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Analyzing S&P's Performance Over The Years

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Abstract

In the history of the movement of stock markets, it has been found that the markets run in a frantic manner without any fixed manner of progress. The same holds true for the Standard & Poor's 500 (S&P 500) indices as well. However, it remains to be appreciated as to how the market indices change with due course of time in terms of the factors affecting the movement of the same. The present study seeks to underpin such factors and via a quantitative analysis, the results are being interpreted. The study concludes with pointers for further research and implications.

Keywords: Standard & Poor, S&P, Indices, Movement, Quantitative analysis

Introduction

Standard & Poor's 500 (S&P 500) indices are a compilation of stock prices of the top 500 companies in the US. With highly volatile stock market movement, it is acknowledged that there are a number of factors which impact the movement of the stock markets in different countries (Bouri, Chen, Lien & Lv, 2017; Gangopadhyay, Nishimura & Pal, 2016). While some of these factors could be internal and may be a result of country's socio-political status at a given point of time; other factors could be external in nature wherein the country's inter-regional relationships with the other countries may be the cause for impacting the stock market movement. In this respect, the present study seeks to underscore the factors which determine the behavior of stock market in US. From the perspective of an individual investor, the present study seeks to evaluate the underpinning factors which might impact the investment decision given the stock market movement. Basically, quantitative methodology

is being invoked in the study wherein multiple regression analysis shall inform the study. The study follows the structure of a review of literature on the subject followed by a section on research method. Thereafter, analysis of the results shall be included in the "Discussion" section. Final remarks shall constitute the "Conclusion" section of the study.

Literature review and hypothesis development

The movement of S & P indices has been erratic over the years and this may be on account of factors as diverse as oil prices, investor knowledge and confidence, industrial growth, etc. (Chen, Chung & Lien, 2016; Kim & Sun, 2017; Li, French & Chen, 2017). In the present study, some of the macro-economic factors (CPI, PPI, HPI, bond maturity rate, GDP, Unemployment rate) are being chosen to determine their impact on the movement of stock market indices.

Consumer Price Index (CPI) is suggestive of the state of inflation in the country's economy. CPI is negatively linked with the movement of stock prices. This is so because as the index rises, there is inflation. Furthermore, there is an increase in the prevailing rates of interest. With higher interest rates, companies become defensive and they do not borrow money from the market thereby adversely impacting the stock market. For the purpose of the study, CPI for the period under study[1] is covered from 1980 till 2012. Thus, we hypothesize that:

H1: CPI is negatively linked with S & P 500 prices.

Producer Price Index (PPI) is suggestive of an early stage of inflation. With the increase of PPI, investors feel more secure and they build their faith in the stock markets. We assume that PPI will impact stock prices positively. Figures for PPI are drawn for the period under study[2]. The hypothesis governing the linkage between PPI and stock market prices is as follows:

H2: PPI is positively linked with S & P 500 prices.

House Price Index (HPI) determines the changes in the mortgage rates in the housing sector. If the HPI increases, there is more demand for buying houses because the loans are easily available. The impact of housing prices on the stock markets is evidenced because investors' equity in their houses is impacted. It is hypothesized that:

H3: HPI is negatively linked with S & P 500 prices.

[1] http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008
[2] https://data.oecd.org/price/producer-price-indices-ppi.htm

The 10-year treasury constant maturity rate which influences the number of issued bonds is another factor which determines the stock market performance. There is a negative linkage between interest rates and bond prices. Figures for recording this factor were picked[3]. Following hypothesis is derived:

H4: Maturity rate is negatively linked with S & P 500 prices.

Conceding that the economy of the country will play a major factor in the stock market performance, the Gross Domestic Product of the US was picked as the next factor. It is estimated that if the country's economy is succeeding well, stocks march in a positive direction. US GDP figures were recorded[4] to substantiate our claim. It is derived that:

H5: US GDP is positively linked with S & P 500 prices.

Besides the local economic growth, international pressure also impacts the movement of stock prices (Rounaghi & Zadeh, 2016). In this regard, Spain and Germany are being picked for the present study whose GDP is being perused (Spain[5] & Germany[6]). It is conjectured that with the rise in GDP figures of Spain and Germany, the stock indices in the US should show a concomitant increase. Thus, the hypotheses derived are as follows:

H6: Spain's GDP is positively linked with S & P 500 prices.

H7: Germany's GDP is positively linked with S & P 500 prices.

Unemployment has a major role to play in the country's economic growth or decline (Chan, Kot & Tang, 2013). It may be appreciated that as unemployment rises, the investors may grow defensive of investments on account of reduced purchasing power. Therefore, keeping US employment (Employment[7]) figures for the period under consideration, following hypothesis may be derived:

H8: Unemployment is negatively linked with S & P prices.

The last factor which is being taken into the consideration set is that of China's GDP figures (China[8]) given the trade relations between the US and China. It is hypothesized that with the

[3] https://research.stlouisfed.org/fred2/series/DGS10/downloaddata
[4] https://knoema.com/tbocwag/gdp-by-country-1980-2015?country=United%20States
[5] https://knoema.com/tbocwag/gdp-by-country-1980-2015?country=Spain
[6] https://knoema.com/tbocwag/gdp-by-country-1980-2015?country=Germany
[7] http://www.bls.gov/cps/tables.htm#empstat
[8] https://knoema.com/tbocwag/gdp-by-country-1980-2015?country=China

growing China's economy, the impact on US stock prices shall be positive and investors' confidence shall be high. It is anticipated that:

H9: China's GDP is positively linked with S & P prices.

Research method

In this study, a quantitative research approach is being used. The period covered for the study is that between 1980 and 2011. Multiple regression analysis is being used as a research method. Two multiple regression equations are being tested in the study with a minor adjustment of variables. The main purpose of deriving these two regression equations is to compare the impact of different variables on the stock market movement.

The first regression equation covers factors affecting the percentage change in S&P 500 indices (S&P500 % change). Here, S&P 500 indices percentage change (S_Pchange) is the dependent variable and the independent variables or predictors are Annual Consumer Price Index (CPI), Annual average Purchasing Price Index (PPI), Annual average house price index (HPI), Annual average interest rate (I), Percentage change of annual average GDP of US (US_GDP), Percentage change of annual average GDP of Spain (Sp_GDP) and Percentage change of annual average GDP of Germany (Ger_GDP). The overall regression equation is:

$$S\_Pchange = \beta 0 - \beta 1CPI + \beta 2PPI - \beta 3HPI - \beta 4I + \beta 5US\_GDP + \beta 6Sp\_GDP + \beta 7Ger\_GDP$$

In the second regression equation, the movement of S & P 500 indices is studied where variables like Consumer Price Index (CPI), House Price Index (HPI), Annual Average Interest Rate (I), Average Annual Unemployment Rate (U), Annual Average GDP of US (US_GDP), Annual Average GDP of Germany (Ger_GDP) and Annual Average GDP of China (Chn_GDP) are included. The dependent variable is the annual average increment of S&P 500 and the regression equation to be estimated is as follows:

$$S\&P500\ (Annual\ Average) = \beta 0 - \beta 1CPI - \beta 2HPI - \beta 3I - \beta 4U + \beta 5US\_GDP + \beta 6Ger\_GDP + \beta 7Chn\_GDP$$

It may be noted that S&P 500 indices were captured for the period in terms of percentage change[9] and S&P 500 indices (average) were captured for the period under study[10].

Discussion

[9] https://en.wikipedia.org/wiki/S%26P_500_Index
[10] http://data.okfn.org/data/core/s-and-p-500#resource-data

For estimating the movement of stock prices covering different variables into the consideration set, both regression equations were estimated using the statistical software SPSS 20. As it has been mentioned earlier, the period covered for estimation was that between 1980 and 2011.

When the first regression equation was fit, the results indicated that none of the independent variables were statistically related with the stock prices index (S & P 500 index). Given the lack of significance, we fail to accept any of the hypotheses which were derived earlier. Besides, if one takes a look at the correlations between the variables, it may be deduced that the correlations were not in the desired direction. For instance, PPI was found to be negatively linked with S & P 500 movement. Likewise, the correlation between interest rates and stock prices was not in line with our regression equation. Finally, the correlation between GDP of Germany vis-a-vis that of the US was not in the direction as anticipated from the hypotheses. If one takes a look at the Fisher Test (F-test), it may be deduced that the F-test results were not significant. Thus, the model is not fitted in line with the data which we have at hand. Implicitly, the model derived is not a good fit for the data. Finally, the independent variables explain only 12.6% variance in the dependent variable (S&P prices). Therefore, it is important that the model be revised.

It is anticipated that the second regression equation shall be in line with the hypotheses derived earlier. It is seen that the independent variables explain a significant amount of variance in the dependent variable which is explained in the R-squared value (91.3%).When the second regression equation is estimated, it is found that the correlations matrix shows some improvisation over the preceding results. However, there are many variables which do not show the desired correlation relationship between the dependent and independent variables. In line with the first hypothesis (H1), it is found that CPI is positively linked with stock market prices. Therefore, H1 is summarily rejected. The second hypothesis (H2) is also not supported and it is found that there is a boom in stock prices despite the rising house prices. This may be implicative of the increased confidence of the investors in the stock market and ample savings available with the investors. The third hypothesis, however, is accepted. Thus, in line with the tenets of H3, there is a negative relationship between rising interest rates and stock prices movement. Furthermore, the fourth hypothesis (H8) is also supported. There is a negative linkage between unemployment rates and stock prices movement. At the same time, there was no impact of China's GDP or Germany's GDP on the stock prices of the US. Notwithstanding the aforesaid, the model is significant ($F=30.30$, $p<0.01$). This implies that the data is well-suited and is well-explained in the model. Summing up, the second regression equation is better in terms of its explanatory power than the first one.

Conclusion

The main purpose of the study was to investigate the role of different macro-economic factors on the stock prices in the US. S&P 500 indices were picked for the purpose of the study and the period covered was that between 1980 till 2012. Some of the factors picked for the present study were internal in scope (unemployment, GDP of US, housing prices, purchasing power parity, consumer price index) and other were external in scope (GDP of Spain, Germany, China). Two regression equations were estimated post-identification of research hypotheses. With the help of statistical software, SPSS 20.0, the regression equations were estimated and it was found that contrary to expectations, variables like Spain's GDP, bond prices, Germany's GDP, housing price index were not able to determine the course of the stock markets. When the factors like rising interest rates were included in the regression analysis, the results were slightly in favor of estimation. Given the volatility of the stock markets, it may be appreciated that stock market indices are not a stand-alone entity. There are several factors which influence the movement of the stock prices. Besides the overall stability of the country in terms of socio-economic determinants, it is important that the country's international relations be smooth. US, for instance, has remained a favorite trading destination for many countries and any turmoil in the socio-political landscape of the trading partners might have an adverse impact on the trade relations between the countries and the same may impact the stock markets as well. The study included some of the indicative factors only and there may be other factors such as fiscal balance, currency depreciation and exchange rates, performance of industrial sectors in the country and abroad, which might impact the movement of the stock indices.

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