the model is the Nifty,KSE100,SSCE-50,KLCI Stock based variable which is indicated on every day t. Independently, the stock returns at Day T on second day of exchange and fifth trading days and 0 otherwise are dummies on the corresponding days of the Week and assume a value of 1

We will look at the phenomenon day by ignored and preventing bank vacations and only five experiments are carried out weekly and initial estimate can be carried out by simply regressing models including five dumb variables Basic linear regression models are classical and are widely used.

A sequence of frequent, constantly compound log returns is computed on a regular basis for each index.

$$R = \beta 0 + \beta 1D1t + \beta 2D2w + \beta 3D3th + \beta 4D4f + \varepsilon \ldots\ldots\ldots\ldots (1)$$

By recalling our linear regression model y is assumed to have this linear relationship with x that is R has linear relation with D0,d1,d2,d3 and d4 and epsilon is random error component representing the fact that the ys have some variability and randomly distributed about that line.

Tuesday=1 if significant day is Tuesday , 0 otherwise

Wednesday=1 if the significant day is Wednesday , 0 otherwise

Thursday = 1 if the significant day is Thursday , 0 otherwise

Friday = 1 if the significant day is Fridar , 0 otherwise

For Monday if its not Tuesday Wednesday Thursday Friday then only β0 intercept is left for Monday

The error term is assumed to be independent and identically distributed with a zero mean and constant variance. Equation 1 is the simplest test for stock market day-of-the-week effects. It assumes the existence of a constant variance, which may result in inefficient estimates, if there is a time varying variance. Therefore, we include the changing variance into estimation. Here, we assume that the error term of the return equation has a normal distribution with zero mean and time varying conditional variance Statistically significant estimated coefficients in Equation 1 provide evidence of day-of-the-week effects. Model 1 does not, however, include any risk factors. It supports the hypothesis of seasonality in returns, it is important to note that risk factors are not taken into account. The possibility that the market can be more/less risky on certain days must be allowed for.

ε is a vector of the residual terms also called the error term of the model or simply the residual. is the intercept term which measures average daily returns on first trading day of the week while are coefficients that provide a pair-wise evaluation in between mean daily returns on first trading and the mean daily returns on second trading day to fifth trading day of week.

If null hypothesis is rejected then it is assumed that there is presence of day of the week effect in respective market. Two serious problem which will be raised by running the above equation will be the residual attained is auto correlated while other is that the residual variance is not constant and dependant of time which lead to non-stationary variable.

## 3.5 ARCH AND GARCH MODEL

The GARCH model The conditional variance of a time series relies upon the square residues of the phase according to the generalized ARCH model often recognize as the GARCH model (Bollerslev, 1986). In order to address anomalies in the variance of the residual, we can use the ARCH model. This method (Engle ,1982) was employed when he noticed that the variation in residuals was not consistent and based on time. A symmetrical GARCH model with the Ţ parameter illustrates how various variance behaviour happens when there are positive and negative shocks, is another model to be implemented.

We have to conclude that this random error term is epsilonic, error term is expected to usually be homoscedastic (all of the same variation on each X) and it is thought that they are independent. This statement might or may not be correct if the others can be observed in the same way.If the variance of the residual is elevated by x, this is a breach of the expected constant variance, a constant variance is assumed, which could contribute to inefficient calculations if there is a time difference. Consequently, we include the shift in forecast variance. Here we suppose that the return equation's error term has a standard distribution of zero mean and period variations based on h, (and ~N (0,ht)). The literature utilizes a number of models of conditional variances. Engle (1982) introduces a model which will systematically alter the estimation variance of the return equation over time. The presumption here is that conditional variance, hi, would depend on the last 2 residues of the Return, equation,

$$(h, = Vc + \sim q = l\, Vje\, l - j\,)$$

which is known as Autoregressive Conditional Heteroskedastic Models .
We are using ARCH model that is Autoregressive conditional Heteroskedastic if the variance is non-constant over time.

Variance is equal to omega plus sum of square returns which is very similar to what we see is unweighted with difference that those squared return are being weighted. So we have introduced in this weighted idea why we do that well because we don't want more recent return.
Where epsilon T is a sequesnce of iid random variable with mean 0 and in this case we will assume the variance to be equal to 1 which is constant so we can without loss of generality assume it to be 1 for the timing. Lets assume a>0 and all j's are>0 now condition that a and aj is positive because siqma square actually turn out to variance .So we ensure that on the left hand side doen not become negative .We will leave alpha positive Xs are squared so whatever the sign of X's have greater weight if its 5 year series. Yesterday's return weight more than we ought to weight more than the returns 5 years ago. So that's the generalized arch which is subset special case of most popular GARCH(1,1) special case of ARCH.

Model assume that positive and negative shocks have same effect .If the positive shock is large that is $X_t$ minus 1 is large positively then it became Xt-1 square and sign doesn't matter .Negative shock effect will be same Xt-1 this is the defect of model that both shocks have different impact on variability. The process generates data with fatter tails then that of normal density. Often t distribution gives better fit.

# 4. Results & Discussion

In this section, wehave discussed about the statistical application. We have gathered the data from different sources and this data will give the results of this research by using STATA. This chapter will analysis the hypothesis, and will interpret the results. Further we have used linear regression and Arch and Garch model to check volatility ,we have also check normality and auto correlation.

## 4.1 Statistical Result

**Table1: Statistical Results**

| Index | Number of obs | Prob>f | R-squared | Adj R-squared |
|---|---|---|---|---|
| NSEI | 1100 | 0.3417 | 0.0041 | 0.005 |
| KSE100 | 1122 | 0.002** | 0.015 | 0.001 |
| KLCI | 1130 | 0.0024** | 0.0146 | 0.0111 |
| SSE500 | 1119 | 0.66 | 0.00 | 0.00 |

**Source: Author's own elaboration**

In table above we can observe f- test for four different countries .Here or KSE and KLCI it is observed that model has explanatory power with p value as it is less than 0.1, 0.5and 0.01,model is significant to all level. So we reject the null hypothesis and f model has explanatory power and it is a good regression model to work. Here by observing R-sqaure all index are less than 0.Other remaining countries shows that at 95% confidence interval f test is not significant which mean that days of the week do not effect stock returns.

**Table. 2. Analysis**

| | **NSE** | | | | **KSE100** | | | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient | Std Error | T | p>t | Coefficient | Std Error | T | p>t |
| **Mon** | 0.003 | 0.090 | 0.030 | 0.978 | -0.2934 | 0.9028 | -0.325 | 0.001** |
| **Tues** | 0.152 | 0.089 | -0.170 | 0.090** | -0.8423 | 0.894 | -0.94 | 0.346 |
| **Wed** | 0.017 | 0.089 | -0.190 | 0.874 | -0.0210 | 0.89 | -0.23 | 0.815 |
| **Thurs** | 0.001 | 0.09 | -0.010 | 0.990 | 0 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Fri** | 0 | | | | -0.884 | 0.90 | -0.98 | 0.329 |
| | Coefficient | Std Error | T | p>t | Coefficient | Std Error | T | p>t |
| **Mon** | 0 | | | | 0 | | | |
| **Tues** | 0.03369 | 0.54 | 0.62 | 0.533 | -0.0028 | 0.155 | -1..29 | 1.98 |
| **Wed** | -0.01478 | 0.0541 | -0.27 | 0.785 | -0.0384 | 0.155 | -0.25 | 0.804 |
| **Thurs** | 0.0069 | 0.054 | 0.13 | 0.88 | -0.201 | 0.156 | -0.13 | 0.198 |
| **Fri** | 0.28 | 0.054 | 0.52 | 0.603 | -0.0060 | 0.156 | 0.04 | 0.969 |

**Source: Author's own elaboration**

By seeing t value of all countries mostly are negative which shows all days are less significant except Tuesday in KLCI which shows positive and highly significance .At 5% level of significance we may see that only Mondays in KSE and Tuesdays on NSEI show the significance. We took" r" from our mean model to make the variance model.After plotting r we find out if there is volatility.

The two pre condition before estimating arch :
1)Periods of high volatility are followed by period of high volatility and periods f low volatility are tend to be followed by period of low volatility for prolong period is clustering volatility.
This suggest that error term conditionaly heteroscedastic and can be represented by Arch and Garch model.
Predicted r is created and then plotted. R showed that for a prolong periodthere is high volatility followed by high volatility and same with low volatility In all four marketss we have chosen.One high volatility is causing another high volatilty for a prolong period.we found clustering volatility.All four countries showed clustring volatility in graph.

**Arch effect**
H0:No arch effect
H1:There is Arch effect
If rejecte null hypothesis and accept H1 then run model.
To check Arch effect we put lag 1 to test arch effect .LM test for Arch effect.

**Table 3. ARCH Test**

| | **SSE** | **NSE** | **KLCI** | **KSE100** |
|---|---|---|---|---|
| **Chi2** | 39.176 | 1.944 | 114.706 | 28.509 |
| **Df** | 1 | 1 | 1 | 1 |
| **Prob>chi2** | 0.000 | 0.1632 | 0.000 | 0.000 |

Above table showsARCH test which result that the probabilty is less than5% in SSE ,KLCI and KSE so will reject H0 that model has arch effect in these countries but NSE does not have arch effect.So we have validity to run ARCH and GArch model as three countries fulfill assumption of clustring volatility as well as arch effect.Model run is GRACH(1,1).With Gaussian distribution is checked first.

**Test 4. Guassian Distribution**

| **SSE** | **STD ERROR** | **Z** | **P>(Z)** |
|---|---|---|---|
| **ARCH L1** | 0.0095181 | 11.46 | 0.000 |
| **FARCH L1** | 0.007638 | 117.08 | 0.000 |

| **KLCI** | **STD ERROR** | **Z** | **P>(Z)** |
|---|---|---|---|
| **ARCH L1** | 0.023099 | 6.06 | 0.000 |
| **GARCH L1** | 0.233515 | 35.22 | 0.000 |

| **KSE100** | **STD ERROR** | **Z** | **P>(Z)** |
|---|---|---|---|
| **ARCH L1** | 0.276772 | 7.25 | 0.000 |
| **GARCH L1** | 0.333609 | 22.02 | 0.000 |

**Source: Author's own elaboration**

Here in above table we can observe that in all countries arch effect is significant variable to explain the volatility of log returns.So is GARCh is significant variable to explain the volatility of log returns of all 3 above countries.Previous days volatility of log return can influence the volatility of log return of all countires under gaussian distribution.Garch is significant previous days volatility of log return of SSE50 can influence the todays vaolitility of market return of SSE market.

## 4.2 Correlation & Normality

We checked serial correlation or whether residual is normally distributed or not as it shows that how much two variables fluctuate together and how they are influencing each other andwe created residuals first so to test serial corelation and if the residual is normally distributed or not.

H0:there is no serial correlation

H1:There is serial correlation

By SSE 500 results of Guassian residuals we found that first lag 1,2 and3 have greater than 5% probabilty thus we will accept h0 that there is no serial correlation.Thus it is desireable and can accept themodel.KLCI residuals we found lag 2 and 3 greater than 5% probability thus accept H0 that there is no serial correlation in klci residuals and it is desireable model.Whileby testing KSE 100 we found a serial correlation in its residual thus KSE is not a desireable and favourable model.

**Table 5: Shapiro-Wilk W test for normal data**

| Variable | Obs | W | V | z | Prob>z |
|---|---|---|---|---|---|
| **SSE gr** | 1100 | 0.87901 | 83.229 | 10.992 | 0.0000 |
| **KLCI gr** | 1129 | 0.94756 | 36.939 | 8.982 | 0.0000 |
| **KSE 100 gr** | 1032 | 0.95586 | 28.652 | 8.30 | 0.0000 |

**Source: Author's own elaboration** $H_0$:residuals are normally distributed

$H_1$:residuals are not normal

In SSE, KLCI and KSE probability is less than 5% thus we will reject H0 and accept H1 that residuals are not normal thus model is not acceptable.Here in Gaussian distribution it is found that KSE is not a desirable model as there is a serial correlation as well residuals are not normal thus it's a good model.

Model under "t"| student distribution:

With 10 degree of freedom

**Table 6: ARCH and GARCH Effects**

| SSE | STD ERROR | Z | P>(Z) |
|---|---|---|---|
| **ARCH L1** | 0.165034 | 7.19 | 0.000 |
| **GARCH L1** | 0.0155956 | 55.30 | 0.000 |

| KLCI | STD ERROR | Z | P>(Z) |
|---|---|---|---|
| **ARCH L1** | 0.266787 | 4.95 | 0.000 |
| **GARCH L1** | 0.285297 | 29.15 | 0.000 |

| KSE100 | STD ERROR | Z | P>(Z) |
|---|---|---|---|
| **ARCH L1** | 0.35227 | 5.33 | 0.0000 |
| **GARCH L1** | 0.473909 | 15.24 | 0.0000 |

**Source: Author's own elaboration**

In SSE, KLCI and KSE 100markets ARCH effect is significant as p value is less than 5% thus previous days return of SSE, KLCI and KSE can influence today's volatility of SSE and KLCI market returns. GARCH is significant as well so previous days volatility can influence the volatility of today's market return. Same result has been seen in SSE market as in t(10) students distribution lag 1,2,3 has more than 5% probability thus we will accept H0 that there is no serial correlation in the residual so it is desirable and can accept the model. In KLCI and KSE 100market all lags have less than 5% probability so we reject H0 here and accept H1 there is a serial correlation in KLCI and KSE100 market residuals so it is not a desirable model.

**Table 7: Shapiro-Wilk W test for normal data**

| Variable | Obs | W | V | z | Prob>z |
|---|---|---|---|---|---|
| SSE sr | 1100 | 0.87843 | 83.629 | 11.004 | 0.0000 |
| KLCI sr | 1129 | 0.94713 | 37.245 | 9.003 | 0.0000 |
| KSE 100 sr | 1032 | 0.95460 | 29.465 | 8.389 | 0.0000 |

**Source: Author's own elaboration**

Here in all above markets p value is less than 5% thus will reject the H0 and accept H1 that residuals are not normally distributed. That is not desirable model as not normally distributed.

**Table 8: Generalized Error Distribution (GED)**

| **SSE** | **STD ERROR** | **Z** | **P>(Z)** |
|---|---|---|---|
| **ARCH L1** | 0.014558 | 7.79 | 0.000 |
| **GARCH L1** | 0.012811 | 68.53 | 0.000 |

| **KLCI** | **STD ERROR** | **Z** | **P>(Z)** |
|---|---|---|---|
| **ARCH L1** | 0.294356 | 4.68 | 0.000 |
| **GARCH L1** | 0.305904 | 26.97 | 0.000 |

| **KSE100** | **STD ERROR** | **Z** | **P>(Z)** |
|---|---|---|---|
| **ARCH L1** | 0.346658 | 5.34 | 0.0000 |
| **GARCH L1** | 0.0453317 | 16.28 | 0.0000 |

**Source: Author's own elaboration**

In SSE, KLCI and KSE100 market ARCH effect is significant as p value is less than 5% thus previous days return information of SSE can influence today's volatility of SSE, KLCI and KSE100 market returns. GARCH is significant as well so previous days volatility can influence the volatility of today's market return. Same result has been seen in SSE market as in GED lag 1,2,3 has more than 5% probability thus we will accept H0 that there is no serial correlation in the residual so it is desirable and can accept the model. In KLCI and KSE 100 market all lags have less than 5% probability so we reject H0 here and accept H1 there is a serial correlation in KLCI and KSE100 market residuals so it is not a desirable model.

**Table 9: Shapiro-Wilk W test for normal data**

| Variable | **Obs** | **W** | **V** | **z** | **Prob>z** |
|---|---|---|---|---|---|
| SSE gedr | 1100 | 0.87839 | 83.658 | 11.005 | 0.0000 |
| KLCI gedr | 1129 | 0.94724 | 37.164 | 8.997 | 0.0000 |
| KSE 100 gedr | 1032 | 0.95460 | 29.465 | 8.389 | 0.0000 |

**Source: Author's own elaboration**

Here p value is less than 5% thus will reject the H0 and accept H1 that residuals are not normally distributed. That is not desirable model as not normally distributed.

# 5. CONCLUSION

Theory, regulatory bodies and politicians will be helped in several respects by our study, since it is beneficial for advertisers, since it means that anomalies of weekend results may be accomplished in the Pakistani stock sector. For political and regulatory leaders to implement proper strategies and mechanisms to accelerate demand by means of financial changes without undermining economic and financial stability, it can be insightful.

Investors can gain abnormal returns by negotiating an information-based approach. It is advisable to purchase stocks on weekends and weekdays depending on outcomes and what they are to sell to make an irregular profit. When the seasonal influence on the financial markets is known and effective, investors may provide helpful hints regarding investments. If investors are conscious of this, they will adjust their investments in view of these shifts in stock returns. The theory and study practices may be driven by academics.

The macroeconomic news release theory is backed by results of the maximum uncertainty. The detection of such volatile trends may be useful in several ways, including the use of projected hedging and speculation motives of volatility and the use of predicted volatility to estimate certain resources, particularly stock index options. In addition, investors should adapt their investments by reducing their exposures to assets that are projected to raise uncertainty and vice versa. In short, on return equations as well as volatility (conditional variance) equations we detect the day of the week effect. The detection of such volatile trends may be useful in several ways, including the use of projected hedging and speculation motives of volatility and the use of predicted volatility to estimate certain resources, particularly stock index options.

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