

Correlation Analysis between Gross Domestic Product (GDP) Growth Rates and Performance of the Jamaica Stock Exchange Indices

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Abstract: *This study investigated any potential correlation between Jamaica's economic growth, as measured by its Gross Domestic Product (GDP) growth rates, and the Jamaica Stock Exchange (JSE) indices' performance over the period of 2012 to 2022. The study employed a quantitative analysis in exploring whether periods of positive GDP growth are mirrored by increased performance in the JSE indices. The analysis of the data was done using a correlation analysis with use of statistical software SPSS and Microsoft Excel employing the statistical test Pearson Product Moment Correlation coupled with statistical significance testing of each calculated correlation coefficient. The findings from the study showed that there is practically no correlation between each JSE index and GDP because it was uncovered that each of the correlation coefficient was less than 0.1. Moreover, none of these correlation measures is statistically significant enough, since $p > 0.05$, to indicate that GDP impacted JSE indices and vice versa. The changes in GDP and JSE indices were influenced mainly by external events and economic shocks during the period of 2012 to 2022. A closer look at these indices and GDP was done over the period 2020 to 2022, which indicated a high correlation of at least 0.97 but marginally less than 1, whose almost perfect linear relationships were not found to be of significance. There was nothing to indicate that their relationships were impactful but only revealed that there were commonalities between GDP and these indices that influenced their growth and performance. Economists, investors, business owners would find this study useful because GDP and JSE indices both have common drivers in achieving economic growth. The awareness of the common drivers must be understood and utilized effectively coupled with their response to external events and economic shocks to develop the economy in the long run.*

Keywords: Correlation, GDP Growth Rates, Performance, Stock Exchange Indices, Economic Growth

1. Introduction and Literature Review

Stock Exchange Markets have existed for years and have been a pillar of the financial sector. It has facilitated companies to become more active in market mobilization and capitalization. These markets have allowed companies and institutions to become listed to invite investors to provide investment to improve, expand, and even build their businesses. This in turn has afforded job employment such as suppliers and opening distribution chains in the manufacturing and distribution sector. Consequently, there have been ongoing discussions of the possibility for the Stock Exchange to aid in economic growth and development. This study was developed as the first part of the discussions by looking at the correlation between Gross Domestic Product (GDP) growth rates and JSE indices performance.

Gross Domestic Product (GDP) growth and stock market performance are two essential financial pillars in gauging and achieving economic development. Over the years, the relationship between GDP and stock exchange market performance seem to get more and more intertwined to influence a country's prosperity, promoting job creation, attracting investments, and improving the overall well-being of the country. This overview provides an exploration of the significance of GDP growth and stock market performance in fostering economic growth by drawing on real-life examples and their interconnected impact.

GDP growth, according to Ref [1], can be defined as a measurement of how the various sectors within the economy perform such as investments and consumption. The progress

of economic development is dependent on GDP growth which serves as a barometer in identifying an economy's vitality and overall health. When the GDP of a country grows it signifies that there has been an expansion in production, investment, and consumption, thereby reflecting the country's ability to generate wealth. Note that with a robust GDP growth rate there is a direct positive correlation with the improvement of the living standards within the country, along with reduced poverty, and increased employment opportunities. For instance, China has reformed its economic structures transforming from a predominantly agrarian economy to a global economic powerhouse and since then have experienced higher GDP growth rates. According to Ref [2], China has implemented free-market reforms in 1979 and facilitated foreign trade and investment opportunities and has been named one the world's fastest growing economies particularly with the average annual real GDP growing at 9.5% in 2018. Congressional Research Services [2] reported that over 800 million people have been rescued from poverty since the growing GDP particularly because of China's partnership with the United States and others in manufacturing and merchandising, establishing foreign exchange reserves. China has been able to organize strategic investments because of its financial capacity and contributed to its economic diversity.

With the establishment of stock markets [which serves as a barometer for investor sentiment] around the world, investors have been able to gauge their confidence in an economy's prospects. When a stock market is performing well, it will not only attract domestic investors but also appeal to international investors that can provide a country with lucrative opportunities. As Ref [3] stated that almost

every business in a country's economy is affected by the stock market in some way or another. Moreover, most businesses facilitate consumer spending and business operations which are crucial for any economy especially in driving economic growth. A booming stock exchange market has the capacity to enable businesses to raise funds for innovation and expansion as well as for capital mobilization. The S&P 500 Index, for example, has been a financial driver of economic growth in the United States, especially facilitating its resilience during challenging periods [economic downturns].

A symbiotic relationship exists between GDP growth rate and the stock market performance that can provide reinforcement for economic development of a country. A flourishing stock market provides raised capital for businesses which spur economic activities and thereby contribute to GDP growth. Conversely, an increase in GDP rates can bolster investor confidence to invest in businesses thus fueling an increase in investments in the stock market.

The Jamaica Stock Exchange (JSE) market is known to be a pivotal institution in the Jamaican financial landscape and acts as an indicator of the country's economic health and development. The role of the JSE is to provide a platform to facilitate the buying and selling of shares of companies and other institutions within the island or from overseas. The JSE reflects Jamaica's economic resilience, investor sentiments and investment opportunities. When there is an increase in the JSE market, there are possibilities for job creation especially when businesses mobilize capital to expand their businesses and promote economic growth. Conversely, should there be a decline in the JSE market then there will be concerns about economic uncertainty, global economic conditions, or policy changes. Therefore, it is important for the JSE to maintain the increase of the market by issuing more shares and raising more capital so that investment can be made to develop the country's infrastructure, perform research, and facilitate development of various sectors, thereby contributing to economic growth. Over the years, especially since the early 1990s following economic reforms, the JSE has been inviting not only domestic investors but also foreign investors to help bolster foreign exchange reserves.

1.1. Relationship between Macroeconomic Indicators and Stock Market Behaviour

Macroeconomic indicators have been used over the years to provide predictions of stock market movements. Researchers have examined indicators such as Gross Domestic Product (GDP) and unemployment levels that can influence stock prices. For instance, in an article written by Investopedia [1] when stock prices increase, consumers and companies are more confident and usually have more wealth, thereby increasing their spending on consumption goods and the purchase of business plants and equipment, along with the hiring of persons amongst other things; and facilitating a higher GDP in a bull market. The article [1] further shared that the earnings generated from quarter-to-quarter each year provide a 2% growth rate in the United States (US), for example based on [the GDP components] consumer spending, business spending, exports, and

government spending. The GDP components usually can be influenced by investors either positively or negatively according to the sentiments to participate in the stock market. Ref [1] stated that the GDP growth impacts the stock markets by making investors sentimental [desiring to invest] because they believe the state of a country's economy is healthy. Thus, this implores investors to act and invest in the stock market. Ref [1] shared that in 2021 the value of US was US\$ 22.9 trillion, and they predicted that based on the boosted economic activities of companies on the stock market such as expanded operations, increase in employment and investment in new projects the GDP was expected to grow to US\$24.8 trillion in 2022. Note, however, that even though GDP growth rate can act as a predictor, it is not a measure of the stock market.

1.2. Preliminaries

In this section, preliminary information is provided related to the mathematical processes involved in the study.

Calculation of Each JSE Index

Each index is calculated using a ratio of aggregate market capitalization and a base divisor. This is regarded as the weighted average market capitalization method.

Calculation of GDP Growth Rate

GDP growth rate is calculated using the following formula:

$$\frac{GDP \text{ in current period} - GDP \text{ in previous period}}{GDP \text{ in previous period}} \times 100$$

Equation 1: GDP Growth Rate Formula

Calculating Returns (Annual % Change) for GDP Growth Rates

The formula for GDP Return is:

$$\frac{GDP \text{ Growth Rate}_{current} - GDP \text{ Growth Rate}_{previous}}{GDP \text{ Growth Rate}_{previous}} \times 100$$

Equation 2: GDP Return Formula

Calculating Returns (Annual % Change) for JSE Indices

The formula for Index Return is:

$$\frac{JSE \text{ Index Value}_{current} - JSE \text{ Index Value}_{previous}}{JSE \text{ Index Value}_{previous}} \times 100$$

Equation 3: Index Return Formula

Definition Correlation

This is a statistical measurement used to determine if there is any possible relationship between two defined variables [4].

Formula of the Pearson Correlation coefficient

To quantify the strength of the relationship between the two variables, a sample correlation coefficient, γ is calculated. For N pairs of observations defined on two variables x and y , then the sample correlation coefficient is:

$$\gamma = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}}$$

Equation 4: Pearson Correlation Coefficient [5]

Interpreting correlation coefficient

The correlation coefficient when calculated ranges from -1 to +1, with 0 indicating no correlation [no association between the two variables] (see Table 1). When the coefficient value is negative then there exists a negative correlation, that is, there is an inverse relation between the two variables. Conversely, when the coefficient is positive, then there is a positive relationship between the two variables. Also, diagrams can be used to interpret correlation as well, but it is not the best method (see Figure 1).

Table 1: Interpreting Correlation Coefficient

Numerical Representation of Correlation (γ)	Description to Interpret Correlation
-1	Perfect Negative Correlation: inverse [perfectly] linear relationship between the two variables.
-0.9	High [Strong] Negative Correlation: inverse [almost perfectly] linear relationship between the two variables.
$-0.5 < \gamma < -0.3$	Low [Moderately] Negative Correlation: inverse [relatively] linear relationship between the two variables.
$-0.3 < \gamma < 0$	Weak Negative Correlation: slightly negative linear relationship between the two variables.
0	No Correlation: no existence of any linear relationship between the two variables.
$0 < \gamma < 0.3$	Weak Positive Correlation: slightly positive linear relationship between the two variables.
$0.3 < \gamma < 0.5$	Low [Moderately] Positive Correlation: [relatively] positive linear relationship between the two variables.
0.9	High [Strong] Positive Correlation: [almost perfectly] positive linear relationship between the two variables.
1	Perfect Positive Correlation: [perfectly] positive linear relationship between the two variables.

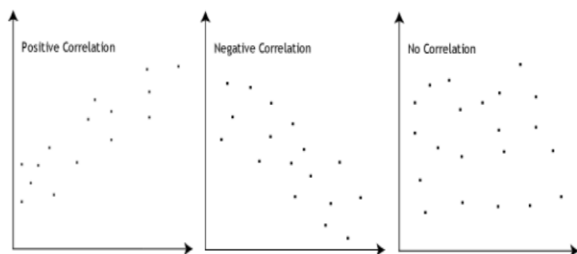


Figure 1: Use of Scatter plots to Explain Correlation

Understanding the Test Statistics for Pearson Product Moment Correlation Coefficient

The test statistics (t-test or p-value) are used to indicate an acceptable region for the strength of the calculated correlation coefficient to be considered to meet the criteria of being statistically significant. The test statistics criteria

says that for the correlation coefficient to be statistically significant then the p-value, p , must be such that $p < 0.05$.

1.3. The Impact of GDP growth on Stock Market Indices

According to the Chief Economist Holger Sandte [he] [6] at West LB Mellon Asset Management, there is a complicated relationship between stock markets and GDP growth rates particularly because there are interwoven effects of time-variant and multiple factors that differ in each country. He [6] further shared that the high rates of growth in GDP do not necessarily indicate that it correlates with rising stock market in dices [possible increasing long-term stock market returns]. He went on to say that based on major movements in the stock market, valuable financial information can be obtained that provides a forecast of the economy. He shared however that corporate earnings related to costs and revenue is impacted by the economy, particularly because stock prices reflect investors' expectations for an increase in future corporate earnings which can promote future economic growth. Nevertheless, he [6] explained that with persistent decrease of stock indices [bear market experience] it is likely to indicate negative confidence effects because the economy will likely slowdown and consequently lower consumer confidence as well as business outlook thus decreasing both investment and consumption spending. It was explained as well that the financial effect may also be negative where companies may receive less investment to assist with financing activities to develop their companies. Moreover, he shared the results of the correlation between S&P 500 and US GDP using the quarterly changes to be almost negligible [close to zero] in Figure 2. He explained that because stock market performance is mostly affected by people's [investors, businesses, and other stakeholders] expectations, there is the perception that the changes in the market performance must be related to future GDP growth rates. He stated though that for a given quarter there has been correlation between GDP developments and stock market movements, but it was found to be a slight relationship.

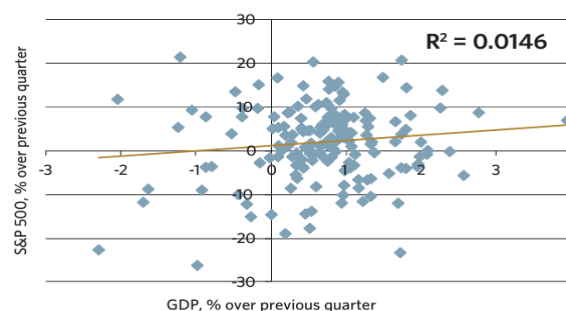


Figure 2: Scatterplot of S&P 500 and US GDP during the period of 1970 and 2012 [6]

1.4. Theoretical Framework

There has been a considerable number of debate and exploration on the potential link between stock market performance and GDP growth rate within finance and economics. As such theoretical concepts have developed such as wealth effect and earnings expectations to provide explanation of the relationship. The wealth effect indicates

that with strong GDP growth rates in countries the people tend to feel wealthier particularly having experienced increased income as well as economic prosperity. This in turn according to Ref [7] will drive their desire for more consumption goods therefore higher consumer spending occurs which drives [increased] corporate profits. For example, when there is a period of robust GDP growth consumers typically spend more money on services and products because they now have higher disposable income. Consequently, this increased consumer demand benefits businesses that in turn have rising earnings and potentially their stock prices will be higher. Whenever this happens, Ref [7] explained that it is implied that in the long run consumer spending moves one to one with wealth and income. Both [1] and [8] shared that stock prices are influenced by investors' expectations of future corporate earnings. So, as the GDP grows the economic environment for companies is usually favourable in generating higher profits to reflect positive investor sentiment and thus higher stock prices. In other words, with robust GDP growth investors anticipate increased consumer demand, business expansion and profitability. Therefore, this positive outlook influences investors to purchase stocks which boost the stock market performance. The existence of a strong GDP growth rate as well influences foreign investment in countries which are likely to open avenues for businesses to participate in global operations based on the increased demand of their products worldwide. Hence, stock market gains become available. Also, businesses in countries benefitting from strong GDP growth rates can invest in research and development, along with facilities [further expansions], therefore enticing investment opportunities and these businesses can benefit further from higher stock valuations.

This study was developed because there is presently insufficient data that shows or addresses the possibility for correlation between the Jamaica Stock Exchange Indices performance and the GDP growth rates in Jamaica. Therefore, it becomes important to not only refer to research related to other countries but be able to present Jamaican research information using a quantitative perspective to identify the prospect of a correlation.

Here are the research questions and objectives that will guide this study:

- 1) Is there a statistically significant correlation between the annual GDP growth rates of Jamaica and the performance of the Jamaica Stock Exchange (JSE) indices between 2012 and 2022?
- 2) To what extent do external events or economic shocks influence the correlation between GDP growth rates and JSE index performance?

2. Methodology

2.1 Research Design and Approach

This study was developed as a quantitative study with the aim of collecting data on GDP growth rates and Jamaica Stock Exchange (JSE) indices. To ensure that the data findings were credible and reliable, the data was gathered from reputable online sources such as Statistical Institute of

Jamaica (STATIN), Bank of Jamaica (BOJ), Jamaica Stock Exchange (JSE) market and The World Bank [shared on the Macrotrends website]. The data on GDP growth rates over the period of 2012 and 2022 was collected from STATIN and the World Bank. While the JSE data on the JSE indices data during the period of 2012 and 2022 were collected from JSE website.

Throughout this study, the following indices were examined: JSE Main Index, JSE All Jamaican Composite Index, and JSE Select Index.

2.2 Operationalization of Variables and Time Period Selection: Ensuring Precise Analysis

In this study both the GDP growth rates and JSE indices performance were operationalized in the form of variables. The GDP growth rate in this study was used as the annual percentage change of Jamaica's GDP, calculated using the official economic data retrieved from STATIN and the World Bank over the period of 2012 and 2022. Each of the JSE indices was operationalized as percentage change as well as using the value of each index at the end of each year during the period of 2012 and 2022. The time selected between 2012 and 2022 was considered because it is the most current research data and can capture trends, cycles, and potential causality between variables.

2.3 Correlation Analysis

Correlation analysis is a statistical analysis used to assess the strength and direction of the relationship between two variables. In this study, the relationship between GDP growth rates and JSE indices performance was examined to provide valuable insights into the degree to which percentage changes in GDP growth rate correspond with changes in JSE market performance.

3. Results of the Statistical Analysis

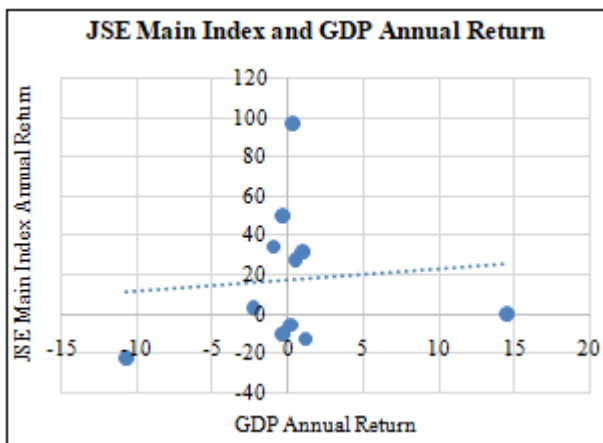
The correlation method was used to examine the relationship between JSE stock indices and GDP growth rates to provide insights into the degree to which changes in GDP growth correspond with changes in stock market performance. The results shared in this section will be of both visual and numerical representations.

3.1. Research Question 1 Results

Is there a statistically significant correlation between the annual GDP growth rates of Jamaica and the performance of the JSE indices over 2012 and 2022?

This research question has investigated the calculated correlation for each JSE index and the GDP growth annual change in identifying the likelihood of any relationships and how it has been reflected in the stock market and overall economy. The level of significance for each coefficient is also determined by using the statistical test of the Pearson Product Moment Correlation with the SPSS software to help properly establish the relationship to indicate the strength and direction of the correlation

Figure 3 shows a scatterplot of the GDP and JSE Main Index Return over 2012 and 2022. The trend line shows the direction of the points for each corresponding observation for each year. In Figure 3, the trend line is slightly projecting an upward movement indicating that as one variable increases, the other variable tends to increase as well. However, the calculated correlation coefficient of 0.0943602 is extremely close to zero. The statistical significance of the calculated coefficient is $p = 0.783$ [such that is $p > 0.05$], on the other hand, shows that the JSE Main Index performance and GDP growth rates have very limited and almost negligible [non-significant] relationship (see Figure 4). This means that the fluctuations in the JSE Main Index are unlikely to be strongly influenced by changes in the GDP growth rates and vice versa.



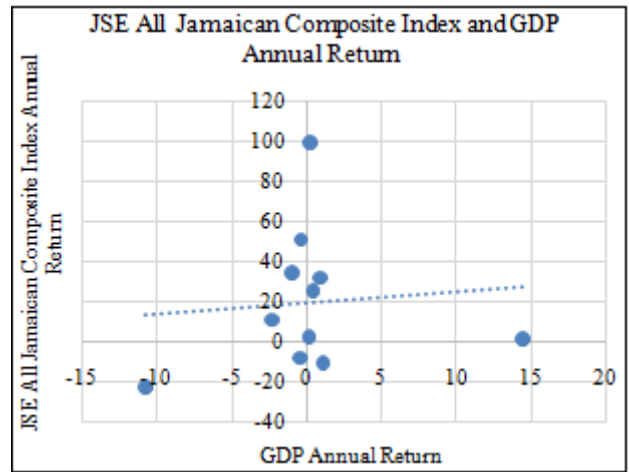
$\gamma = 0.0943602$

Figure 3: Scatterplot of GDP and JSE Main Index Annual Return and the Correlation coefficient for the period of 2012 and 2022

Correlations			
		GDPReturn	JSEMainReturn
GDPReturn	Pearson Correlation	1	.094
	Sig. (2-tailed)		.783
	N	11	11
JSEMainReturn	Pearson Correlation	.094	1
	Sig. (2-tailed)	.783	
	N	11	11

Figure 4: Statistical Significance of the Correlation Coefficient of GDP and JSE Main Index Annual Return for the period of 2012 and 2022

The trendline of the scatter plot showing the JSE All Jamaica Composite Index and GDP Return in Figure 5 is slightly upward, almost reflecting a positive linear relationship. However, the calculated correlation coefficient of 0.094195074, just like the correlation in Figure 3 is practically negligible [almost zero]. Moreover, there is not any statistical significance of the study $p = 0.783$ [such that is $p > 0.05$] (see Figure 6). Hence, the fluctuations in the JSE All Jamaica Composite Index are unlikely to be strongly influenced by changes in the GDP growth rates and vice versa.



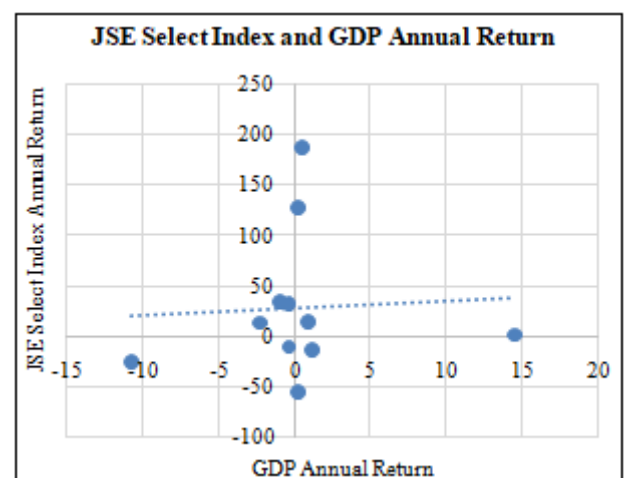
$\gamma = 0.094195074$

Figure 5: Scatterplot of JSE All Jamaica Composite Index and GDP Annual Return and the Correlation coefficient for the period of 2012 and 2022

Correlations			
		GDPReturn	AllJamComReturn
GDPReturn	Pearson Correlation	1	.094
	Sig. (2-tailed)		.783
	N	11	11
AllJamComReturn	Pearson Correlation	.094	1
	Sig. (2-tailed)	.783	
	N	11	11

Figure 6: Statistical Significance of the Correlation Coefficient of JSE All Jamaica Composite Index and GDP Annual Return for the period of 2012 and 2022

The trend line shown in Figure 7 is almost horizontal, just slightly elevated to project an almost positive correlation. Notice as well that most of the plotted points are not close to the line in a linear way. Also, the correlation coefficient of 0.059812883, however, is nearly zero so it reflects a very weak correlation. Moreover, the statistical significance of the coefficient $p = 0.861$ [such that is $p > 0.05$] indicates that the relationship between the GDP and JSE Select is not significant (see Figure 8). Therefore, there is a slight tendency for the variables to move in the same direction, but the correlation is not strong enough to indicate there is substantial relationship between the JSE All Jamaica Composite Index and GDP growth rates.



$\gamma = 0.059812883$

Figure 7: Scatterplot of JSE Select Index and GDP growth Annual Return and Correlation Coefficient for the period of 2012 and 2022

Correlations			
		GDPReturn	JSESelectReturn
GDPReturn	Pearson Correlation	1	.060
	Sig. (2-tailed)		.861
	N	11	11
JSESelectReturn	Pearson Correlation	.060	1
	Sig. (2-tailed)	.861	
	N	11	11

Figure 8: Statistical Significance of the Correlation Coefficient of JSE Select Index and GDP Annual Return for the period of 2012 and 2022

3.2 Research Question 2 Results

To what extent do external events or economic shocks influence the correlation between GDP growth rates and JSE indices performance?

This research question looked at the significant external events [or economic shocks] that occurred during the period of 2012 to 2022. It identified the external events and economic shocks that could have been influenced by each correlation calculated. It examined correlations before, during and after significant events and highlighted potential shifts in the market dynamics.

In 2012, Jamaica’s economy experienced a difficult year. The country has been in debt and sought financial help from the IMF but was unable to secure the deal and thus the economy contracted. The Jamaica Stock Exchange [9] shared that in 2012 the economy started to contract by the third quarter by at least 0.2% in comparison to the third quarter of the previous year. Ref [9] shared that the country also experienced a slide of the Jamaican dollar that affected Jamaica’s net international reserves which declined by 42.75% [losing at least US \$840.53 million] by the end of December 2012. Consequently, all the JSE indices were adversely affected showing a decline in 2012. During that same period the GDP growth rate was -0.61%, a decline from 2011. In 2013, however, Ref [10] wrote that the IMF agreement was finalized to provide a four-year Extended Fund Facility and there was a slight decrease in the unemployment rate. Moreover, all the indices declined, and the GDP growth rate was 0.52%. These events obviously affected the GDP growth rate and the JSE indices but indicated no effect on the correlation of the GDP growth rate and the JSE indices performance.

Over the period of 2017 and 2019, GDP and the JSE indices grew steadily. It was inferred by the Jamaica Stock Exchange [11], [12] and [13] that this was because of the 18.01% increase in Net International Reserves in 2017; the JSE Main Index being named “Best Performing Index” in 2018 along with increased employment; and a 4.98% increase in Net International Reserves in 2019.

By March 2020, Jamaica experienced the COVID-19 pandemic which lasted until early 2022. It was shared in the Jamaica Stock Exchange Report [14] that the economy experienced a decline in 2020 by 10.7% where the services and goods producing industries declined mostly because of the containment of the virus measures which involved stay at home curfew measures for most of the year. This heavily affected GDP [with a -9.19% growth rate and a -10.79 return] during that time because consumer spending

minimized greatly because businesses were not very active as they previously were prior to the pandemic. The JSE indices, however, in 2020 also declined. GDP however grew over 2021 and 2022 by 4.60% and 4.20% respectively which was rapid in comparison to 2020, during which period the Jamaica economy grew.

Most of the JSE indices, on the other hand, declined in 2020 and 2022 but experienced a slight increase in 2021. During this time all the indices in comparison with GDP return experienced a high positive correlation of about 0.9 indicating that changes in GDP growth rates and JSE indices are strongly related.

Correlations			
		GDPReturn	JSEMainReturn
GDPReturn	Pearson Correlation	1	.988
	Sig. (2-tailed)		.097
	N	3	3
JSEMainReturn	Pearson Correlation	.988	1
	Sig. (2-tailed)	.097	
	N	3	3

Figure 9: Statistical Significance of the Correlation Coefficient of JSE Main Market Index and GDP Annual Return for the period of 2020 and 2022

Correlations			
		GDPReturn	AllJamComReturn
GDPReturn	Pearson Correlation	1	.973
	Sig. (2-tailed)		.148
	N	3	3
AllJamComReturn	Pearson Correlation	.973	1
	Sig. (2-tailed)	.148	
	N	3	3

Figure 10: Statistical Significance of the Correlation Coefficient of JSE All Jamaican Combined Market Index and GDP Annual Return for the period of 2020 and 2022

Correlations			
		GDPReturn	JSESelectReturn
GDPReturn	Pearson Correlation	1	.982
	Sig. (2-tailed)		.120
	N	3	3
JSESelectReturn	Pearson Correlation	.982	1
	Sig. (2-tailed)	.120	
	N	3	3

Figure 11: Statistical Significance of the Correlation Coefficient of JSE Select Market Index and GDP Annual Return for the period of 2020 and 2022

This indicates that when GDP growth rates increase, there is a high tendency for the JSE indices to increase, which is good for investors and policymakers. However, there is no statistical significance of the relationships [since $p > 0.05$] of the Main Index, JSE Select, and All Jamaican Combined Market Index with GDP (see Figures 9, 10, and 11).

3.3. Further Discussion and Implications

The study uncovered that the three indices [JSE Main Index, All Jamaica Composite Index and JSE Select Index] in comparison with GDP between 2012 and 2022 showed a low [very weak] correlation, that some might even say is almost no linear correlation particularly since their relationship with GDP was of no significance. This suggested that there are other factors besides the GDP

growth rates that contributed to a more significant impact on the performance of the JSE Main Index. The GDP growth rates, JSE Main Index, All Jamaica Composite Index and JSE Select Index move in the same direction where there is steady growth of each over the period of 2012 and 2022. All of them as well were affected by the same economic conditions. Consequently, during the COVID-19 pandemic between 2020 and 2022 the experiences were also very similar having a correlation coefficient of 0.9. This strong positive correlation during 2020 and 2022 conveyed that a higher GDP growth tends to coincide with better performance of the JSE Main Index, All Jamaica Composite Index and JSE Select Index. However, their relationship with GDP was not significant at all but rather affected by other external factors.

When the data was carefully inspected alongside the calculated correlation coefficient, especially factoring what is happening in the economy between 2012 and 2022; it is noticeable that there are other factors that contribute to the impact of these indices. For example, GDP looks at measuring the performance of consumption and investments while the stock market measures subsets of stocks according to indices which are related to investments. As such, there is seemingly the notion that they relate. The reality is, as inferred by the Jamaica Stock Exchange Report in 2016 [15] that they do relate but only through commonality particularly based on business and consumer confidence that influence the growth of the economy and acts as an opportunity for the JSE stock market to capitalize to maximize the performance of the indices. For example, the GDP rate of -0.61 in 2012 was found to be very low reflecting mostly that there were insufficient funds in the market, particularly evident since the government had failed to extend funds from the IMF. This seemingly becomes an economic condition impacting both the stock market and GDP growth rate and the response by investors can be because of the poor growth rate to decide if they should really invest by purchasing stocks. This does not mean however that there is a direct link between them. Also, it is worth noting that businesses listed on the stock market raising capital are the same businesses that encourage consumption and business spending in the Jamaican economy. GDP growth increases because of this spending while the stock market would have a good performance because it achieves its goals to help companies raise capital.

Typically, economic performance and the stock market are aligned. Economic performance is usually measured by different factors including GDP growth. Since the trendline for most of the indices and GDP growth rates both the JSE indices and GDP growth rates are aligned. This is possible whenever both functions at their capacity level, that is GDP grows and there is good stock market performance. For instance, alignment occurs whenever there is increased consumer spending, sector-specific growth, and corporate earnings. Between 2015 and 2017, the Planning Institute of Jamaica (PIOJ) [16] inferred that Jamaica experienced a boost in GDP growth driven by the construction and tourism sectors while the JSE indices including the JSE Composite Index experienced notable gains. However, there are times that the alignment is off, for instance when the stock market is performing well but the GDP growth rate is not excellent.

Divergence tends to happen when there are external shocks, political instability, inflation, and interest rates needing to be controlled. During 2012 as previously stated the Jamaican dollar value declined due to exchange rate fluctuations and the government failed in obtaining funds from the IMF. By the end of 2012, the JSE Main Market Index experienced a return of 3.35 but the GDP return for that year was -2.34.

The study identified some implications to consider based on the six instances of low correlation for most indices. These implications are:

- 1) Diverse Market Influences: Even if there is consistent GDP growth over a period, the JSE indices might not necessarily show any clear trend in either direction. This could mean that there are other market factors that have a stronger influence on the stock market [behaviour] performance, while GDP growth rates might be positive.
- 2) External Factors: The JSE indices by nature exhibit fluctuations that are not necessarily aligned with Jamaica's GDP growth rates. This might be because of external events such as global economic crises, political developments, or commodity prices that might have a dominant impact on the stock market movements than the country's GDP growth rates.
- 3) Investor Behaviour: Even though strong correlation is absent; investor sentiment can play a role in market movements. For example, in moments of uncertainty, the stock market might experience volatility despite GDP growth because of other economic indicators or even global events.
- 4) Multiple Influences: There might be other factors such as inflation, corporate earnings reports, interest rates, and political stability that collectively have a more substantial impact on the JSE indices.
- 5) Market Efficiency: There is a possibility that the stock market might have already factored in anticipated GDP growth rates, resulting in stock prices that align closely with expectations. So, there might be limited room for additional market movements solely based on GDP data.
- 6) Long-Term versus Short-Term: This study uncovered a weak correlation in a short term [using only a decade 2012 to 2022] but a long-term analysis could reveal more meaningful trends. This is particularly because economic policies and structural changes usually have time to manifest in both the stock market performance and GDP growth rates.

3.5 Conclusions

The study revealed that a [non-significant] very weak correlation between the JSE indices and GDP growth rates suggests that other factors are likely to influence stock market behaviour to a larger extent. Moreover, GDP growth rates and the stock market performance are mostly attributed to business and consumer confidence. So, as businesses and consumers become more confident about taking advantage of investments, expansions, and consumptions then they are likely to invest in the stock market or purchase items in the general economy. Consequently, businesses can attract investment opportunities through the stock market to

facilitate expansions and their spent funds facilitate an increase in business spending which in turn increases GDP. Similarly, when businesses provide more products and services on the market, that attracts consumers; consumers will increase their spending which positively affects GDP. Also, factors such as economic conditions, natural disasters and a pandemic are more likely to affect both GDP and JSE indices than them affecting themselves.

The study also showed that both the GDP and JSE indices can be in alignment or even divergence. There is alignment between GDP and the JSE indices only when both are moving in the same direction facilitating economic growth. However, they diverge from each other when impacted by unfavourable external activities or economic shocks.

This study concludes that there is no correlation between GDP returns and JSE indices. However, they often move in the same direction because they both are impacted by similar activities, but they do not influence each other directly. So, there relationships cannot convey its influence on economic growth.

3.6 Recommendations

This study is of great importance to give a Jamaican perspective of whether there is any correlation between GDP and JSE indices performance, particularly since no study was found to indicate this. Moreover, the understanding about the correlation between GDP growth and JSE indices is of utmost importance in the Jamaican financial market particularly since both are indicators to economic growth. The study indicates that even though no correlation was found it is crucial that economists, researchers, businesses owners, investors, consumers amongst others recognize however, the commonalities between GDP and JSE indices that affect their growth and performance and capitalize on them.

Also, it is important to understand that GDP and JSE indices align at some point and diverge at other times; to be able to identify the specific moments of alignment and divergence to effectively influence their growth and performance. Investors can align investment strategies with economic growth trends [during periods of alignment between GDP growth and JSE indices] during favourable conditions such as when the services and goods production industries are booming. Investors can also identify diversification strategies to mitigate risks that usually occur during economic downturns that may lead to stock market decline. Moreover, policymakers need to review or reinforce economic policies that emphasize the importance of fostering a conducive economic environment to stimulate investors' confidence and positively influence the stock market.

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