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DECODING THE STOCK MARKET AND GDP RELATIONSHIP OVER THE LONG TERM: IMPLICATIONS FOR INDEX FUND INVESTMENTS

Flamur BUNJAKU
Independent Researcher

Abstract:

This paper analyzes the relationship between GDP and the stock market over the long term, intending to understand the implications for Index Fund investments. A quantitative research method, using US (United States) GDP as an independent variable, and the S&P 500 index as a dependent variable, is employed. A population of 29 years, from 1990 to 2019, of data on US GDP and the S&P 500 from official US sources was used. Linear regression analysis with SPSS calculating techniques is performed to determine whether there is a relationship between GDP growth and the stock market (S&P 500). The results show a significant positive relationship between GDP growth and S&P 500 performance. β coefficient of the regression analysis of 0.911 shows a strong correlation between the GDP and the S&P 500. Our findings are also scientifically validated by the sig (P value) coefficient of 0.0000000000012. In addition, an R Square of 0.830 shows that our model explains all the variability of the response data around the mean at a level of 83%. The positive results of GDP and the stock market relationship, indicate considerable implications for Index Funds investments. Therefore, adding academic value to the practical financial implication aspects.

Key words: *Stock market, GDP, S&P 500, Index fund, relationship*

1. Introduction

As stated by Albu et al. (2014) and Tsaurai (2018) various macroeconomic factors are seen as influencers for capital markets, and some of the most frequently analyzed factors are the Gross Domestic Product (GDP), consumer price index, money supply, interest rates, exchange rates, unemployment, exports (cited in Nicolescu, 2020, p. 160). Over the long term, we consider GDP as the best rational factor to measure financial markets, since it is not characterized by frequent changes and volatility. Other factors are also very important to measure the performance of the stock market, However, other factors such as consumer price index, interest rates, exchange rates, and alike, in most cases cause short-term stock market swings, thus not giving a clear picture of the stock market performance in the long term. Therefore, since our analysis focuses on the long term, the GDP is used as the indicator to measure the stock market performance.

The relationship between GDP and stock market returns has been under the focus of many scholars, financial analysts, stock market investors, and so forth. Undoubtedly,

economic conditions predict the stock market's future, especially in the short term. For example, if there are signs of inflation in the economy, the central banks will most likely raise the interest rates to keep the prices down. Hence, affecting the stock market to decline. On the other hand, if the economy slows down, central banks would lower the interest rates. That, will consequently, affect the stock market positively. However, we consider that the latter examples are valid only for short-term analysis of stock market performance. We consider that the relationship between economic performance and the stock market should be approached in the long term. Therefore, in our analysis, long-term (29 years) US GDP data are used, since it was considered that this macroeconomic indicator (GDP) indirectly incorporates most of the other secondary economic indicators. The GDP performance for 29 years was then compared to the S&P 500 performance for the respective years.

Academics and other stock market practitioners have different opinions regarding the relationship between GDP and the stock market. Most of them claim that the latter relationship is strong. However, there are some minor opinions that there is no correlation. Based on our long-term observations and linear regression of our econometric model, performed using SPSS techniques, the stock market performance appears to follow a trajectory similar to GDP growth, indicating that the relationship between GDP and stock market performance is significant and positive. However, our claims are valid if that relationship is measured over the long term. Moreover, some authors, such as Gupta and Rao (2018) claim that this relationship is reversible. So, not only the performance of the stock market is affected by GDP growth, but also the stock market performance affects GDP growth. The latter authors have come to these findings in research about the stock market and GDP relationship in India.

It is worth mentioning that several factors cause some discrepancies between GDP growth and stock market returns. However, those discrepancies are of a short-term nature and can be classified as follows: Volatility, prior adjustments on the price of the stock, share dilution, the impact of Central Banks Policies - through the policy of interest rates, exclusion of non-listed private sector companies, the influence of politics and media, and so forth. The latter short-term factor's influence is mitigated by approaching the GDP and S&P 500 index relationship in the long term.

A positive relationship between GDP and the S&P 500 over the long term has important implications for a passive safer investment strategy, which fits with the Index Fund Investing strategy. So, if we can predict the GDP growth, we can also have a better picture of the stock market performance in respective years. Usually, investors who use the strategy of broader market investing, focusing on GDP growth and other macroeconomic indicators, invest in index funds.

An index fund is a type of mutual fund with a portfolio constructed to match or track the components of a financial market index, such as the Standard & Poor's 500 Index (S&P 500). An index mutual fund provides broad market exposure, low operating expenses, and low portfolio turnover. So, when you invest in such stock market funds, you don't have to pay much attention to daily financial and economic news that can affect the stock market, nor to the skills of any broker that potentially manages the fund. As stated by Goetzmann and Massa (2003, p. 3) investors in index funds are by definition not responding to beliefs

about the skill of the manager, nor are they speculating on any economic information other than prospects for the market as a whole.

The rest of the paper is organized as follows: In the next section literature review is provided. The third section provides a short data collection and methodology explanation. In this respect, GDP and the S&P 500 index data are used for the period from 1990 – 2019. Using the SPSS technique, the latter data are used to perform a linear regression analysis. In the fourth section, a discussion and an interpretation of the results are provided. Conclusions are drawn in the fifth section.

2. Literature review

Many authors have analyzed the relationship between GDP and the stock market. As stated earlier, there are some confronting opinions between academics and other practitioners of this field when it comes to the GDP and stock market relation. Most scholars claim that correlation exists, while a minor number of academics believe there is no correlation. We believe that the reason for these contradictory findings comes from the different analysis models used, the parameters used for analysis, and the same. In this line, Boubakari & Jin (2010) in research about the stock market's influence on economic growth, claim that in terms of the findings, the interlinkage between the two variables is tangled because of the various elements involved, which vary from one country to another country (cited in Duda, 2020). In addition, Lee, et al. (2013) using daily data that covers the period between 2001/1/1 to 2010/12/31 found that the causal relationship between industry and stock market returns differs across industries as well as countries. Chen et al. (1986) suggest that macroeconomic variables systematically affect stock market returns. Moreover, the latter authors claimed that all the market risks, such as interest rates, expected and unexpected inflation, production, and alike, are priced in the stock market price. Levine and Zervos (1996) are among the academics who claim that there is a clear linkage between stock market performance and economic growth. Based on their research, there is a positive correlation between stock market growth and the economy's growth. Furthermore, McMIllan (2021. p. 3652) emphasizing economic performance and stock market movements, claims that movements in stock returns depend on investor expectations of future economic performance. Zalgiryte et al. (2014) in research about the stock market and GDP relation in the US and France, have also found that there is a positive correlation between the stock market and GDP growth. The latter authors found that the correlation appears stronger in France compared to the US. Contrary to these findings, Klement (2015) claims that he found no evidence of a positive correlation between stock market returns and real gross domestic product (GDP), as well as no evidence of a positive correlation between real earnings growth of large-cap stocks and real GDP per capita growth across 22 emerging economies countries. However, according to Fama (1990), there is a relationship between GDP growth and the stock market. Moreover, the same author claims that the forecasted returns and real economic activity could explain a considerable amount of stock market return. In this line, Giri and Joshi (2017) in research about the impact of macroeconomic indicators on Indian stock market prices, have regarded GDP as one of the most important determinants of the

stock market performance. Duda (2020) doesn't deny the linkage between the GDP and the stock market. However, he claims that various other factors should also be taken under consideration while assessing their linkage with each other. Linck and Decourt (2016) in research about stock market returns and macroeconomic variables in Brazil have found that GDP and interest rates affect stock market returns. However, the latter authors claim that these macroeconomic indicators' inflation and market expectation of future behavior indicate an insignificant effect on stock market returns. Vithalbhai (2020), using statistical tools for testing hypotheses like Descriptive statistics, Co-relation, and simple Regression analysis, has found that there is a strong relationship between GDP and stock market performance in India. The latter author measured the co-relation between the two variables, and the co-relation result derived was at the level of 0.965768. Tabani Mpofu (2014) expresses reservations regarding GDP and the stock market relationship. The latter author claims that stock market growth rates and GDP growth rates are coincidental and cannot be used for prediction. Moreover, the latter author argues that since growth economic cycles are characterized by unreliability and unpredictability, GDP growth cannot accurately predict stock market growth. However, Hussain et al. (2012) in empirical research about the stock market correlation to GDP found that there is a significant positive correlation between the stock market and GDP, indicating that the stock market has a relationship with economic growth. It is worth mentioning that the positive and proportional relationship between GDP and the stock market can be compromised time by time over short-term periods during some financial crises, and alike. That is because of the tendency of investors to withdraw funds from major stock market indices if there are signs of potential market disruptions. Moreover, during financial crises, investors tend to hedge their stock positions with commodities. As stated by Batten et al. (2021) during times of financial crises and uncertainty, investors reduce their stock positions, while commodity positions remain less affected. Most professional investing institutions and experienced stock market investors claim that it is very difficult to pick the best momentum to invest in the stock market. It is almost impossible to enter when the stock market is at the very bottom or to leave the market on top. It is also very difficult to pick an individual company, assuming that it will perform better in the stock market than other individual companies or the broad market in general. This is why following and analyzing the patterns of GDP growth could help long-term investors who invest in index funds. A solid GDP growth in the future would affect positively stock market performance. As suggested by (Gaivoronski et al., 2005; Colwell et al., 2007; Montfort et al., 2008) construction of index funds in stock market investing is based on a single objective: to minimize risk and to maximize the rate of return. According to Bebchuk and Hirst (2019), index investment funds pool the assets of many individuals and entities and invest those assets in diversified portfolios of securities. In addition, the same authors claim that the term "index fund" encompasses both mutual funds and exchange-traded funds (ETFs) or any other investment vehicle that mechanically tracks an index, such as the S&P 500 and other major indexes (p. 2044). GDP and the stock market's positive relationship could be a great tool to use for stock market investors since it makes the predictability of the stock market performance in the long term accurate at a considerable level. According to Dempsey (2016), although the market sentiment swings between greed and fear, and is prone to large-scale fluctuations, the stock market traditionally rewards long-term investment. As stated by

Halan (2011) the GDP growth, dividend yield, and inflation, should be equal to the average annual rate of return of the broad market index. Hence, having reliable predictions about GDP growth would be solid information for long-term index-based stock market investing. Moreover, approaching the stock market performance in the long term, using GDP predictions in the future, could mitigate volatility fears. In the long run, the stock market is less volatile, which can be proved by the historical performance of the stock market. Volatility is often described as the "rate and magnitude of changes in prices" and in financial terms as "risk" (Narwal et al., 2018). Therefore, claim the latter authors, an insight into the volatility of the stock markets can be a useful tool for estimating the cost of capital and for evaluating asset allocation decisions. Concerning volatility, based on historical data, Index Funds or ETFs that track the S&P 500 are far less volatile than other stock market investing instruments. According to Edwin et al. (2019), not only that passive portfolios such as ETFs have higher mean returns on average, but they also have lower monthly standard deviations of returns over the life of each active fund. In addition, based on the econometric experiments of the latter authors, in the no-short-sales-allowed case, the matching ETFs' monthly standard deviations were lower by an average of 0.151, and in the short-sales-allowed case, the standard deviations were lower by 0.103. Thus, indicating that Index Funds and ETFs that track the S&P 500 are less volatile and less risky investments.

3. Data collection and methodology

A quantitative research method is employed to examine the relationship between GDP and the stock market. A systematic and empirical investigation based on linear regression is undertaken to study the latter relationship. A population of 29 years of data on the US GDP and the S&P 500 from official US sources was used. The figures are expressed in trillions of USD. The collected numerical data are analyzed to find patterns in the S&P 500 trajectory, and relationships between the S&P 500 and GDP, as well as predictions of the Stock Market patterns in the future, based on historical GDP performance. Secondary sources such as academic articles and other publications are also used to support the analysis.

Table 1. US GDP and S&P 500 data (in trillions).

Years	US GDP (in trillions)	S&P 500 index (In trillions)
2019	19.2	2.91
2018	18.63	2.74
2017	18.11	2.44
2016	17.68	2.09
2015	17.4	2.06
2014	16.9	1.93
2013	16.49	1.64
2012	16.19	1.37

2011	15.84	1.26
2010	15.59	1.13
2009	15.2	0.94
2008	15.6	1.22
2007	15.62	1.47
2006	15.34	1.31
2005	14.91	1.2
2004	14.4	1.13
2003	13.87	0.96
2002	13.49	0.99
2001	13.26	1.19
2000	13.13	1.42
1999	12.61	1.32
1998	12.03	1.085
1997	11.52	0.87
1996	11.03	0.67
1995	10.6	0.54
1994	10.35	0.46
1993	9.95	0.45
1992	9.68	0.41
1991	9.35	0.37
1990	9.36	0.34

Source: Macrotrends

After processing data in the SPSS software, linear regression analysis between US GDP and S&P 500 (1990 – 2019) was performed, and the following table results were obtained.

Figure 1. Correlations of S&P 500 to US GDP

Correlations			
		S%P_Market _C	GDP
Pearson Correlation	S%P_Market _C	1.000	.911
	GDP	.911	1.000
Sig. (1-tailed)	S%P_Market _C	.	.000
	GDP	.000	.

N	S%P_Market _C	30	30
	GDP	30	30

Source: Author's work

Figure 2. Model summary of S&P 500 and US GDP

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.911[a]	.830	.824	.28476
a. Predictors: (Constant), GDP				
b. Dependent Variable: S%P_Market _C				

Source: Author's work

Figure 3. Anova of S&P 500 and US GDP

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	11.060	1	11.060	136.398	.000[b]
	Residual	2.270	28	.081		
	Total	13.330	29			
a. Dependent Variable: S%P_Market						
b. Predictors: (Constant), GDP						

Source: Author's work

Figure 4. Coefficients of S&P 500 and US GDP

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound

1	(Constant)	-1.703	.259		-6.567	.000	-2.234	-1.172
	GDP	.210	.018	.911	11.679	.000	.173	.247
a. Dependent Variable: S%P 500_Market _C								

Source: Author's work

4. Discussion and result interpretation

We input the coefficients into the simple linear regression formula, using the data from Figure 4.

$Y = \beta_0 + \beta_1 X$, where:

Y = dependent variable

β_0 = constant/intercept coefficient

β_1 = slope coefficient

X = independent variable

$Y = -1.703 + 0.210X$

The results indicate that, if the GDP was zero, the S&P 500 would be negative -1.703 (Fig. 4).

In addition, the results indicate that for one unit of GDP increase, the S&P 500 increases by 0.210 (Fig. 4).

In our model of analysis, we use simple linear regression, using nominal values of US GDP as the independent variable and the S&P 500 index as the dependent variable. Our results confirm that over the long term, GDP is a category that has a very significant relationship with the stock market performance. The results suggest that over the long term, the S&P 500 index follows almost the same pattern of growth as the GDP. As mentioned above, the results indicate that one unit GDP increase contributes to a 0.210% S&P 500 increase (Fig.4). In addition, the relationship between GDP and S&P 500 is validated by the β coefficient of 0.911, derived in our regression analysis (Fig. 4). Our findings are also scientifically validated by the sig (P value) coefficient of 0.0000000000012 (Fig. 3 and 4). Moreover, an R Square of 0.830 (Fig. 2) indicates that in our model the dependent variable is explained by the independent variable at a level of 83%. Furthermore, the strong positive correlation between the variables is validated by the Pearson Correlation of 1.000 and 0.911 (Fig. 1). In theory, if dependent and independent variables follow relatively the same trajectory patterns, that indicates that the coefficient is positive. In our model, dependent and independent variables (S&P 500 and GDP) move almost at the same level, with a difference of 0.089 (1.000 – 0.911). Of course, there may be exemptions when it comes to this relationship. That's because of some events that occur time by time. The financial crisis of the year 2008 is a pure example of such a scenario. Therefore, we claim that any analysis of the GDP and stock market relationship should be approached in the medium or long term. Based on these results, it is obvious that over the long term, equity market indexes such as the S&P 500, have relatively similar movements as GDP, which could be very helpful information for long-term safer stock market investing strategy.

Our findings are in line with most previous studies, validating further our research and the relevance of the results in correlation with other studies in the field, as well as emphasizing the significance of the relationship between the GDP and the stock market. Previous studies, such as (Fama 1990; Hussain et al., 2012; McMillan, 2021; Vithalbhai, 2020; Zalgirite et al., 2014) have also found a strong relationship between these two variables. There is consistency in terms of findings and results in the academic world regarding the GDP and the stock market positive relationship, with a minority of academics arguing that there is no correlation or that the correlation is weak. The latter consistency in findings across the academic research landscape, highlights the robustness of the GDP and S&P 500 correlation, strengthening our arguments regarding the practical implications of stock market investing. Moreover, if we match different studies in the field, such as those of (Gupta and Rao, 2018; Vithalbhai, 2020; Zalgirite et al., 2014) regarding GDP and the stock market relationship, similar movements and a positive relationship between the two variables may be found in different countries around the world. Therefore, beyond the specific context of our observation, there is a cross-country consistency regarding positive GDP and stock market relation, which supports the relevance of our results and the generalization of our arguments. Moreover, our results contribute to the existing literature by extending the analysis with updated data, capturing the recent dynamics on GDP performance and the stock market developments. The positive long-term relationship between GDP and the stock market (S&P 500) could be a great tool for a safer stock market investing strategy. These claims are supported by previous studies such as Giri and Joshi (2017), who suggest that GDP growth can help investors decide on what investing strategies they should adopt. Given that stock market indexes that track the S&P 500 index have incorporated diversified industries and a broader economy, it is those indexes that reflect the performance of an economy. Thus, based on our results, investing in stock market Indexes and ETFs that track the S&P 500 could be a solid strategy a serious investor should consider. Based on our results, Index fund Investing may be strongly related to GDP performance in the mid or long-term, and it is characterized by a wide range of market exposure, which allows investors to invest in a broader market or industries, or the economy as one. Another characteristic of index investing is diversified portfolios since it allow the investors to spread the risk across different sectors or industries. So, if one sector underperforms, some other sectors may outperform. Hence, mitigating the risk and reflecting the overall economic performance of a country or a market.

Although our research results emphasize the potential benefits of index funds investing, based on the positive relationship between the GDP and the S&P 500, potential investors need also to consider other relevant factors in their investing decision-making process, such as the level of risk they are ready to tolerate, investment objectives, portfolio diversification, and the like.

5. Conclusion

The paper discussed the relationship between GDP and the stock market. Historical nominal data on US GDP and S&P 500, from the years 1990 to 2019 were used to determine

such a relationship. The GDP is used as an independent variable. In contrast, the S&P 500 is used as a dependent variable

Using simple linear regression analysis, it was found that over the long term, there is a strong positive relationship between GDP and the stock market (S&P 500).
Our findings are scientifically validated by the sig (P value) coefficient of 0.0000000000012. β coefficient of the regression analysis of 0.911 shows a strong correlation between the GDP movement trajectory and the S&P 500. In addition, an R Square of 0.830 shows that our model explains all the variability of the response data around the mean at a level of 83%. Using the coefficient results it was also found that for one unit of GDP increase, the stock market increases by 0.210.

The positive GDP and the stock market relation may be utilized by establishing a less risky stock market investment strategy. If the economy is growing, corporate earnings may grow as well. Hence, using GDP performance, it can be easier for potential long-term investors to invest with minimum risk by investing in stock market Index Funds or ETFs that track the S&P 500, or other major indexes.

The latter findings would not be reliable for short-term stock market investors nor those investing in individual companies. In addition, although there is a clear positive relationship between the GDP and the S&P 500, there are also some other factors, such as risk tolerance, individual objectives, portfolio diversification, and the like, that investors need to consider in their investment decision-making process. Further studies are needed to provide a better and more comprehensive understanding of the GDP and stock market relationship over the long term and to verify this relationship across countries, contexts, and periods.

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