CALENDAR EFFECTS IN STOCK MARKETS OF INDIA AND CHINA: AN EMPIRICAL ANALYSIS OF MONTH-OF-THE-YEAR EFFECT

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Equity markets of emerging economies have gained a wide interest among the investors. The behaviour of stock prices attracts the investors and practitioners to identify the seasonality/ calendar anomalies existing in them. The present research tries to identify the existence of calendar effects focussing on Month-of-the-year effect in the stock markets of India and China choosing Nifty and SHCOMP as indexes representing the index values on monthly since the inception of the indexes till December 2013. The study uses basic statistics, Augmented Dickey Fuller (ADF) and Phillip Perron (PP) unit root tests and Dummy Variable Regression to identify the patters. After investigation it was found that there tends to persist a statistically significant 'December effect' in India and statistically insignificant 'May effect' in China. However the common pattern found was the 'October effect' showing least stock returns.

Key words: Seasonality, Calendar Anomalies, Month-of-the-Year Effect, Nifty, SHCOMP, ADF & PP Unit Root Test, Dummy Variable Regression.

INTRODUCTION

This concept of Efficient Market Hypothesis (EMH) Theory is mostly followed by market investors. This theory is the most popular one in the financial markets as developed by Eugene Fama in 1960s. What EMH says is that the prices of assets are created/arises as a reflecting image of the available market information about companies and investors ('The Price is Right') so no individual investor can find a mantra/ secret to outperform purposefully and consistently by using such information ('No free Lunch'), Thaler. With development in the technology this information is now easily available on different websites, dailies, magazines, news channels etc. But many economists have

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counter attacked this theory on the ground of the speed with which the information reaches the investors. Numerous researches have been carried out on this concept but now there is a gradual shift in the attention of scholars and practitioners towards the existence of seasonality in the stock market returns. This presence of seasonality shows the existence of market inefficiency. *'Be greedy when others are fearful and fearful when others are greedy'*. – Warren Buffett. 'The truth is that the market doesn't really reflect some magical perfect valuation of a stock under the efficient market hypothesis. It reflects the mass consensus of how actual individual investors value the stock. It is the sum total of everyone's hopes and fears', M.E. (Thomas). It is being rightly said by Warren Buffet in his article 'The Super investors of Graham-and-Doddsville' pointing the investors that "Ships will sail around the world but the Flat Earth Society will flourish. There will continue to be wide discrepancies between price and value in the marketplace, and those who read their Graham & Dodd will continue to prosper."

Seasonality has created calendar anomalies which cannot be explained by any model or theory in finance. The seasonality referred here is the pattern in stock market returns i.e. on an average the returns of the markets are not distributed uniformly in various periods of calendars. As a result several effects are being created such as 'month-of-the-year effect', 'day-of-the-week effect', 'week-of-the-month effect', 'holiday effect', 'month-of-the-quarter effect' etc. As the paper focuses on the 'month-of-the-year effect' several papers on this concept have been written and published and majority of them came out with the 'January effect'. This effect was first investigated by Wachtel (1942) in USA financial markets followed by Rozef and Kinney (1976), Kiem (1983), Kiem and Stambaugh (1984) and Ariel (1987). The reasons explained for this seasonality by them were 'tax loss selling', information asymmetry, insider trading, window dressing and size of firms.

Since Globalisation, the emerging markets have made investors keenly interested to invest in them and achieve the benefits of global portfolio diversification. The probable reason for such interest is the high economic growth in these economies after being globalised. Thus the best examples from Asian economies are India and China which are on the path soon emerging as super powers. In such a context the investors and researchers will be highly interested to know the stock price behaviour of these economies. So the present study examines the 'month-of-the-year effect' in stock markets of India and China.

LITERATURE REVIEW

There exists vast literature on the Calendar Anomalies comprising of day-of-the-week effect, month-of-the-year effect etc. These seasonality trends have been extensively studied by various researchers. Some studies were in support of prior studies while others gave totally contrasting statements. So according to the scope of the present study the literature review can be divided into three sub categories: Calendar effects in Indian Stock Markets, Calendar effects in Chinese Stock Markets and finally calendar effects in remaining economies of the world and their comparison. So, the following literatures will focus on these areas respectively.

Patel (2008) compared BSE Sensex and NSE Nifty and documented Nov-Dec pattern and also found a new Mar to May effect during June 1999 to June 2007.Karmakar&Chakraborty (2000) in their research article reported the existence of monthly effect and turn-of-the-month effect in the Index Numbers of Ordinary Share Prices, *Economic Times,* using a broad period of Jan 1981 to Dec 1995. Dash *et al.* (2011) found evidence of month-of-the-year effect in Indian economy with positive returns in August, November and December while negative in March by using BSE Sensex. Nageswari & Selvam (2011) found Wednesday positive returns and no month-of-the-year existed in Sensex choosing a period of 10 years. Chawla *et al.* (2013) captured Nov-Dec pattern in BSE SENSEX including various BSE Sectorial Indices using the period Jan 2000 to Dec 2012. The new finding in their study was the existence of Apr-Aug-Nov-Dec pattern.

Lei & Kling (2005) pitched end-of-the-year effect in Chinese stock markets i.e. after year ends in China (after Feb) which is in contrast with other countries the positive returns began to start by working on Shanghai and Shenzhen composite index using a period of 13 years. . Zhang& Li (2006) again worked on Shanghai Composite Index &Shenzhen Composite Index for the period of 1991 to 2004 modelling through GED GARCH (1, 1) and found positive Tuesday and January effects in contrast to former study and also analysed that no more turn-of-the-month effect existed in Chinese economy since 1997.Qi &Wang (2013) investigated Golden Weeks effects in China using GED-GARCH (1, 1) approach and found Feb, Apr, Aug, Sep, Nov & Dec yield statistically significant results.

The studies of Hourvouliades and Kourkoumelis (2009) conducted on six emerging markets i.e. Cyprus, Ukraine, Bulgaria, Romania, Turkey and Greece tried to find the

calendar effects during financial crises and found mixed evidence about the day of the week effect in these equity markets. The findings reveal that on one hand this effect was evaporated in the markets of Greece and Turkey during the crises which existed in the prior period but on the other hand there was no such trend found in the remaining economies. Rahman (2009) considered Dhaka indices to find the day of the week effect using dummy variable regression and volatility analysis using GARCH models. They investigated that Sunday and Monday created negative returns while the remaining week days yield positive returns.

McGowan (2009) tested for day-of-the-week effect using models of ARCH & GARCH and found lowest returns on Wednesday and highest returns on Friday but examined that none of the day's returns were statistically significant. Ali & Akbar (2009) conducted study on Pakistani stock market and revealed that no monthly or weekly effects could be detected in Karachi Stock Exchange. Giovanis (2009) documented the day-of-the-week, month-of-the-year, semi-month of the year and turn-of-the-month effect in 51 economies of the world using 55 stock indices. Tangjitprom (2010) examined the overall performance of SET Index of Thailand and found that there exists a holiday effect in the market due to the high abnormal return of the stock index during the trading day prior to holiday by using various GARCH models. Keong et al. (2010) worked on Asian stock markets including 11 countries and pitched the existence of seasonality in these stock market returns as well as the periods of volatility in the index returns. Patel & Radadia (2012) compared four Asian markets consisting of India, China, Japan and Hong Kong for the period of twelve years by breaking the data into three sub periods and concluded that Monday was the most volatile day in these Asian markets. Prajapati et al. (2013) worked on 11 stock markets situated in different corners of the world. Their intension was to help investors to find those stock markets in which they can earn profitable returns. Their study proposed the existence of day-of-the-week effect in all stock markets and hence those days which yield higher returns were profitable to invest for. Mangla & Lohia (2013) investigated the presence of month-of-year effect in nine emerging stock markets including India and China. Their study proposed that in majority of stock markets, Aug & Sep exhibit positive statistically significant returns.

OBJECTIVES

1) To compute the Descriptive statistics of NIFTY and SHCOMP.

2) To examine whether Index returns follow Normal Distribution.

3) To examine whether Index returns are stationary or not.

4) To examine the monthly pattern existing in NIFTY.

5) To examine the monthly pattern existing in SHCOMP.

6) To determine whether the high return monthly pattern are statistically significant or not.

7) To compare the efficiency of the two Indices from the point of view of investors.

DATA AND METHODOLOGY

This study focus on the broad monthly return patterns of the two emerging stock markets of Asia: India and China. In order to derive significant results, the benchmark indices of both the countries have been taken for comparison which provides meaningful results. The data of index value is taken on monthly basis i.e. value of the index on last trading day of the month. To represent Indian economy its benchmark index Nifty is taken. Nifty is National Stock Exchange (NSE) benchmark index which represents Indian equity market. Its ownership belongs to IISL (India Index Services and Products Limited) and is managed by the same. It covers 50 companies belonging to 22 sectors of the Indian economy. The methodology followed by Nifty to calculate Index value is free float market capitalisation method. For Chinese economy their benchmark Index Shanghai Composite Index (SHCOMP) is taken to see the performance of Chinese stock market. SHCOMP is a stock market index that includes all the stocks consisting of 'A' and 'B' category shares. The index value is calculated by using the technique of Paasche Weighted Composite Price Index. The source of data collection is Yahoo Finance and the period of study is since the inception of the Indices till Dec 2013. The period of study is extensively wide so that appropriate results can be obtained with much more confidence.

Table 1: Data collection Table

Country	Index	Period	Source
India	NIFTY	Jan 1995- Dec 2013	Yahoo Finance
China	SHCOMP	Jan 1991-Dec 2013	Yahoo Finance

Prior most, the monthly returns of Nifty & SHCOMP are calculated by using the equation:

$$R_t = (M_t - M_{t-1})M_{t-1} * 100$$

Where R_t = Return for the month t

M_t = Closing value of the Index on the last trading day of the month t

M_{t-1} = Closing value of the Index on the last trading day of the month immediately preceding the month t

Then moving forward towards the descriptive statistics of the monthly returns of the two Indexes were calculated separately which provides summaries of the basic statistics of the return using Mean, Median, Standard Deviation (S.D.), Skewness, Kurtosis, Coefficient of Variation Etc. Jarque Bera (J.B.) test was applied to check whether the index returns series is Normal or not. Then the study test for the existence of seasonal patterns / monthly patterns in the index returns using the Dummy Variable Regression. In general for categorical variables with **q** categories, we need **(q-1)** dummies, one for each category except one (the omitted category). This means that the estimated intercept will be the intercept for the omitted category, but the intercept for all other categories will be (the estimated intercept plus the estimated dummy coefficient). In present study there are 12 categories of the months starting from Jan to Dec i.e. 12 months. So, the dummies will be (12-1) i.e. 11 dummies will be created and here the omitted category will be taken as December. The equation will be:

$$R_{it}(\text{Return on Index}) = \beta_0 + \beta_1(d_{Jan}) + \beta_2(d_{Feb}) + \beta_3(d_{Mar}) + \beta_4(d_{Apr}) + \beta_5(d_{May}) + \beta_6(d_{Jun}) + \beta_7(d_{Jul}) + \beta_8(d_{Aug}) + \beta_9(d_{Sep}) + \beta_{10}(d_{Oct}) + \beta_{11}(d_{Nov}) + v_t$$

Where R_i = return of corresponding Index at time t

v_t = error Term

β_0 = estimated Intercept for Omitted Category (in this case December month)

$\beta_1 ..... \beta_{11}$ = estimated intercepts from Jan to Nov

$d_{Jan} ..... d_{Nov}$ = will be dummy variables for the month Jan to Nov, holding the values (0 or 1), such that d_{Jan}=1 if t is Jan, 0 otherwise. Similarly d_{Feb}=1 if t is Feb, 0 otherwise and so on. Accordingly Hypothesis was framed as:

H_0: $\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11}$

H_1: At least one β is different

So, in order to test the significance of hypothesis, T-Test was conducted.

To avoid Spurious Regression the data of the index returns should be tested for stationarity. This can be done by conducting the Unit Root- Tests. For this purpose two unit –root test were applied to the study which are The Augmented Dickey Fuller (ADF) Test and Phillip Perron (PP) Unit Root Test.

EMPIRICAL ANALYSIS (RESULTS & DISCUSSION)

Starting with the basic Descriptive Statistics, Table 2 shows comparison of basic statistics of returns of Indian and Chinese Economy.

Table 2: Descriptive Statistics

Statistics	India	China
Mean	1.000545	2.052838
Median	0.882250	0.698634
Maximum	28.06600	177.2262
Minimum	-26.41030	-31.15295
Standard Deviation	7.392675	17.16323
Coefficient of Variation	7.388642487	8.360733
Skewness	-0.119788	5.672922
Kurtosis	3.715955	53.84350
Jarque Bera	5.414885	31208.58
Probability	0.066707	0.000000
Observations	228	276

Note: * The value are significant at 1% level

Both the countries show positive mean return during the study period, but China showed higher mean return of (2.052838) almost double of India which stick to (1.00545). The variation in the mean returns of the two countries in terms of Standard Deviation(SD) was found very high in case of China (17.16 per cent) as compared to India (7.39 per cent) which showed that SHCOMP is more volatile than Nifty. From Investors point of view the basic investment rule in finance is 'Higher the Risk, Higher would be the Return'. Risk per unit of return is indentified through the measure of coefficient of variation (CV). CV of India was found to be 7.38 times and for China it was 8.36 times which clearly states that investment in China will be more risky than India. The skewness of both the countries was found to be different from zero, thus indicating that

both the countries do not follow symmetrical distribution or there is asymmetry in the returns of Index. The Kurtosis of both the indexes was greater than 3 which imply that the return series curve is more peaked i.e. Leptokurtic in nature. The Jarque Bera (JB) stats of both Nifty and SHCOMP returns are significant at 1% level, and hence the null hypothesis is rejected, which shows that the monthly returns of both the indexes do not follow Normal Distribution. Table 3 indicates results of ADF and PP unit root tests to examine the stationarity of the Index return series.

Table 3: Results of Unit Root Test

Index	Augmented Dickey Fuller	Phillip Perron
India	-14.90396	-14.92243
China	-17.05834	-17.05168
Critical Values of ADF and PP test		
Significance Level	India	China
1%	-3.459101	-3.453997
5%	-2.874086	-2.871845
10%	-2.573533	-2.572334

The values in the table depict that the null hypothesis is rejected at 1% significant level, thus clearly indicating stationarity in index returns. This can also be seen with the help of Graph 1 & 2.

Graph 1: NIFTY_RETURN

Source: Yahoo Finance

Graph 2: SHCOMP_RETURN
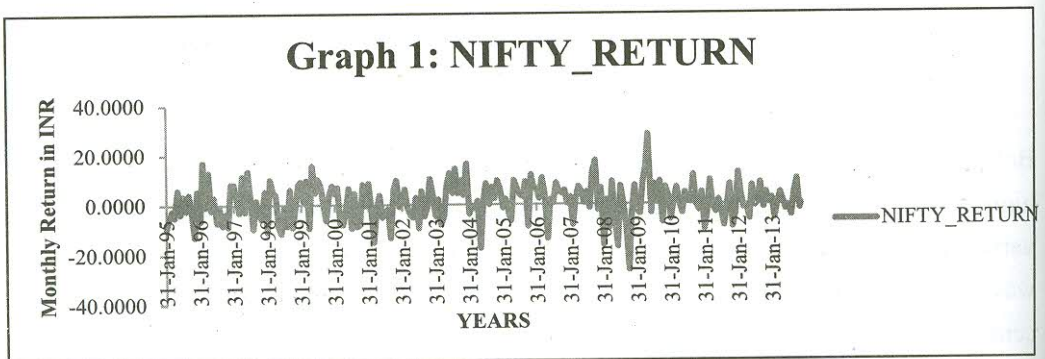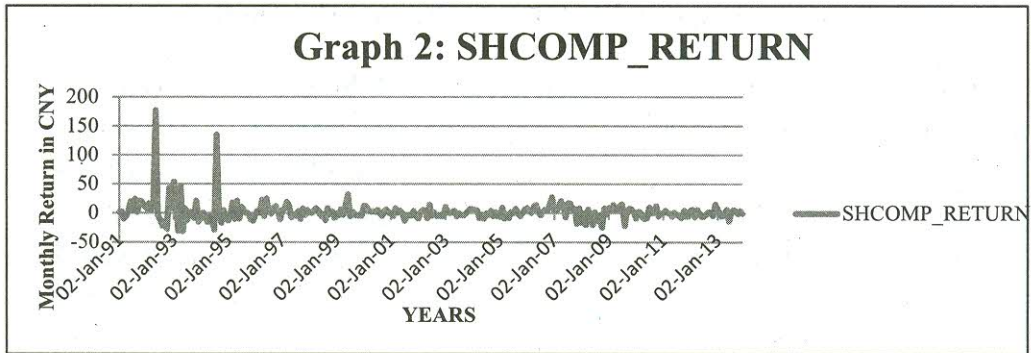
Source: *Yahoo Finance*

Thus we can easily proceed to regression shown in Table 4 and 5.

Table 4: Regression model for Nifty to test the monthly pattern

Variable	Coefficient	Std. Error	T- Stats	P-value
Constant	4.50288	1.707072	2.637779	0.008952
d_ Jan	-5.37049	2.414165	-2.22458	0.027144
d_ Feb	-2.9687	2.414165	-1.2297	0.220146
d_ Mar	-4.54357	2.414165	-1.88205	0.061174
d_ Apr	-2.986	2.414165	-1.23687	0.217479
d_ May	-4.13502	2.414165	-1.71282	0.088182
d_ Jun	-3.25841	2.414165	-1.3497	0.178524
d_ Jul	-3.48721	2.414165	-1.44448	0.150053
d_ Aug	-4.08202	2.414165	-1.69086	0.092306
d_ Sep	-2.51047	2.414165	-1.03989	0.299553
d_ Oct	-5.55004	2.414165	-2.29895	0.022464
d_ Nov	-3.13607	2.414165	-1.29903	0.195319
R^2	0.035989			

Note: * The values are significant at 5% level

Table 5: Regression model for SHCOMP to test the monthly pattern

Variable	Coefficient	Std. Error	T- Stats	P-value
Constant	0.276655994	3.607922629	0.07668013	0.93893609
d_ Jan	2.415642914	5.102373114	0.47343518	0.63629398
d_ Feb	3.266302191	5.102373114	0.64015354	0.52262797
d_ Mar	0.10338494	5.102373114	0.02026213	0.98384957
d_ Apr	4.35089214	5.102373114	0.85271932	0.39458792
d_ May	7.023731569	5.102373114	1.37656173	0.16981413
d_ Jun	0.151309477	5.102373114	0.02965473	0.97636482
d_ Jul	-1.532939349	5.102373114	-0.30043654	0.76408064
d_ Aug	4.586799816	5.102373114	0.89895421	0.36949623
d_ Sep	-0.955191543	5.102373114	-0.18720535	0.85164342
d_ Oct	-1.551730617	5.102373114	-0.30411939	0.7612765
d_ Nov	3.455982961	5.102373114	0.67732855	0.49879064
R^2	0.024302341			

Note: * The values are significant at 5% level

By observing the dummy variable regression table, following results were found:

The measure of R^2 is very small in case of both the countries i.e. less than unity which shows that the model is valid. On examining the coefficients of intercepts and P-values it can be inferred that in India there is a 'December-Effect' as shown in Graph 3 which is statistically significant also as corresponding p-value is significant at five percent level followed by September i.e. the two months give maximum returns. Although, all the coefficients representing intercepts of different months yield negative returns except December, the returns have been lowest in the month of October which is again statistically significant followed by January which is totally contrasting statement to the previous literatures examined on calendar effects in Nifty representing the January effect. Another pattern of seasonality seen in Nifty during the research was that in the first half of the year (during first six months of year i.e. Jan to June) a pattern of 'Decrease-Increase' can be identified easily such that returns of Jan decreases than returns of Feb increases and so on. This is a totally new pattern identified in the present study which has not been considered in the previous literatures so far.

Graph 3: Mean Montly Returns of Nifty
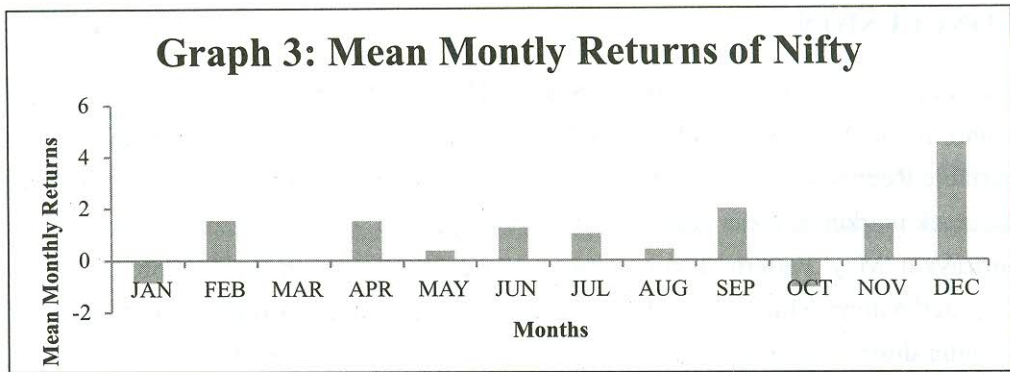
Source: Yahoo Finance

In context of China none of the coefficients showed statistical significance. If we look at the values of coefficient there is a clear 'May-Effect' as shown Graph 4. Month of May showed highest returns followed by August. This 'May-Effect' is totally new seasonality found in the research which has not been identified in the previous literatures so far. If we look at the lowest values then least returns were found in the month of October followed by July. Another seasonality depicted in SHCOMP was that the negative returns were found only in the second half of the year in the month of July, September, and October.

Graph 4: Mean Monthly Reurns Of SHCOMP
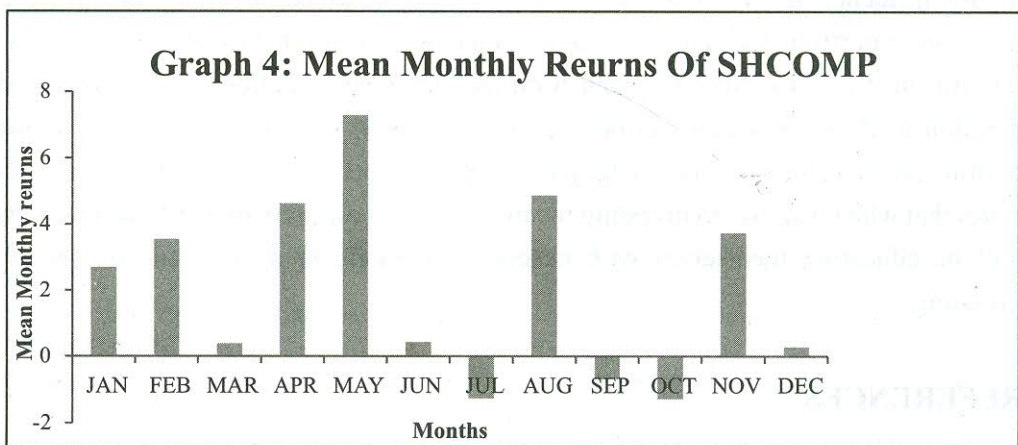
Source: Yahoo Finance

However In overall one thing which is found in common in both the countries was the 'Oct-Effect' i.e. both the countries showed least returns in this month.

CONCLUSION

The study identified the existence of Seasonality/ Monthly patterns in the two emerging economies of Asia (India and China). Descriptive statistics, Unit Root tests and Dummy Variable Regression was used to compute the appropriate results. The study found that the stock market of India depicts a 'December' pattern while the Chinese stock market portrays a 'May' Pattern. The common pattern found in both the economies was the 'October' pattern which showed least returns. The probable reasons for the high returns in India during the month of December are due to occurrence of many festivals like Diwali, Christmas and Ganesh Chaturthi. So, investors are in a good mood to invest as they have more access to cash and thus have strong liquidity position. As a result the economic activity of the country is high and expectations of the general public increases due to the coming budget announcements of the government. So, it a pre budget reaction. As Chinese year end in February the highest return can be obtained in the month of March and April but contrastingly the study showed that effect shifted to May month and hence it leaves a scope for further study on the part of researchers. Finally if we talk about from Investors point of view which is the last objective of the research it can be inferred that as the present study is based upon the latest and current time period it can highly influence the rational investors may be individual investors, institutional investors or portfolio managers, all can plan their portfolio basket wisely before making investment decisions. Now they can form the strategies to better find best time and duration of their investments in both the economies so that they can achieve higher returns. 'An investment in knowledge pays the best interest' – Benjamin Franklin clearly states that when it comes to investing the most efficient property of a rational investors will be educating themselves with necessary research, study and analysis before investing.

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