

**The Nexus Between Johannesburg Stock Exchange and the United States Unemployment Rate
Announcement: An Impulse Response Analysis**

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Abstract: The study explores the relationship between the unemployment rate in the United States and South Africa's stock prices from the beginning of 2013 to the last day 2017. The objective of this paper is to examine the impact of the US unemployment rate announcement on the South African financial market. Results of Impulse Response analysis show that there is a very minimal impact from the US unemployment announcement to South Africa's stock prices which disappears within two days of the announcement. In addition, the Johannesburg stock exchange index marginally responds to own shocks, which marginally fades away within two days. These findings imply that the changes in the US employment policies have a direct ripple effect on the South African macroeconomic environment, its investing public sentiments and corporate confidence on the future prospects of businesses.

Keywords: *US unemployment, the stock market, macroeconomic factors, sentiments, Africa*

1. Introduction

Financial analysts and investors spend long periods of time and effort examining the South African business environment. They constantly monitor various key economic indicators; such as a country's inflation, government policy, unemployment, budget deficit, borrowing rates, national output and balance of payment position, to identify financial market trends. They assume that these macroeconomic indicators determine the intrinsic value of any investment in the economy (Mutize, 2015). The statistics on these macroeconomic factors, which is published periodically by both governmental and private agencies, reflect the present economic situation (Ergun, and Ozlen, 2012). Publishing reports on these macroeconomic indicators usually result in volatility of the financial markets being observed, which has made their announcement important to market participants (Veronesi, 1999). A negative development in these key economic indicators usually results in negative financial market reactions and vice-versa. There has however been a debate on the impact of the United States (US) Employment Report on other world economies. The US Employment Report is amongst some of the most watched economic indicators in the world (Abo-Zaid, 2014), including the housing statistics, exchange rates and retail sales figures. The US Department of Labor through the Bureau of Labor Statistics, every Friday of the beginning of every month, at 0830, it publishes the United States' the previous month's unemployment figures, commonly referred to as the 'Unemployment or Job Report'.

The Job report provides estimations on the fractional unemployed population as well as total hours that the employed have worked. The Employment report announcement is widely anticipated and forecasted by market participants (Hautsch, and Hess, 2002). Financial analysts across the world consistently refer to the US employment situation report when making major economic decisions. Questions have therefore been raised about the nexus between the US employment situation report and the developing financial markets, its effect on investor sentiments, as well as market optimism. Hence, the research examines the short-term reaction of the South African equities market returns to US unemployment rate announcement as macroeconomic news. The stock prices response to public announcements depends on three key factors; the risk-free rate of interest, corporate earnings and dividends growth expectations, a risk premium (Ross, 1976). Thus, if the announcement of the unemployment rate has an impact on stock prices it conveys information about some or all to these factors. Andritzky, Bannister and Tamirisa (2007) observe that the sensitivity of the bond and stock markets in emerging economies to the US employment announcements has significantly increased over the years. However, South African financial markets are considerable anxious to the build-up towards the announcement of the US unemployment rate statistics every month. Furthermore, analysts and investors constantly make reference to the US unemployment situation as a key variable towards general market sentiments in local markets. It has thus become a major input across the country's investment environment for the corporate world when making major economic decisions.

The US hegemony on the world's financial markets and its role in the global financial system creates inherent financial linkages across the world (Pierce, and Schott, 2016). Despite the financial crises that have rocked the United States of America over the last decades, it has maintained its ability to sustain the growing external deficits without major speculative negative sentiments. According to Janacek and Komarek (2012), the use of the US dollar in pricing international goods and commodities extends the dominance of the US and its macroeconomic dynamics. Hence, the changes in the macroeconomic environment of the US have an impact on other countries' currencies relative to the reserve currency. Konings (2008) adds that the main variable that contributes to the sustenance of the US dominance of the global financial system is the US dollar, which plays a dominant role in the settlement of international transactions. Approximately 86 percent of all foreign exchange transactions involve the US dollar and about 66 percent of foreign exchange reserves held by countries across the world are in dollars. Although the literature on the impact of economic fundamentals on financial markets is well established, studies that examine the effects of the US employment report on South African financial markets are rare.

Thus, this study contributes to the fundamental analysis of South Africa's financial markets literature in three ways. First, by being amongst the first to quantify the impact of the US employment reports using South Africa's stock market data. Second, by contributing empirical evidence to literature debate on the US hegemony on the financial markets of developing countries. Hence, the study explores the responsiveness of equities markets in emerging economies to fundamental changes in developed economies; specifically, South Africa's financial markets and the US unemployment announcements. Lastly, by examining the financial linkages between the US economic system and African financial markets, which are perceived to be underdeveloped, illiquid and inefficient. The following is the structure of this research. The following segment gives the theoretical background of the financial market pricing and fundamental economic factors, followed by a review of the literature. The review explores literature on the impact of the US employment situation in both developing and developed countries' financial markets. Section 4 then describes the employment report and South African financial market data, and the methodology used to conduct the analyses is discussed in Section 5. Then after, the research outlines the results and concludes with the implications of results on policy and businesses.

Theoretical Background: Behavioural theories suggest contradictory excerpts on the factors underlying financial market dynamics and movements of the two key contradictory theories, the first set of theories asserts that financial markets reflect all economic macroeconomic fundamentals in the current security prices. The main theory of financial markets fundamental asset pricing is the Efficient Market Hypothesis (EMH), proposed by Eugene Fama in 1965. The theory asserts that it is not possible for market participants to earn abnormal returns from trading securities in financial markets by using relevant information advantage because security markets are efficient in incorporating all relevant information in the current stock prices. Hence, according to the theory, equities are always fairly priced, with neither overvaluation nor undervaluation because security current values reflect all available relevant information. As such, market timing, expert search for undervalued stocks, and fundamental and technical analysis to predict market trends is all pointless. Investors can only earn more returns by assuming additional risk in their current or new investments. In contrast, the second set of theories subsequently provide empirical evidence that there are times when financial markets fail to reflect all macroeconomic fundamentals in the current security prices.

They argue that, based on the behaviour of investors, financial markets efficiency is not realistic because stock prices react to fundamental macroeconomic news announcements. Hence, Malkiel (2003) contend that the market waves created by investors' actions during periods of optimism and pessimism following news announcements leads security prices to depart from their intrinsic prices every now and then. Subsequently, it is argued that the abnormal returns earned by some analysts and investors are a sign that financial markets deviate from efficiency. Hirshleifer et al. (2013) further argue that, if markets were perfect efficient there would be no need for investors to engage specialist market consultants in order to maximise their portfolio returns. In addition, Zuo (2016) point the increase in databases selling information on financial market fundamentals as well as the increase in sophisticated models for analysing financial market movements as evidence that people have confidence in interpreting market performance using fundamental news announcements.

2. Literature Review

Financial markets perceive the United States' employment benchmark as a fairly good macroeconomic variable that indicates the health of the country's economy, especially in key areas such as consumer spending and consumer debt (Haltiwanger, 2012). In addition, Baron (2013) posit that there is a direct positive relationship between employment growth and the growth in consumer spending, which is developed out of positive consumer confidence. These circumstances thus usually generate the bulk of economic activity in most countries. Thus, the release of the employment data is usually followed by frenzied trading that can last for many days, depending on sentiments and expectations of financial markets (Zhang et al., 2017). Zhang et al. further posit that the employment situation announcement is very crucial as it set market sentiments and the overall tone in market trends even weeks after. Therefore, financial market participants refer to the unemployment announcement for clues and nuggets for predicting future market situations. Pierce and Schott (2016) analyse the major components of the employment report that connects directly to financial markets. They point out that the report contains the number of new employment created each month as well as the unemployment rate. In support of Pierce and Schott, Lee and Wolpin (2010), posit that these two components tend to predict the direction of economic strength as high figures in new employments signifies economic growth. And, stronger economic growth would increase the likelihood of high inflation, which the central bank responds to by raising interest rates to curb inflationary pressure. In contrast, a fall in the number of new employments signifies economic slowdown.

A rise in unemployment usually means the United States economy is not operating at maximum capacity. Hence, this could lead the Federal Reserve to lower interest rates to trigger more consumers spending (Sun et al., 2010). Furthermore, Rupasingha and Goetz (2013) add that it also could cause the federal and state governments to promote expansionary policies to boost employment growth and stimulate economic growth. However, Hautsch and Hess (2002) argue that bonds and stocks react differently to rising unemployment in the US unemployment report. To the stock market, positive unemployment report is an indication of business and investor optimism, hence potential for economic growth. Therefore, to the stock markets, interest rates and inflation figures are not very important as compared to bond market. Conversely, Boyd et al. (2005) argue that the country's economic status is the major determinant of the magnitude by which equities price react to unemployment announcements. In support, depending on previous unemployment rates, Veronesi (1999) shows that in equilibrium, the same unemployment announcement can trigger a positive stock market response and sometimes a negative response. Boyd et al. thus argue that the stock market responds positively to increasing unemployment during periods when the economy is expanding and vice versa during periods when the economy is shrinking. However, as most economies in emerging markets are usually in expansion mode, it is therefore logical to argue that equities prices respond positively to increasing unemployment announcements. According to Abo-Zaid (2014), equities respond negatively when unemployment increases during economic contractions mainly because it contains more information about economic growth expectations.

Zoega (2012) adds that, the negative reaction of stock prices during economic expansions is driven by the possibility of interest rate decreases. Thus, rising unemployment causes expected future interest rates to decline as part of monetary policy response a possible decline in economic growth expectations. In a theoretical argument, Galil and Soffer (2011) show that rising unemployment in times of economic expansion and falling unemployment in times of economic contraction is generally associated with increased uncertainty due to inconsistent stock market reactions. However, the most probable response would generally be an increase in the stock risk premium. The employment report has however been criticized that the unemployment rate is considered as a 'lagging indicator' that it is a highly uncertain prediction of economic-related indicators and is not reliable (Aysun et al., 2014). Harris and Zabka (1995) argue that the unemployment figures are often significantly revised over a long period after they are announced, hence the job report does not have the predictive strength to estimate future economic prospects with an average degree of accuracy. Further, the unemployment rate has shown constant spikes due to unexpected deviations from the expected trends over longer periods of time. In addition, Abo-Zaid (2014) argue that the employment report has some major inherent distortions in the data from factors such as the freelance economy, black market, and discouraged prospective workers which makes it grossly inaccurate.

Other studies argue that there are some things that the employment report does not mention. The unemployment announcement is analysed based on its contents with respect to the economic status of a nation (Belgacem, and Lahiani, 2012). Thus, the amount of jobs that are created signifies the direction in which the economy is taking, either growing, shrinking or overheating (Nguyen, and Ngo, 2014). Subsequently, it may thus be argued that the unemployment announcement report does not have any significant predictive strength due to its grow inaccuracy as witnessed by the many times it is revised post its initial release. Furthermore, Hautsch et al. (2011) note the weaknesses in the unemployment data with reference to announcements following the global recession in 2008 where the forecasted employment figures were far below the actual amounts. Alternatively, Hautsch et al further cite several instances when the Federal Reserve raises interest rates in anticipation of accelerating employment rate, only to realise significantly rising unemployment figures instead. In addition, comparing actual outcomes to the information harvested from households and businesses, there is complete divergence which further support the view that these announcements lack the predictive strength to estimate future economic status. Hence, Bardasi and Francesconi (2004) argue that unexpected results from the employment figures usually indicate some anomalies with both the economy and employment environment.

Despite the questionable accuracy of the US unemployment report, global financial markets seem to be closely linked to the US employment figures as the announcement is highly considered by both businesses and investors across the world in making key economic decisions about future opportunities. (Nguyen, and Ngo, 2014). Others argue that, the US employment report announcement has a significant effect on public perceptions and business sentiments concerning future recruitment decisions (Ergun, and Ozlen, 2012). As such, financial markets are nervous in the build-up to the announcement of the US employment report. And, studies have argued that financial markets significantly respond to the employment report announcement (Pierce, and Schott, 2016). Thus, in addition to the uncertainty in other employment and economic indicators, Abo-Zaid (2014) argue that the unemployment report still provides worthwhile information. Ajello (2016) has shown results in several ways in which employment data impact the financial markets. He argues that, the world financial markets significantly response to the employment report announcement impact of given that the United States Dollar is an international currency.

The unexpected increase in the US unemployment leads to a fall in the US currency against other currencies. Ajello also reports that when financial markets unexpectedly react to US unemployment report, the phenomenon is closely linked to short-term interest rates across all international financial markets. In summary, the main theme in the reviewed literature is that due the globalization and financial market liberalization, financial markets have also become increasingly sensitive to America's macroeconomic data announcements. However, other studies argue that the US macroeconomic variables are marred by distortions and inaccuracies. Despite the questionable accuracy of US macroeconomic data, financial markets across the world seem to react to their announcements. This study therefore investigates the impact of the US employment report on the Johannesburg Stock Exchange (JSE) returns.

Description of Data: The analysis of the response of the JSE to the announcements of changes in the US unemployment rate makes use of the US unemployment and the Financial Times-Stock Exchange/Johannesburg Stock Exchange (FTSE/JSE) all-share index 4-year data from January 2013 to December 2017. This period on analysis was preferred because there were no other major exogenous events that could act as confounding factors to influence objectivity in the data selection period. In addition, this is the period when the financial market in South Africa has been performing at par, according to major investment firms. The unemployment report is announced by the US's Department of Labour on a Friday of the beginning of every month. Hence, the unemployment statistics were obtained from the US Bureau of Labor website. The US Bureau of Labor Statistics also publishes data on many other employment variables such as the total number of employed, employment figures distribution across industries, revisions of past 3 months unemployment data, the hourly and weekly employment totals (Rupasingha, and Goetz, 2013).

Although the effects of these other variables may have to be considered, the methodology of this study follows Sullivan et al. (2001) to consider only the unemployment rate as analysts and investors view it as relevant information in security pricing. For the JSE, the FTSE/JSE all-shares index, a market capitalization-weighted index, which accounts for approximately 99 percent of the market capitalisation of all JSE listed

companies, was selected to represent the performance of the South African stock market. It also complies with the recommendations made by the International Organization of Securities Commissions (IOSCO). Thus, the index is designed to represent a fairly accurate of the performance of South African companies, and is comprehensive. The daily index data was obtained from the JSE website. Following Boyd et al. (2005), the monthly data for the US unemployment rate was then converted to daily data using Visual Basic for Applications (VBA) estimation function in order to match the FTSE/JSE all-share index daily data.

3. Methodology

This study makes use of the Impulse Response Function (IRF), an analysis of a shock to a Vector Auto regression (VAR) system. The IRF identifies the responsiveness of the FTSE/JSE all-share index, an endogenous variable in the VAR system model when the US unemployment situation is announced. A unit shock (US unemployment announcement) is applied to the error term (ε_t) to see its effect on the VAR system. If x represents the FTSE/JSE all share index and y represents US unemployment announcement, a VAR system model is specified as follows:

$$x_t = \beta_1 + \sum_{k=1}^n \beta_k y_{t-k} + \sum_{l=1}^n \beta_l x_{t-l} + \varepsilon_t \quad (1)$$

Where n is the sufficient number of lags to model the VAR system, ε_t are impulses or shocks, and β_i are constant coefficients. The IRF analysis the response of each individual variable in the VAR model to the external impulses to the model (Koop et al., 1996) and the responses are quantified for each variable at specific intervals following the announcements of the US unemployment report. Hence, the IRF tracks the impact on a unit impulse of the VAR system over different time periods. This analysis thus allows both positive and negative relationships between the impulses and individual variables in the VAR to be specifically identified. It is thus hypothesised that, if there is a response of FTSE/JSE all-share index to an impulse in US unemployment announcement, the later may be called the causal for the former.

4. Findings

Table 1 below present the results of a group unit root test applied to the data of the two series being analysed at the level, the US unemployment rate and the FTSE/JSE all-share index. As shown in the results, the null hypothesis that at level the two series have unit roots may be rejected. This shows that the autocorrelation structure of the errors in the series as well as the mean and variance are stationary, a key underlying requirement for the analysis of time series data.

Table 1: Results of Unit Root Test

(FSTE/JSE all-share index, US unemployment rate)		
	t-stat	Prob.
Null Hypothesis: The series have a unit root.		
Chu, Levin & Lin	-70.1013	0.0000*
Shin, Im & Pesaran	-57.8823	0.0000*
Fisher Chi-squared – DF	184.980	0.0000*
Fisher Chi-squared – PP	181.384	0.0000*

* represents significance at 1% level

After testing for stationarity, the next step is to estimate a sufficient number of lags to model VAR for the two series as specified in the lag selection criteria. Results of the lag selection are presented in Table 2 below determined by the lag length selection criteria. The results of the adequate lags to model the VAR system are shown in Table 2 below, which presents the lag selection criteria that 1 lag adequately model the regression equations. Five criteria prove that the 1 lag is sufficient for parsimony and predictive strength of the VAR model (Ng, and Perron, 2001). Thus, there is no misidentification of the lag structure through over-estimation or underestimation of the adequate number of lags (Howard, 2013). Thus, a 1 lag structure was applied in all the analyses in this paper as suggested by five lag criteria (SC, HQ, AIC, LR & FRE) in contrast to over 5 lags

suggested by the LogL more than.

Table 2: Results of Lag Selection

Lag No.	Log L	LR	FPE	AIC	SC	HQ
0	9159.874	0.9795	0.033	-13.8441	-13.8362	-13.8411
1	9160.365	5.9093*	0.035*	-13.8388*	-13.8152*	-13.8299*
2	9163.331	1.2303	0.035	-13.8372	-13.7980	-13.8225
3	9163.950	8.1054	0.037	-13.8321	-13.7772	-13.8115
4	9168.030	7.8216	0.037	-13.8322	-13.7616	-13.8057
5	9171.974	0.6687	0.039	-13.8321	-13.7458	-13.7998

* represents the adequate number of lags

After selecting the adequate number of lags, the VAR system is then estimated and the results are presented in table 3 below. From the estimates, it can be seen that the US unemployment rate announcement is insignificant in explaining the variation in the FTSE/JSE all-share index. Hence, the US employment rate announcement does not significantly impact the FTSE/JSE all-share index.

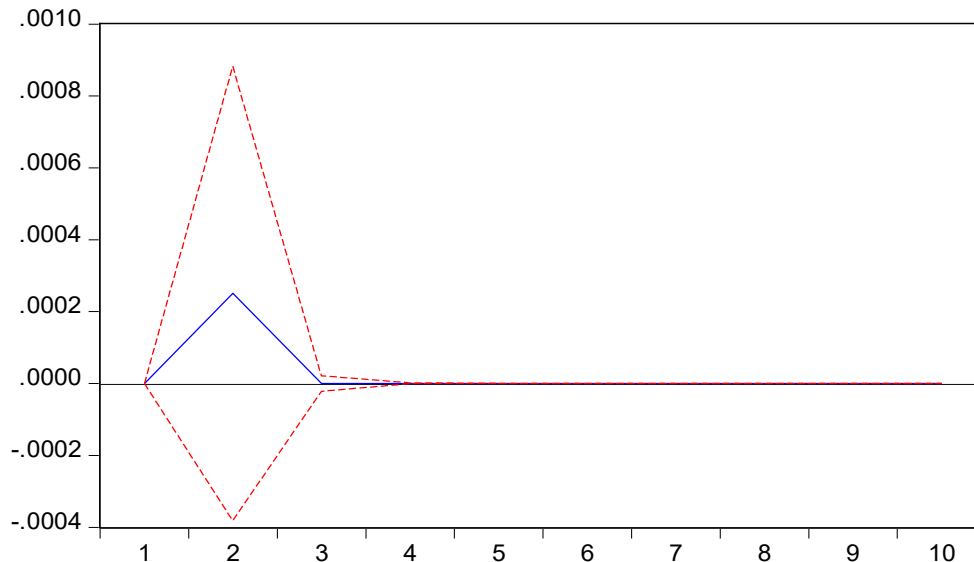
Table 3: Var Estimates with one Lag

	FTSE/JSE all-share index	US unemployment rate	Constant
FTSE/JSE all-share index	0.0063 (0.0302) [0.2111]	0.0433 (0.0545) [0.7940]	0.0003 (0.0003) [1.1761]

Standard errors in () and *t*-statistics in []

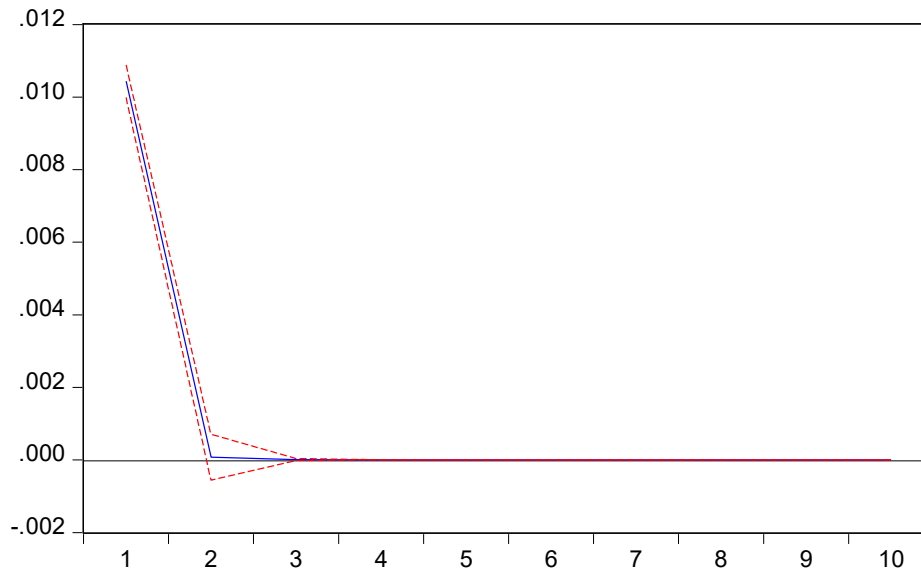
After the VAR system estimations, Figure 1 shows results of the FTSE/JSE all-share index responses to Cholesky's one standard deviation impulse to the US unemployment rate announcement. As can be seen from the graph below, one-unit standard deviation shock in the US unemployment rate results in approximately 0.25 percent positive reaction in the FTSE/JSE all-share index. The results indicate that when the US unemployment announcement is positive, the FTSE/JSE all-shares index generally react positively by one percent, which disappears in three and a half days after the announcement of the US employment situation announcement. Thus, the impact of the US unemployment rate announcement is marginal and it is incorporated into current equities prices immediately after announcements.

Figure 1: Response of FTSE/JSE all-share index to US unemployment rate shock



The responses observed in Figure 1 above could possibly be attributed to a knee-jack reaction from financial market participants. As suggested by Boyd et al. (2005) the reaction does not last for long as investors immediately realize the actual importance of the US unemployment report they adjust overprice stocks downwards and under-priced stocks upwards as the market corrects itself. This result is in line with Ikram and Nugroho (2014) who assert that investors attach too much importance on certain macroeconomic events, an error that leads to uncertain and inconsistent financial markets performance. Hence, the results concur with Malkiel (2003)'s findings that investors behave irrationally when they do not correctly understand or process all the available relevant information while forming their sentiments, perceptions and expectations about the future stock performance. The next graph shows the FTSE/JSE all-share index's response to its own shocks. Figure 1 below shows that the FTSE/JSE all-share index does significantly react positively to its own one standard deviation positive shocks on for only one day. Thereafter, the index's response to own shock marginally decrease and fades away in two days.

Figure 2: Response of FTSE/JSE all-share index to own shocks



To ensure that the VAR system is sufficiently and correctly specified, the serial correlation LM test and the normality tests are performed. These analyses examine if the residuals are not serially correlated and normally distributed, a requirement for time series estimation models (Zivot, and Wang, 2006). The results of the LM test presented suggest that the null hypothesis that there is no autocorrelation may not be rejected. Thus, a VAR with one lag is sufficient to capture the dynamics in the VAR system and the model is correctly specified.

Table 4: Residual Serial Correlation LM test results

Lag	LRE		Rao F-test	
	LM-statistic	Probability	F-statistic	Probability
1	5.4460	0.2445	1.3626	0.2445
2	6.5556	0.1613	1.6407	0.1613

* represents significance at 1% level

The next robustness test is the VAR residual test for normality, which analyses if error terms are normally distributed. Results presented in Table 5 suggest that a null hypothesis that the residuals in the VAR (1) model are normally distributed may not be rejected. Hence, the VAR (1) model is correctly specified since its residuals are multivariate normally distributed. It is thus imperative for monetary and fiscal policy-makers to maintain prudent policies that align with the global best practices to avoid being a weak-link to the world financial markets system.

Table 5: VAR residual normality test

Component	Jargue-Bera	Probability
1	181.8351	0.4235
2	2.4789.6	0.5611
Joint	204971.4	0.5481

* represents significance at 1% level

5. Conclusion

The paper investigated the effect of the announcement of the US unemployment situation on South Africa's stock market during the period of January 2013 to December 2017. Results of the impulse response analysis show that the effect of the US unemployment rate announcement positively impacts South African stock prices. However, the effect is very marginal and is immediately incorporated into current equities prices in less than three days of announcement. The Impulse responses also show that South Africa's stocks significantly respond positively to their own positive shocks, which marginally decrease and fades away in two days. These papers draw five implications from these results. First, changes in the US employment policies have a direct ripple effect on the South African macroeconomic environment, its investing public and corporate confidence in the future prospects of businesses. Second, although there are weakly financial linkages between the US and the South African financial system, the dominance of the US dollar on the macroeconomic dynamics of developing countries is still significant. Thus, emerging stock markets are significantly sensitive to macroeconomic fundamental changes in developed countries. Third, investors evaluate the effect of macroeconomic factors beyond countries' borders. Thus, there are macroeconomic spillover effect of fundamental announcements of significant economic events. Lastly, the South African financial market is inevitably part of the global financial system.

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