

## S&P indices movement

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### ABSTRACT

Conceding that a country's stock market performance is dependent upon a number of factors, the study seeks to probe into the determining factors which influence the movement of Standard & Poor's 500 (S&P 500) indices- a compendium of stock prices of the top 500 companies in the US. The research question for the study is, "What are the factors which determine the behavior of stock market in US?" A number of factors impinge upon the stock market prices in the US. For instance, some of these factors may be external in nature like the cross-country stock prices indicators, currency movements, political situation, trade relations, etc (Rjoub, Tursoy and Gonsel, 2009). For instance, there is impact of oil prices movement on the stock markets (Babatunde, Adenikinju and Adenkinju, 2013). Likewise, internal factors, such as country's micro-economic and macro-economic stability influence the movements of US stock markets. In this vein, it becomes pertinent to assess the factors which determine the stock market behavior from the perspective of an individual investor. This study assesses this fundamental dimension using multiple regression analysis keeping a few determining factors into consideration. Following a literature review on the factors affecting the movement of stock market prices in the next section, the study shall examine the research design in detail wherein the hypotheses shall be explicitly stated and the results shall be discussed. Concluding remarks shall inform the tail-end of this study.

### Keywords:

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### INTRODUCTION

S & P indices have been witnessing a number of upturns and downturns owing to a number of reasons (Hradzil, 2009). For instance, the impact of global financial crisis on the S & P 500 indices has been well-attested in research (Lovisceck & Riley, 2013). In the present study, a couple of macro-economic factors are being picked to ascertain the impact of these factors on the performance of stock market indices.

Consumer Price Index (CPI) is indicative of the state of inflation in the country's economy. The linkage of this index with the stock prices movement is negative because as the index rises, there is inflation (Spithoven, 1995) and a rise of rates of interest. As a result, companies are prevented from borrowing money for further development of their businesses. In this way, the stock prices might be

adversely affected. For the purpose of the study, CPI for the period under study<sup>1</sup> is covered from 1980 till 2012. Thus, we hypothesize that:

H1: Consumer Price Index (CPI) is negatively related with S & P 500 prices.

Producer Price Index (PPI) is indicative of an early stage of inflation. Thus, if PPI increases, investors' confidence in stock markets increases. It is assumed that PPI will impact stock prices, albeit to not a great extent. Figures for PPI are drawn for the period under study<sup>2</sup>. Thus, we derive our hypothesis as:

H2: Purchasing Price Index (PPI) is positively related with S & P 500 prices.

House Price Index (HPI) helps to estimate changes in the mortgage rates. When there is a fall in HPI, the demand for purchasing houses lessens because loans become expensive thereby indicating an increment in mortgage rates. Housing prices impact stock markets performance because investors' equity in their houses is adversely affected. Therefore, we hypothesize that:

H3: House Price Index (HPI) is negatively related with S & P 500 prices.

The next variable under consideration is the 10-year treasury constant maturity rate which influences the number of issued bonds. There is a negative relationship between interest rates and bond prices. The rate is a risk-free rate which is calculated to estimate the return on investment. For the period into consideration, rates were picked from a reliable source<sup>3</sup>. We estimate the following hypothesis:

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

The next variable under consideration is that of the Gross Domestic Product of the US and we estimate that investors' confidence would be boosted to witness a rise in country's GDP. Accordingly, if the country's economy is progressing well, investors tend to invest more in stocks. Figures for the US GDP were drawn from a reliable source (US<sup>4</sup>). Thus, we hypothesize that:

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

International comparison holds merit when one attempts to predict the stock prices in the US. For the purpose of our study, two countries are being picked-Spain and Germany. Figures for both the

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<sup>1</sup> <http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008>

<sup>2</sup> <https://data.oecd.org/price/producer-price-indices-ppi.htm>

<sup>3</sup> <https://research.stlouisfed.org/fred2/series/DGS10/downloaddata>

<sup>4</sup> <https://knoema.com/tbocwag/gdp-by-country-1980-2015?country=United%20States>

countries in terms of GDP have been derived from reliable sources (Spain<sup>5</sup> & Germany<sup>6</sup>). Previous research has undertaken GDP figures for international comparison as significant predictors of stock market movement (Geyser and Lowies, 2001; Kurihara and Nezu, 2006; Tsoukalas, 2003). It is predicted that with the rise in GDP figures of Spain and Germany, the stock indices in the US should show an increment. Although there should be no correlation between the GDP figures of Spain and Germany for the former is witnessing a recession phase and the latter is counted among the top-notch trading partners of the US, their individual impact on the performance of stock markets in the US may be worthwhile. Thus, the hypotheses derived are as:

H6: GDP of Spain is positively related with S & P 500 prices.

H7: GDP of Germany is positively related with S & P 500 prices.

Unemployment is a critical factor which is influenced and influences a country's economy. This is especially true in industrial economies like USA where financial system tends to be adversely impacted owing to unemployment (Feldmann, 2011; Tsaliki, 2009). Likewise, a country's output impacts its stock prices indices as well, as in the case of Germany (Merikas and Merika, 2006). Furthermore, crises in banking system as well as currency markets may impact unemployment which may further spur bearish attitude on the stocks. It is understandable that with high unemployment rates, the purchasing power of investors may be affected adversely which may, in turn, negatively affect stock markets performance. For the US unemployment figures for the period under study, reliable sources were referred (Employment<sup>7</sup>). Thus, we hypothesize that:

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

Finally, another comparison is being done with the China's GDP figures and because US and China are leading in trade ties and China's economy is growing progressively, we hypothesize that with the burgeoning China's economy, the impact on US stock prices shall be positive. The figures for China's economic growth were picked from reliable sources (China<sup>8</sup>). In other words, our hypothesis is:

H9: GDP of China is positively related with S & P prices.

### **Research design**

Following a quantitative approach, the study seeks to underscore the influence of a set of variables on the movement of stock market indices for the period between 1980 and 2011. Multiple regression analysis is being used for substantiating the study. Two multiple regression equations are being

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<sup>5</sup> <https://knoema.com/tbcowag/gdp-by-country-1980-2015?country=Spain>

<sup>6</sup> <https://knoema.com/tbcowag/gdp-by-country-1980-2015?country=Germany>

<sup>7</sup> <http://www.bls.gov/cps/tables.htm#empstat>

<sup>8</sup> <https://knoema.com/tbcowag/gdp-by-country-1980-2015?country=China>

tested in the study.

In the first regression equation, factors affecting the percentage change in S&P 500 indices (S&P500 % change) are being covered. Therefore, 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 period under study is between 1980 and 2011. The regression equation to be estimated is:

$$S\_Pchange = \beta_0 - \beta_1CPI + \beta_2PPI - \beta_3HPI - \beta_4I + \beta_5US\_GDP + \beta_6Sp\_GDP + \beta_7Ger\_GDP$$

The second regression equation sought to capture the movement of S & P 500 indices in terms of 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). In this equation, instead of percentage increase in S & P 500 figures, annual average increment is being taken into consideration. Thus, the regression equation derived for the study is:

$$S\&P500 \text{ (Annual Average)} = \beta_0 - \beta_1CPI - \beta_2HPI - \beta_3I - \beta_4U + \beta_5US\_GDP + \beta_6Ger\_GDP + \beta_7Chn\_GDP$$

Finally, it may be mentioned that the study prescribed S & P 500 indices in terms of percentage figures in the first regression equation and absolute figures in the second regression equation. S&P 500 indices were captured for the period in terms of percentage change<sup>9</sup>. S&P 500 indices (average) were captured for the period as well<sup>10</sup>.

## **Results and discussion**

Both regression equations were attempted in SPSS 20. As indicated above, period between 1980 and 2011 was taken into consideration for analysis.

In the first regression equation, the findings were that none of the independent variables were found to be statistically related with the stock prices index (S & P 500 index). Therefore, we failed to accept any of the hypotheses. Further, the correlations between some of the variables were not in the predicted 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 supported in line with our regression equation. Finally, the correlation between GDP of Germany vis-a-vis that of the US was not in alignment with our expectations. Furthermore, the F-test is not significant which further casts doubt on the model-fit of the data. In our case, this implies that the model is not a good fit for the data. The independent variables are able to explain only 12.6% variance in the dependent variable

<sup>9</sup> [https://en.wikipedia.org/wiki/S%26P\\_500\\_Index](https://en.wikipedia.org/wiki/S%26P_500_Index)

<sup>10</sup> <http://data.okfn.org/data/core/s-and-p-500#resource-data>

and therefore the model requires refinement.

Thus, the second regression equation is tested. Here, the correlations matrix shows a remarkable improvement. The first hypothesis (H1) is rejected and we find that with CPI is positively linked with stock market prices. Likewise, the second hypothesis (H2) is rejected and we witness that there is a boom in stock prices as the house prices rise. Even the third hypothesis (H3) is accepted and we find that there is a negative relationship between rising interest rates and stock prices movement. The fourth hypothesis (H8) is supported and we find a negative pattern of relationship between unemployment rates and stock prices movement. As such, other variables could not be correlated with stock prices movement at statistically significant levels. As such, there was no impact of China's GDP or Germany's GDP on the stock prices of the US. Nevertheless, the model is significant and it fits the data quite well ( $F=30.30$ ,  $p<0.01$ ). Finally, the independent variables explain a significant amount of variance in the dependent variable which is explained in the R-squared value (91.3%). Overall, the model is far better than the one predicted earlier.

### **Conclusion**

In this study, we attempted to probe the impact of different macro-economic and micro-economic variables on the stock prices movement in the US where the S & P market indices were taken as the key dependent variable. Two regression equations were modeled and we found that while some results were surprising, especially in the case of housing prices or the consumer price index, overall the impact of different variables on the stock market prices was adequately shown. It is probable that there are other variables which might be required to be added while some of the existing variables may be required to be dropped from the existing equations to yield more robust results. We understand that further model improvement statistics may be applied to improve the results and the analysis. Nevertheless, there are two straight-forward conclusions which emerge from the study-stock market indices are vulnerable to a host of factors which may be extraneous or latent in nature. Second, US economy may be influenced differently with employment rates, purchasing power and international factors like the currency movements of neighboring countries or the environmental factors as well. Therefore, forecasting of stock indices remains a dicey affair.

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