STOCK MARKETS VS GDP GROWTH IN SOUTH AFRICA

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Abstract

Investors look at stock market performance and assume that it anticipates economic developments or that the latest GDP quarterly figures have a huge effect on the market's movements. This study seeks to test if this is true in the long-term. According to a study of the USA stock exchanges done by Holger Sandte (2012) he found that this relationship does not exist. In this paper, we examine the relationship between GDP growth and stock markets returns. We observe that the relationship between these two variables remains complicated because of the effects of multiple factors interwoven over time, which can differ from one country to the next (Boubakari and Jin, 2010). While accurate economic forecasts are helpful for stock investing, we argue that investors should not rely on a single economic indicator in predicting future market developments. As counterintuitive as it might seem, research suggests that high growth rates do not necessarily correlate with the highest long-term stock market returns (Levine, and Zervos, 1996). Nevertheless, major stock market movements may contain valuable information for economic forecasters. This paper reveals that the relationship between the FTSE-JSE All-Share Index growth rates and GDP growth rates is coincidental and cannot be used for prediction. Stock prices generally reflect investor expectations for future corporate earnings and consequently for future economic growth but the papers argued that this relationship cannot be modelled to accurately predict the stock market growth from GDP growth. The findings of the study indicate that investors should not rely on past economic growth as an indicator of future stock gains. Accurately forecasting future economic growth might help but those forecasts are difficult to get right. We suggest that investors should not base their stock investments purely on economic cycles because of the unreliability and unpredictability of such cycles. It is advisable that investors look at fundamentals before investing in high-risk equity markets of growing economies.

Keywords: GDP, FTSE-JSE, Economic growth, Stock market, South Africa

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1. Introduction

Investors look at stock market performance and assume that it anticipates economic developments or that the latest GDP quarterly figures have a huge effect on the market's movements. This study seeks to test if this is true in the long-term. According to a study of the USA stock exchanges done by Holger Sandte (2012) he found that this relationship does not exist. The study did confirm that economic growth does eventually have an effect on corporate profits and sales, but the reverse was not true. According to this study, over the years, the United States has seen stocks gaining the most consistent returns when GDP growth was around 3%. When quarterly GDP growth was within 50 basis points of 3%, the S&P 500 posted an average gain of 6.5% during that quarter. To cap it all, when GDP growth was around 3%, the S&P 500 posted gains in 22 of the 24 quarters. Research has shown that strong GDP growth can be a sign of an overheating economy (Roy, Chung, Ip and Chan, 2008; Hu, 2005; Sun, 2014; Nirupam, Jianan and Sachs, 1997; Menzie and Ito, 2007) that may be due for a recession, and weak GDP growth may be discounted by the stock market ahead of an actual turnaround (Holger Sandte, 2012). This is not just true for the United States of America but for most developed countries. In this research, we investigate this relationship in the South African market. While there is a wealth of research covering developed economies, there has been little research done in developing economies. It was observed that Brazilian GDP growth for 2013 came in at 2.5% while the stock market declined by a 24.6%, as measured by the Ibovespa Index in dollar terms. In this study, we take a closer look at South African stocks by examining long-run equity market returns and real GDP growth for the years 2001 to the first quarter of 2014 (Holger Sandte, 2012).

In this paper, we examine the relationship between GDP growth and stock markets returns. We observe that the relationship between these two

variables remains complicated because of the effects of multiple factors interwoven over time, which can differ from one country to the next (Boubakari and Jin, 2010). While accurate economic forecasts are helpful for stock investing, investors should use more indicators in predicting future market developments reliably. As counterintuitive as it might seem, research suggests that high growth rates do not necessarily correlate with the highest long-term stock market returns (Levine, and Zervos, 1996). Nevertheless, major stock market movements may contain valuable information for economic forecasters. According to Peter Lynch, "If you spend 13 minutes a year trying to predict the economy, you have wasted 10 minutes"(Peter Lynch, 2014), and Paul Samuelson stated that "The stock market has failed five out of the last five recessions! (Carlson, 2013)"

This study looked at the GDP growth and stock markets returns of the FTSE-JSE index from the first quarter of 2001 till the first quarter of 2014. The subsequent sections look at a summary of related literature, the data collection methods used and a detailed analysis of quarterly time-series data covering a period of 13 years. The last section presents the conclusions from the data analysis and the limitations of the study as well as proposals for future research on the GDP growth rate-stock market return relationship.

2. Review of Related Literature

There are researchers and practitioners that have cast doubt on the contribution of stock markets to long-run economic growth. For example, the role of stock markets in improving informational asymmetries has been questioned by Stiglitz (1985) who argues that stock markets reveal knowledge through rapid changes in stock prices, and this creates a free-rider drawback that reduces investor incentives to conduct expensive search. The contribution of liquidity itself to long-run growth has been questioned by other researchers as well. Demirguc-Kunt and Levine (1990) have argued that increased liquidity would possibly deter growth via three channels. Initially, it may cut back saving rates through income and substitution effects. Secondly, by reducing the uncertainty connected with investments, larger stock market liquidity might scale back saving rates as a result of the ambiguous effects of uncertainty on savings; and thirdly, stock market liquidity may encourage investor myopia, adversely affecting company governance and thereby reducing growth. However, directly opposing this third viewpoint, - that of company governance - Jensen and Murphy (1990) argue that in well-developed stock markets, company directors tend to tie managers' compensation to stocks in order to try and align managers' interests with those of shareholders, thereby spurring efficient allocation of resource and bootstrapping economic growth in the long-run.

It should also be observed that much of the earlier research used highly aggregated indicators of financial intermediation, such as the ratio of M2 or public sector credit to GDP, instead of the more direct and disaggregate measures. In addition, this body of research, though insightful, lacked analytical foundations since, as stated previously, financial intermediation in traditional theory was related to the extent of capital stock per employee or productivity, and not to growth rate, because the latter were attributed to external technical progress.

Another important study that forms part of the framework of the new growth theory, is that done by Levine and Zervos (1998), who are among the early researchers to investigate whether or not stock markets are simply profitable cash-spinning casinos or form a vital cog of economic development. This they did by looking at empirical data and they found a positive and vital correlation between stock market development and future growth. However, as mentioned earlier, Levine and Zervos's use of a cross-sectional approach did limit the potential robustness of their findings in as far as country specific effects and time. This paper represents an attempt to close this gap by using time-series knowledge to reexamine the long-run impact of stock markets on economic growth in South Africa. Although throughout this study only one variable is used, the FTSE-JSE All Share Index, which is used to measure the amount of trade within the JSE Securities Exchange, it is observed that there may be alternative stock market variables that play a key role in economic development. Research shows that stock market size, liquidity, and integration with the earth capital markets could affect economic growth (Demirguc_Kunt and Levine, 1996). However, there are a number of studies (Alajekwu and Achugbu, 2011; Boubakari and Jin, 2010; Azarmi, Lazar and Jeyapaul, 2005; Levineand Zervos, 1996; Levine and Zervos, 1998; Janor, Halid and Rahman, 2005; Binswanger, 2000; Kwon, and Shin, 1999 and Lee, 1992) that confirm that this particular variable is a good proxy of measuring the contribution of a stock exchange to economic growth.

3. Materials and Methods

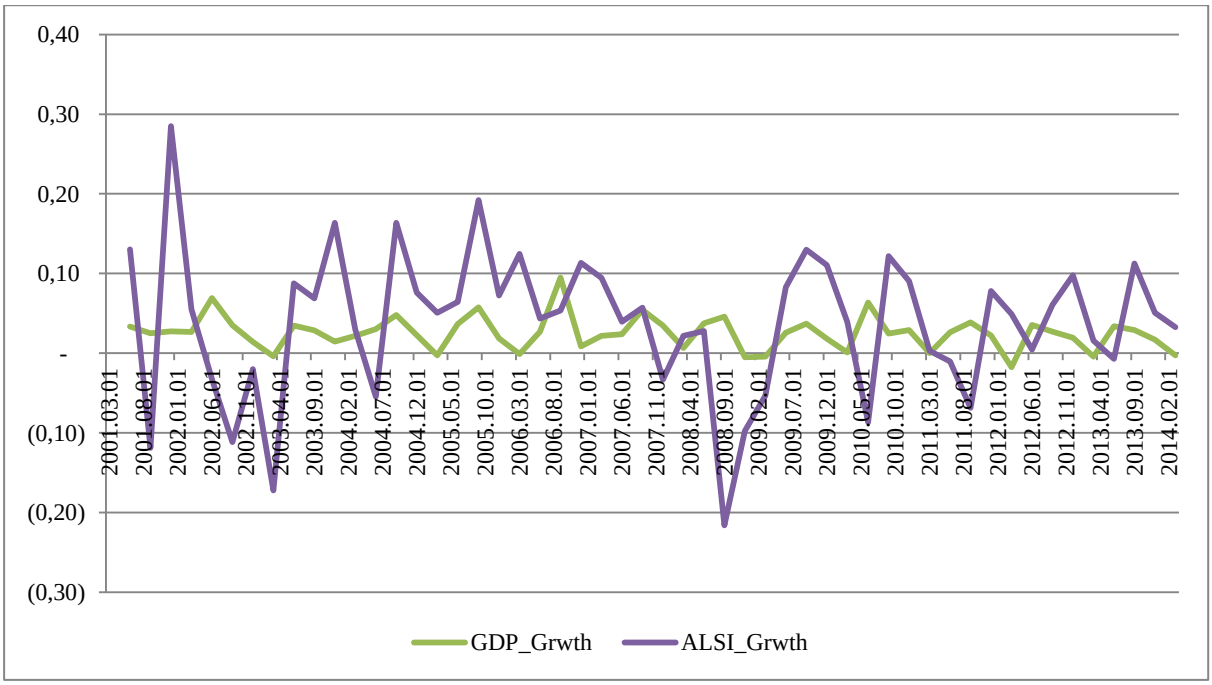
3.1. The data

National product series, such as GDP, typically contain a unit root (Granger, 1966). Trends and unit roots show up as low or infinite frequency variations in the spectral density. Standard analysis requires. In line with the above, volume data was tested for stationarity using Said and Dickeys' (1984) augmented Dickey-Fuller (ADF) test. The results confirmed that the volume data are non-stationary for the FTSE-JSE index over the study period and this is

consistent with the alternative hypothesis that the volume data are non-stationary. This test for stationarity ensures that the study on the price change-volume relationship on the JSE does not give misleading inferences.

Quarterly figures between 2001 and 2014 first quarter of the FTSE-JSE and the GDP are studied. The FTSE-JSE series was converted to quarterly figures from daily closing prices. These series together with their logarithms are presented in Figure 1.

Figure 1. FTSE-GDP Quarterly Growth Rates



3.2. Testing for stationarity

The two time series variables were tested for stationarity. Non-stationary series have an ACF that remains significant for six or more lags, rather than quickly declining to zero. These types of series must be differenced until stationary. The dependent variable and any independent variables are treated as time series, meaning that each case represents a time point, with successive cases separated by a constant time interval. The test was done using the Dickey-Fuller (1979) ADF test. The results in Table 1 indicate a non-stationary FTSE-JSE growth time series but a stationary GDP time series.

Table 1. Testing for stationarity of price changes and trading volume changes: Estimation Method – VARMAX Least Squares Estimation

Model Parameter Estimates						
Equation	**Parameter**	**Estimate**	**Standard Error**	**t Value**	**Pr > |t|**	**Variable**
FTSE-JSE	**CONST1**	-2.70095	0.77192	-3.50	0.0011	1
	AR1_1_1	0.14456	0.15554	0.93	0.3576	FTSEJSE(t-1)
	AR1_1_2	0.15166	0.12116	1.25	0.2172	GDP(t-1)
	AR2_1_1	-0.12127	0.14873	-0.82	0.4192	FTSEJSE(t-2)
	AR2_1_2	-0.12729	0.12072	-1.05	0.2973	GDP(t-2)
GDP	**CONST2**	-6.77616	0.96007	-7.06	0.0001	1
	AR1_2_1	-0.04813	0.19346	-0.25	0.8046	FTSEJSE(t-1)
	AR1_2_2	-0.16349	0.15070	-1.08	0.2838	GDP(t-1)
	AR2_2_1	-0.19585	0.18499	-1.06	0.2954	FTSEJSE(t-2)
	AR2_2_2	-0.34493	0.15015	-2.30	0.0263	GDP(t-2)

A time series is called a white noise if it is a sequence of independent and identically distributed random variables with finite mean and variance. In particular, if the series is normally distributed, all the ACFs are zero. Based on Table 1, the quarterly returns of the FTSE-JSE index are close to white noise with ACFs close to zero in both single and second lags. The *p*-values of these test statistics are all close to zero. In this case, the log FTSE-JSE growth series is unit-root non-stationary and hence can be treated as an ARIMA process. The t-test statistic for FTSE-JSE was -3.50 with a p-value of 0.001 while the t-value for GDP was -7.06 with a p-value close to zero. Thus, the unit-root hypothesis cannot be rejected at any reasonable significance level.

3.3. Testing for Autocorrelation

A necessary condition for testing for a relationship between FTSE-JSE growth rates and GDP growth rates is to test for autocorrelation. This was based on a Vector Autoregressive (VAR) model using the Durbin-Watson test for autocorrelation. The first-order Durbin-Watson test showed no significant autocorrelation. Table 2 shows the results of a forth order Durbin-Watson test that confirms that no autocorrelation correction was needed.

Table 2. Testing for Autocorrelation using the Durbin-Watson Test

The AUTOREG Procedure: Ordinary Least Squares Estimates

SSE	40.7411293		DFE		50	
MSE	0.81482		Root MSE		0.90268	
SBC	142.783804		AIC		138.881317	
MAE	0.66898403		AICC		139.126215	
MAPE	25.3394075		Regress R-Square		140.377438	
			Total R-Square		0.0000	
Durbin-Watson Statistics						
Order	**DW**		**Pr < DW**		**Pr > DW**	
1	1.7383		0.1748		0.8252	
2	2.1960		0.8207		0.1793	
3	1.7308		0.2518		0.7482	
4	1.3695		0.0230		0.9770	
Variable	**Approx DF**	**Variable Estimate**	**Standard Error**	**t Value**	**Pr > |t|**	**Label**
Intercept	1	-1.8680	0.4428	-4.22	0.0001	
PRICE	1	0.2407	0.1053	2.29	0.0266	GDP

NOTE: Pr<DW is the p-value for testing positive autocorrelation, and Pr>DW is the p-value for testing negative autocorrelation.

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NOTE: Pr<DW is the p-value for testing positive autocorrelation, and Pr>DW is the p-value for testing negative autocorrelation.

4. Results and Discussion

4.1. Descriptive analysis

Table 3 and 4 provide the summary statistics for the variables in this study. The FTSE-JSE growth rates show some volatility with a standard deviation measure of 0.93 and GDP growth rates a slightly higher volatility with a standard deviation of 1.20. There is also evidence of negative skewness for both GDP growth rate and FTSE-JSE growth rate at -1.26 and -1.89 respectively. The kurtosis value for GDP growth rates exceeds the normal value of three to four at a value of 4.36 but is in line with findings from other research studies. The kurtosis value for FTSE-JSE at 2.08 is within the acceptable range for normality.

Table 4. Descriptive statistics forGDP growth rates and FTSE-JSE growth rates

Descriptive Statistics – The UNIVARIATE Procedure Variable: GDP			
Moments			
N	52	**Sum Weights**	52
Mean	-4.0334226	**Sum Observations**	-209.73797
Std Deviation	1.20018468	**Variance**	1.44044326
Skewness	-1.8973617	**Kurtosis**	4.36235963
Uncorrected SS	919.424479	**Corrected SS**	73.4626065
Coeff Variation	-29.755987	**Std Error Mean**	0.16643567
Basic Statistical Measures			
Location		**Variability**	
Mean	-4.03342	**Std Deviation**	1.20018
Median	-3.64798	**Variance**	1.44044
Mode	.	**Range**	6.44173
		Interquartile Range	0.80268

Table 5. Descriptive statistics forGDP growth rates and FTSE-JSE growth rates

Descriptive Statistics – The UNIVARIATE Procedure **Variable: FTSEJSE**			
Moments			
N	52	**Sum Weights**	52
Mean	-2.8387048	**Sum Observations**	-147.61265
Std Deviation	0.93929198	**Variance**	0.88226942
Skewness	-1.2606078	**Kurtosis**	2.08027639
Uncorrected SS	464.024491	**Corrected SS**	44.9957405
Coeff Variation	-33.088751	**Std Error Mean**	0.13025636
Basic Statistical Measures			
Location		**Variability**	
Mean	-2.83870	**Std Deviation**	0.93929
Median	-2.67799	**Variance**	0.88227
Mode	.	**Range**	4.67689
		Interquartile Range	1.05271

4.2. Testing for the relationship between the variables

As the time series shows no signs of autocorrelation, correction was not needed and a linear regression model was used to test the relationship between GDP growth and FTSE-JSE growth. The next analysis involved testing whether GDP growth rates have a significant impact on the stock market activity and buoyancy as measured by the FTSE-JSE growth rates. Table 6 presents the linear relationship between GDP growth and FTSE-JSE growth based on a linear regression model.

Table 6. The Linear Regression of GDP growth against FTSE-JSE growth

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.307[a]	0.095	0.076	0.9026752

a. Predictors: (Constant), GDP

Table 5 shows the results for the test of the null hypothesis that GDP growth does not affect stock market growth as measured by FTSE-JSE growth. The hypothesis is accepted. This finding implies that GDP growth does not add any significant predictive power for future stock market growth in the JSE Securities Exchange. This suggests that stock market growth is not influenced by GDP growth in the JSE Securities Exchange. The total R^2 statistic calculated from the model is 0.095, reflecting a very poor fit and rendering the model useless in predicting stock market growth. The model can only explain about 10% of the relationship. This finding seems to support our earlier statement by

If one looks at Figure 1, it shows that there exists a relationship between economic growth and stock market growth. However, the model indicates that this relationship is misleading and useless as a tool to anticipate stock market growth. One of the reasons for this is that stock investors are always trying to look into the uncertain future and assess the risks and rewards associated with growth, shifting resources back and forth between fixed income and co-ownership, as they anticipate either bust or boom respectively. This implies that stock market risk premiums are a matter of anticipated future growth than they are of past or even present economic growth.

Ignoring this fact can cause analytical flaws when it comes to studying the relationship between growth and equity premiums. Stock market investors attempt to look into the future and respond to what they think is coming. Unfortunately, statistical techniques that rely on Granger Causation are a bit too crude to deal with more nuanced sciences of human behaviour.

Another question is whether the economy runs ahead of the stock market or is it vice-versa, with the stock market anticipating economic developments? Both outcomes are conceivable; the question can only be clarified empirically based on data. Over longer times, the statistical correlation between the quarterly change of real GDP and the FTSE-JSE growth rate is very low at 30% (Table 7).

Table 7. Correlation Coefficient

			GDPLG	FTSEJSELG
Kendall's tau_b	GDPLG	Correlation Coefficient	1.000	0.098
		Sig. (2-tailed)	.	0.305
		N	52	52
	FTSEJSELG	Correlation Coefficient	0.098	1.000
		Sig. (2-tailed)	0.305	.
		N	52	52
Spearman's rho	GDPLG	Correlation Coefficient	1.000	0.155
		Sig. (2-tailed)	.	0.272
		N	52	52
	FTSEJSELG	Correlation Coefficient	0.155	1.000
		Sig. (2-tailed)	0.272	.
		N	52	52

According to an IMF study from 2002, two thirds of all recessions remain undetected by consensus forecasts until April of the year in which they actually occur. Economic forecasters have always lacked good leading indicators for a recession. On average, forecasters identify recessions too late and inaccurately estimate their dimensions, as was the case during the recession of 2008/09.

5. Conclusions

This paper reveals that the relationship between the FTSE-JSE All-Share Index growth rates and GDP growth rates is coincidental and cannot be used for prediction. Stock prices generally reflect investor expectations for future corporate earnings and consequently for future economic growth but the papers argued that this relationship cannot be modelled to accurately predict the stock market growth from GDP growth.

Stock investor Peter Lynch, believe that investors are wasting their time with economic analyses and forecasts, since they believe that the stock market has already priced-in expectations for the economy. Those who invest based on economic forecasts would therefore always be late to the game. Seen from this perspective, the stock market provides useful information about the future development of the economy, not the other way around.

Equity investors are helped by sound macroeconomic forecasts because fundamental stock market trends are influenced by growth trends and related cycles. However, most so-called "leading" indicators do not run ahead of stock markets; rather, they move in tandem with or lag stock markets. Macroeconomic news flow can still be negative when stock markets have already reversed and are trending higher. Economic researchers should include massive moves of major equity indexes in their economic forecasts; they can be especially useful in forecasting recessions

The findings of the study indicate that investors should not rely on past economic growth as an indicator of future stock gains. Accurately forecasting future economic growth might help but those forecasts are difficult to get right. We suggest that investors should not base their stock investments purely on economic cycles because of the unreliability and unpredictability of such cycles. It is advisable that investors look at fundamentals before investing in high risk equity markets of growing economies.

The severe market decline in 2008 has rekindled research on this topic. When Paul Samuelson jeered about the forecasting "qualifications" of stock markets as an indicator for recessions in 1966 (see our quote above), he referred to the fact that the financial markets tend to overstate rather than accurately reflect (expectations about) the economic cycle. Not every severe sell-off forecasts a recession, not every bull market a recovery. Today investors are still not close to predicting a recession or economic boom than they were back in the 1960s.

In conclusion, to quote Warren Buffet, he says "If you knew what was going to happen in the economy, you still wouldn't necessarily know what was going to happen in the stock market" (Carlson, 2013)

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