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THE IMPACT OF STOCK MARKET DEVELOPMENT ON UNEMPLOYMENT: EMPIRICAL EVIDENCE FROM SOUTH AFRICA

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Abstract

In this paper, the impact of stock market development on unemployment in South Africa has been empirically examined using time-series data from 1980 to 2019. The study was motivated by the high level of structural unemployment facing the country, on the one hand, and a well-developed stock market, which compares favourably with those in advanced economies, on the other hand. The study aims to add value to the finance-unemployment literature by using a range of stock market development proxies, namely stock market capitalisation, the total value of stocks traded, and the turnover ratio. Based on the autoregressive distributed lag (ARDL) bounds testing approach, the results of the study revealed that in South Africa, stock market development has a negative impact on unemployment. These results were found to hold, irrespective of the stock market development proxy used and whether the analysis was conducted in the long run or in the short run. Based on these results, it can be concluded that the stock market unambiguously promotes job creation in South Africa. The study, therefore, recommends that policymakers should continue with the implementation of policies aimed at promoting stock market development in order to create more jobs, while at the same time ensuring that other structural challenges facing the labour market are also addressed.

JEL Classification Code: G1, E24.

Keywords: Financial development; stock market development; market-based financial development; unemployment; South Africa, ARDL

1. Introduction

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For some time now, South Africa has been battling with the triple challenge of inequality, poverty and unemployment (the South African Government "SAG", 2019; Xesibe and Nyasha, 2020). Many economists and policy analysts alike thought that the silver bullet to cure these ills lay in boosting economic growth, leading to numerous studies being conducted on the impact of various variables on economic growth in South Africa (see, among other studies, Nyasha and Odhiambo, 2020, 2015a; Nyasha *et al*., 2020; Xesibe and Nyasha, 2020). Despite the overflow of such studies, the triple threat still hounds South Africa, raising the necessity for studies investigating ways of directly fighting against inequality, poverty and unemployment (see Magombeyi and Odhiambo, 2018, among others).

According to the SAG (2019) and Banda *et al*. (2016), unemployment is considered to be one of the significant contributors to widespread levels of inequality and poverty in South Africa. As such, the South African Government has sought not only to grow the South African economy, but also to explicitly focus on transforming the economy, necessitated by the country's deep inequalities and stubborn unemployment (SAG, 2019).

Several decades of academic research highlight the benefits of well-developed financial markets for economic growth (see, for instance, Levine, 1997, 2005; Nyasha and Odhiambo, 2014, 2015a, 2015b; Rajan and Zingales, 1998). Earlier literature not only stressed the importance of well-developed financial markets for the real economy, but it also provided empirical evidence of the different transmission channels, favouring market-based finance over bank credit (Acemoglu *et al*. 2006; Levine and Zervos 1998). Given this established power of financial markets to overturn real-sector misfortunes in an economy, on the one hand, and the high levels of stock market development in South Africa, on the other hand, it is prudent that the finance–unemployment nexus be put to empirical test.

Over the years, South Africa has invested in the reform and development of its stock market, which is currently one of the top bourses in Africa, favourably comparable to the top world bourses (see Asongu, 2015; Nyasha & Odhiambo, 2015c). The financial sector of the country is also well regulated – evidenced by the minimal impact of the 2007/2008 global financial crisis on the South African financial sector (Marrs, 2013; the South African Government Information, 2009).

Despite the overwhelming evidence on how highly developed South Africa's financial system is, to our knowledge, no study has fully explored the possible benefits such a financial system may have on unemployment levels in South Africa. This is the current gap in the literature this

study aims to bridge. The outcome of the research is expected to offer policy guidance relating to the finance-unemployment nexus in South Africa. Looking beyond South Africa, the impact of financial development on unemployment appears to also be an under researched area. Only a few studies have put the finance–unemployment nexus to the test (Aliero *et al*., 2013; Darrat *et al*., 2005; Ernst, 2019), pointing to the gaps in knowledge this study aims to cover.

Against this backdrop, the objective of this study is to empirically investigate the impact of stock market development on unemployment in South Africa using the ARDL bounds testing approach.

The closest research to our study is based on the work done by Aliero *et al*. (2013) for the case of Nigeria. However, as opposed to Aliero *et al.* (2013), which mainly focused on bank-based financial development, our paper focuses on stock market development. In addition, in the current study, three proxies of stock market development are used, namely stock market capitalisation, total value of stock traded and turnover ratio, thereby leading to a system of three multivariate equations. To our knowledge, this study may be the first of its kind to explore in detail the finance–unemployment nexus in South Africa using three different proxies of stock market development. The outcome of this study is expected to contribute significantly to policy options towards diffusing the triple-threat challenge facing South Africa, namely inequality, poverty and unemployment. The results of this study are also expected to contribute immensely towards the opening up of the finance–unemployment nexus debate nationally and beyond.

The rest of the paper is organised as follows: In Section 2, finance-unemployment dynamics in South Africa are discussed. In Section 3, the literature on the finance-unemployment nexus is reviewed. Section 4 is aimed at presenting the methodology employed to examine the impact of stock market development on unemployment in the country under study, as well as discussing the results. In Section 5, the study is concluded.

2. Stock Market and Unemployment Dynamics in South Africa

In South Africa trading in stocks dates back to as early as the 1880s, following the discovery of gold on the Witwatersrand in 1886, which led to many mining and financial companies opening – and a need soon arose for a stock exchange (JSE, 2020; Nyasha and Odhiambo, 2015c). The JSE provides a market where securities can be traded freely under a regulated procedure. It does not only channel funds into the economy, but it also provides investors with returns on investments in the form of dividends. Thus, the exchange successfully fulfils its

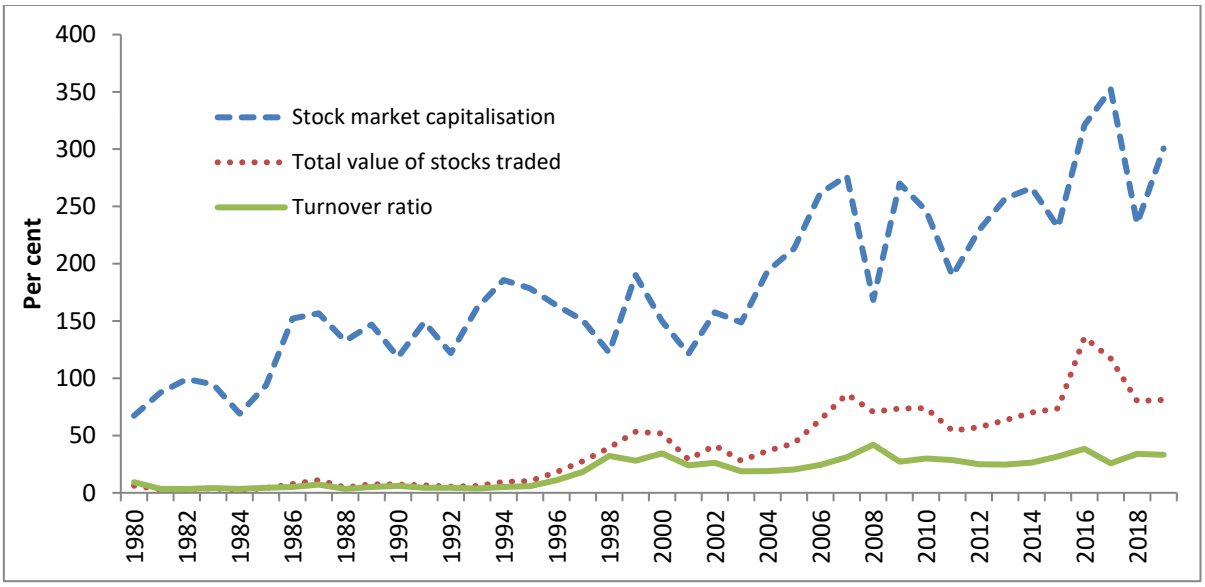
main function – the raising of primary capital – by rechannelling cash resources into productive economic activity, thus building the economy, while simultaneously enhancing job opportunities and wealth creation (Nyasha and Odhiambo, 2015c).

To keep pace with the global economy, the South African stock market had to undergo an extensive reform process, which saw the transformation of the stock market into the great African bourse it is today. According to Nyasha and Odhiambo (2015c), the reforms began in earnest in the 1990s. Among these reforms have been the restructuring of the financial market, and the replacement of the traditional trading systems by full electronic trading systems. Overall, the South Africa stock market has responded positively to the various stock market initiatives implemented over the years.

South Africa's stock market responded positively to most of the reforms implemented since the 1990s, and has been experiencing growth over the years. It has over 400 listed companies (JSE, 2020). The growth of South Africa's stock market can also be explained using stock market capitalisation of listed companies, the total value of stocks traded, and the turnover ratio of stocks traded. Market capitalisation ratio usually equals the value of listed shares divided by the gross domestic product (GDP) and analysts frequently use the ratio as a measure of stock market size; while the total value of stocks traded and the turnover ratio of stocks traded generally measure stock market liquidity – where 'liquidity' refers to the ability to buy and sell securities easily. Figure 1 summarises trends in stock market development in South Africa over the period from 1980 to 2019, as measured by stock market capitalisation of listed domestic companies as a percentage of GDP, the total value of stocks traded as a percentage of GDP, and the turnover ratio.

As shown in Figure 1, the South African stock market growth, in terms of capitalisation and liquidity trended upwards in the review period – with the rate of growth more pronounced from the early 2000s (World Bank, 2020). Although the overall growth in the South Africa stock market is confirmed, this growth was accompanied by stock market volatility as evidenced by oscillations – though shallow. Despite the notable progress, challenges still remain. Some of these include: i) the lack of public awareness; hence, limited public participation in the stock market; ii) a relatively low liquidity; and iii) a slow economic pace in South Africa (Nyasha and Odhiambo, 2015c; JSE, 2011; IMF, 2008; Misati, 2006).

Figure 1: The Growth Trends in the South African Stock Market (1980 – 2019)



Source: World Bank, 2020

From the unemployment front, it can be observed that since the global financial crisis of 2007/8, South Africa's economic growth has not yet recovered. It saw its GDP growth rate tumble from over 5% per annum in 2007 to -1.5% in 2009. Since then, the highest GDP growth rate recorded by South Africa was 3.3% in 2011; and the trend has been a downward one, reaching as low as 0.4% in 2016, and 0.2% in 2019 (World Bank, 2020). A number of macroeconomic fundamentals have received their fair share of the blame for this dismal economic performance. Among the most blamed ones is unemployment, which has soared over the years, from an unemployment rate of 22.5% in 2008, to 28.7% in 2019 – representing a 6.2 percentage point increase (IMF, 2020).

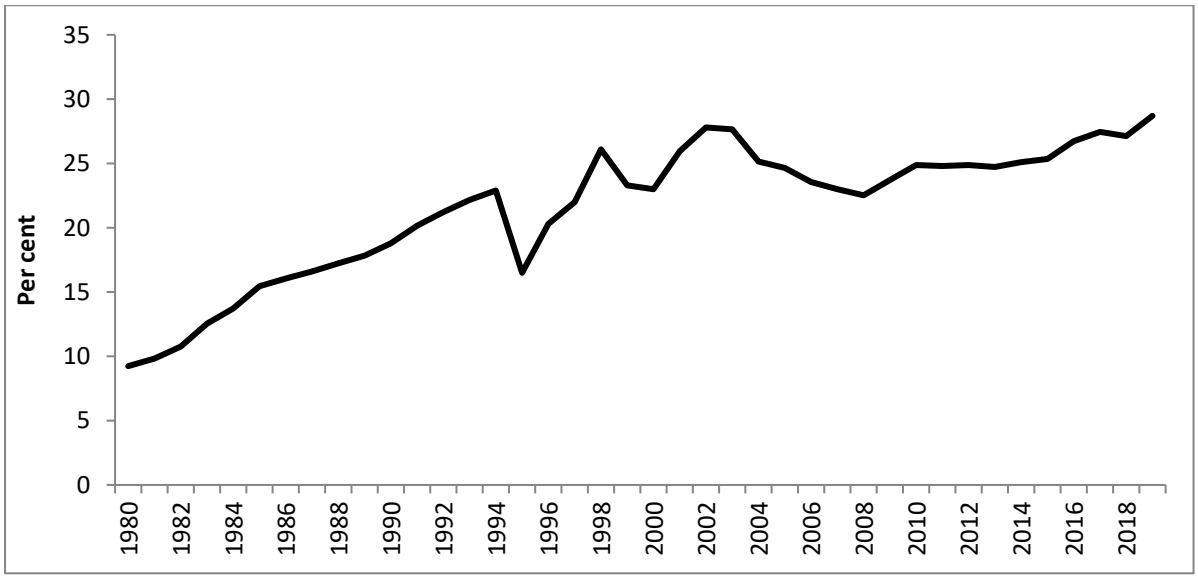
Even in recent quarters, unemployment has continued soaring. The concoction of decreased quarter-on-quarter employment, increased unemployment, increased labour force participation rate, and decreased labour absorption left South Africa's unemployment rate with no option but to shoot up. While the formal unemployment rate increased to 30.1% in the first quarter of 2020, from 29.1% in the previous quarter, the expanded unemployment rate increased to 39.7%, from 38.7% over the same period (Statistics South Africa, 2020).

It has been widely acknowledged that unemployment has proven to be a persistent challenge facing South Africa. Since the dawn of the post-apartheid era, a number of policies have been implemented at a national level – ranging from the Reconstruction and Development Programme (RDP); Growth, Employment and Redistribution (GEAR); and Accelerated and

Shared Growth Initiative for South Africa (ASGISA), to the New Growth Path (NGP); and the more recent National Development Plan (NDP) (SAG, 2019). In recent years, as the fight against unemployment intensifies, a number of employment creation incentives and initiatives were also implemented, championed by various national departments. Despite the implementation of these policies, incentives and initiatives, unemployment has remained stubbornly high, and the trend has not yet been broken (SAG, 2019).

The New Dawn, as the current presidency is also known, has ushered in another dose of employment-targeted national drives, with the Job Summit and investment as the most prominent ones. A number of initiatives to create more jobs were implemented country-wide. Although the unemployment situation has not improved significantly over the review period, these incentives and programmes managed to ease the rate at which unemployment was increasing. The economic and social implications of such persistently high unemployment levels in South Africa include: loss of income by individuals; depressed demand; depressed production; capacity under-utilisation; reduced exports; loss of government revenue; service delivery deterioration; investment loss; future loss of income; economic growth slip, social instability; violence; crime; and further spiralling unemployment (SAG, 2019). Figure 2 presents the trends in unemployment in the study country, as measured by the official rate of unemployment.

Figure 2: Unemployment Rate in South Africa (1980 - 2019)



Source: IMF, 2020

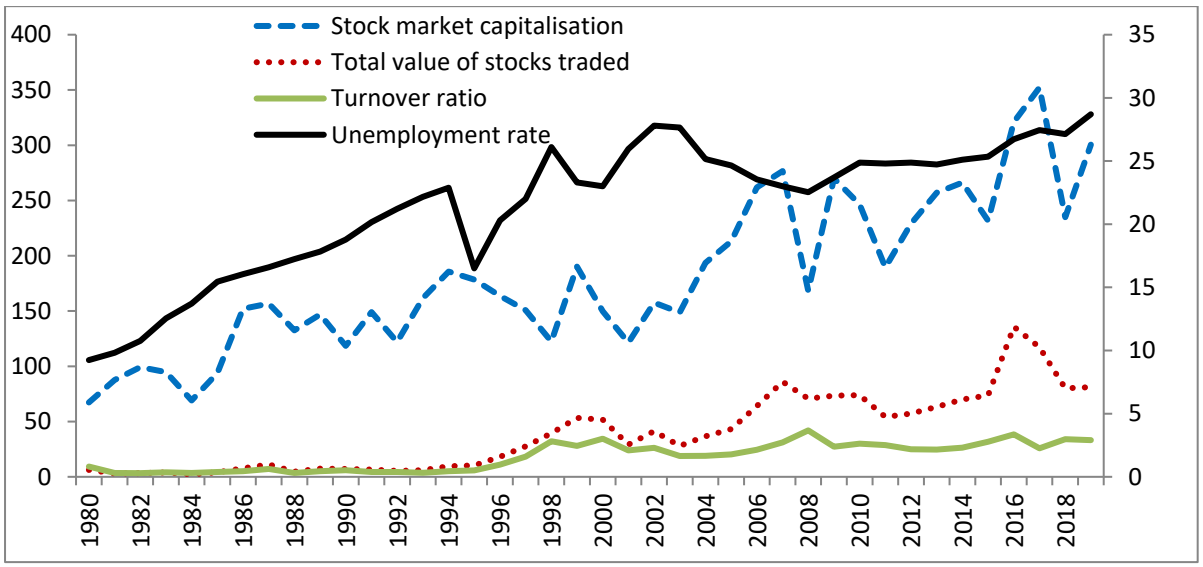
As attested to by Figure 2, unemployment in South Africa has been on a rising path over the review period. Only between 2003 and 2008 did the unemployment rate significantly fall from 27.7% to 22.5%, respectively, before resuming its ascent for the remainder of the period (IMF, 2020).

Figure 3 attempts to interrogate the dynamics of stock market development and unemployment trends in South Africa over the review period.

From 1980 to 2019, as reflected in Figure 3, trends in both stock market development and unemployment have been on an upward trajectory, in the main. However, between 1995 and 2007, the trends in unemployment and stock market development, as proxied by stock market capitalisation, exhibited a seemingly inverse relationship – where unemployment increases with a decrease in stock market capitalisation, and vice versa (IMF, 2020; World Bank, 2020).

Figure 3: Stock Market Development and Unemployment Trends in South Africa

(1980 - 2019)



Source: World Bank, 2020; IMF, 2020

2. Literature Review

The nexus between financial development and unemployment is an area currently little explored. Studies that have empirically examined the impact of financial development, in general, and stock market development, in particular, on unemployment are scant. Rather, a

significant portion of these studies is on the stability rather than pure development of the financial system on labour dynamics.

The relevant empirical literature on the impact of financial development on unemployment can be organised into three strata. The first stratum consists of studies that found a negative association between the two macroeconomic variables. These studies include those conducted by Epstein and Shapiro (2018) on developing and emerging economies; Kanberoğlu (2014) when investigating the relationship between unemployment and major indicators of financial development in Turkey during the 1985-2010 period; Shabbir *et al*. (2012) on Pakistan, both in the short run, as well as in the long run when financial development is proxied by financial sector activities, and by Darrat *et al*. (2005) in their finance-unemployment study in the United Arab Emirates, but only in the long run.

The second group mainly consists of studies in which the relationship between the two was found to be positive. These include a study conducted by Ogbeide *et al*. (2015) on the interaction between unemployment and the level of banking sector development in Nigeria during the 1981-2013 period; Kanberoğlu (2014) when broad money supply was used as a measure of financial development in an investigation of the relationship between unemployment and major indicators of financial development in Turkey during the 1985-2010 period; Shabbir *et al*. (2012) on Pakistan when financial development was proxied by M2 minus currency in circulation as a ratio of GDP; and the research conducted by Gatti and Vaubourg (2009), but only in selected cases when credits provided by financial sector was used as a proxy of financial development.

The third stratum is for studies in which financial development was found to have an insignificant impact on unemployment. Such studies include those conducted by Epstein and Shapiro (2018) on advanced economies; Bayar (2016) on 16 emerging market economies during the period 2001-2014; Ilo (2015) in the case of Nigeria during the period 1986-2012; and Darrat *et al*. (2005) in the case of the United Arab Emirates in the short run.

The studies reviewed so far are mainly based on the direct impact of financial development on unemployment in various countries and regions under study. There is, however, another class of empirical literature that alludes to the relationship between financial development and unemployment – although in an implied manner. These studies still help in shedding more light on the finance–unemployment nexus. These studies include those conducted by Berton *et al*. (2018) who found a negative relationship between financial development and unemployment

in Italy, highlighting the heterogeneous employment effect of financial shocks; Bentolila *et al*. (2017), who, after using firm-level data for Spain, found that around 24% of job losses were due to firms being attached to weak banks; Pagano and Pica (2012) who also confirmed the volatility-enhancing impact of banking crises in a panel of OECD countries prior to the crisis, indicating that job creation is more tightly linked to falls in output, particularly during banking-related crises, thereby amplifying the employment impact of the recession; Han (2009) on the USA, who asserted that financial sector turmoil caused unemployment; and Caggese and Cunat (2008) who demonstrated that in Italy, financially constrained firms use temporary employment more than unconstrained ones, amplifying the employment volatility of shocks.

Based on the empirical literature reviewed, it can be concluded that although each strand has supporting evidence, it is the strand that supports the negative impact of financial development on unemployment that appears to predominate, with more evidence than other strands – irrespective of the methodology used.

4. Methodology and Results

4.1 ARDL Bounds Testing Approach

In this study, the empirical examination of the impact of stock market development on unemployment in South Africa is based on a superior methodology anchored on the fairly recently developed autoregressive distributed lag (ARDL) bounds testing approach – as initially advanced by Pesaran and Shin (1999), and later refined by Pesaran et al. (2001). Unlike the conventional methodologies based on Johansen (1988), Engle and Granger (1987) and Johansen and Juselius (1990), this chosen contemporary approach is advantageous from numerous fronts (see also Odhiambo, 2014; Nyasha and Odhiambo, 2015d). The ARDL bounds testing approach: does not impose the restrictive assumption that all the variables under study must be integrated of the same order; normally provides unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous (Odhiambo, 2008; Nyasha and Odhiambo, 2020); employs only a single reduced-form equation, unlike the conventional cointegration methods that estimate the long-run relationships within a context of a system of equations (see also Duasa, 2007); has superior small sample properties, when compared to the other conventional methods of testing cointegration (Pesaran and Shin, 1999); and is appropriate even when the sample size is small, unlike other cointegration techniques that are sensitive to the sample size. Hence, the ARDL approach is considered to be appropriate

for analysing the underlying relationship in this study. Of late, the method has gained traction among researchers.

4.2 Variable Description and Empirical Model Specification

In this study, the dependent variable is unemployment (UE), proxied by unemployment rate, while the independent variable of interest is stock market development (SMD). Three stock market development proxies have been identified and utilised in this study. These proxies have been widely used in financial development studies; hence, their market-based financial development predictive power has stood the test of time (see Levine 1997; 2005; Rajan and Zingales, 1998; Asongu, 2012; Asongu and Nwachukwu, 2018; Nyasha and Odhiambo, 2018). They are stock market capitalisation (CA), total value of stocks traded (TV), and turnover ratio (TO).

Seven key determinants of unemployment have also been included in the model. All the variables utilised in this study, their descriptions, and a priori expectations, are summarised in Table 1.

Table 1: Variable Description

Symbol	**Description**	**Measure**	***A priori* expectation**
UE	Unemployment	Unemployment (% of total labour force)	-
SMD	Stock market development	CA; TV; and TO	Negative
CA	Stock market capitalisation	Market capitalisation of listed domestic companies (% of GDP)	Negative
TV	Total value of stock traded	Total value of stock traded (% of GDP)	Negative
TO	Turnover ratio	Turnover ratio of domestic shares (%)	Negative
y	Economic growth	Annual percentage growth rate of GDP at market prices.	Negative
FI	Foreign direct investment	Foreign direct investment inflows (% of GDP)	Negative
DI	Domestic investment	Gross fixed capital formation (% of GDP)	Negative

HC	Household final consumption expenditure	Household final consumption expenditure (% of GDP)	Negative
NE	National expenditure	Gross national expenditure (% of GDP)	Negative
IN	Inflation	Consumer prices (annual %)	Negative
ER	Exchange rate	Real effective exchange rate index (2010 = 100)	Negative

The annual time-series data from 1980 to 2019 used in this study were all obtained from the World Bank Economic Indicators (World Bank, 2020) except for unemployment data that were sourced from the IMF's world economic outlook database (IMF, 2020).

The ARDL-based empirical model used in this study to examine the impact of the various proxies of stock market development on unemployment can be expressed as follows:

$$\Delta UE_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\Delta UE_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\Delta SMD_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\Delta y_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\Delta FI_{t-i}$$
$$+ \sum_{i=0}^{n} \gamma_{5i}\Delta DI_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\Delta HC_{t-i} + \sum_{i=0}^{n} \gamma_{7i}\Delta NE_{t-i}$$
$$+ \sum_{i=0}^{n} \gamma_{8i}\Delta IN_{t-i} + \sum_{i=0}^{n} \gamma_{9i}\Delta ER_{t-i} + \gamma_{10}UE_{t-1} + \gamma_{11}SMD_{t-1} + \gamma_{12}y_{t-1}$$
$$+ \gamma_{13}FI_{t-1} + \gamma_{14}DI_{t-1} + \gamma_{15}HC_{t-1} + \gamma_{16}NE_{t-1} + \gamma_{17}IN_{t-1} + \gamma_{18}ER_{t-1}$$
$$+ \mu_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

UE = Unemployment

SMD = Stock market development measured by three proxies, namely i) stock market capitalisation (CA) – Model 1; ii) total value of stock traded (TV) – Model 2; iii) turnover ratio (TO) – Model 3; where CA, TV and TO enter the equation one at a time, substituting SMD

Y= Economic growth

FI = Foreign direct investment

DI = Domestic investment

HC = Household final consumption expenditure

NE = National expenditure

IN = Inflation

ER = Exchange rate

Δ = First difference operator

n = Lag length

μ_{1t} = White noise-error term.

Following the ARDL model specified in equations (1), the associated ARDL-based error-correction model is specified as follows:

$$\Delta UE_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\Delta UE_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\Delta SMD_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\Delta y_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\Delta FI_{t-i} + \sum_{i=0}^{n} \gamma_{5i}\Delta DI_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\Delta HC_{t-i} + \sum_{i=0}^{n} \gamma_{7i}\Delta NE_{t-i} + \sum_{i=0}^{n} \gamma_{8i}\Delta IN_{t-i} + \sum_{i=0}^{n} \gamma_{9i}\Delta ER_{t-i} + \varphi ECM_{t-1} + \mu_t \ldots \ldots (2)$$

Where all variables and characters remain as described under Equation 1, ECM is the error correction term and φ is the coefficient of the error correction term.

4.3 Results

4.3.1 Results of Unit Root Test

To confirm the appropriateness of the use of the ARDL procedure in this study, all the variables were tested for stationarity using the Augmented Dickey-Fuller, the Phillips-Perron and the Dickey-Fuller generalised least squares unit root tests. The results are summarised in Table 2.

As revealed by the results of the three unit root tests displayed in Table 2, all the variables are stationary in either levels or after differenced once – thereby validating the use of the ARDL procedure in empirically examining the finance-unemployment nexus in this study.

Table 2: Results of Unit Root Test

Panel A: Augmented Dickey-Fuller (ADF)				
Variable	**Stationarity of all Variables in Levels**		**Stationarity of all Variables in First Difference**	
	Without Trend	With Trend	Without Trend	With Trend

UE	-2.008	-2.670	-6.674***	-6.726***
CA	-2.116711	-5.275***	-8.967***	-8.828***
TV	-1.249767	-3.530***	-6.254***	-6.166
TO	-1.307734	-3.224*	-7.927***	-7.806***
y	-4.418***	-4.392***	-	-
FI	-4.633***	-5.465***	-	-
DI	-3.171**	-2.804	-4.117***	-4.323***
HC	-4.847***	-3.593**	-	-
NE	-4.017***	-3.605**	-	-
IN	-1.217	-2.064	-5.810***	-4.428***
ER	-1.723	-3.845**	-5.501***	-5.532***

Panel B: Phillips-Perron (PP)

Variable	**Stationarity of all Variables in Levels**		**Stationarity of all Variables in First Difference**	
	Without Trend	With Trend	Without Trend	With Trend
UE	-2.596	-2.391	-8.194***	-9.973***
CA	-1.815	-5.254***	-12.026***	-11.784***
TV	-1.169	-3.217*	-8.089***	-7.979***
TO	-1.147	-3.194	-7.834***	-7.719***
y	-4.429***	-4.397***	-	-
FI	-4.017***	-5.477***	-	-
DI	-2.115	-1.702	-4.101***	-4.150**
HC	-4.169***	-3.498**	-	-
NE	-4.167***	-4.190**	-	-
IR	-1.922	-2.107	-6.82***	-7.517***
ER	-1.670	-2.267	-5.994***	-7.580***

Panel C: Dickey-Fuller Generalised Least Squares (DF-GLS)

Variable	**Stationarity of all Variables in Levels**		**Stationarity of all Variables in First Difference**	
	Without Trend	With Trend	Without Trend	With Trend
UE	-0.434	-2.284	-6.738***	-6.850***
CA	0.320	-5.380***	-6.893***	-7.891***
TV	-1.015	-3.369**	-6.217***	-6.315***
TO	-1.183	-3.038*	-6.419***	-7.571***
y	-3.138***	-3.785***	-	-
FI	-4.398***	-5.609***	-	-
DI	-1.627	-2.258	-3.580***	-3.995***
HC	-1.122	-1.718	-4.686***	-4.502***
NE	-2.820***	-3.712**	-	-
IR	-0.850	-1.973	-4.325***	4.642***
ER	-0.740	-3.682**	-4.888***	-5.322***

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance level

4.3.2 Results of Cointegration Test

The long-run equilibrium relationship between the variables is examined using the ARDL bounds testing procedure; and the results are displayed in Table 3.

Table 3: Bounds FTtest for Cointegration

Dependent variable	**Function**				**F-statistic**	**Cointegration status**
Model 1	F(UE| CA, y, FI, DI, HC, NE, IN, ER)				5.251***	Cointegrated
Model 2	F(UE| TV, y, FI, DI, HC, NE, IN, ER)				4.163***	Cointegrated
Model 3	F(UE| TO, y, FI, DI, HC, NE, IN, ER)				4.240***	Cointegrated
	Asymptotic critical value					
Pesaran *et al*. (2001), p. 300, Table CI(iii), Case III	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.79	4.10	2.22	3.39	1.95	3.06

Note: ** and *** denotes significance at 5% and 1% levels.

The results confirm the presence of a stable long-run equilibrium relationship between unemployment and the independent variables, irrespective of the measure of stock market development under consideration. With the confirmation of cointegration, the study proceeds to the estimation of both the long-run and the short-run coefficients.

4.3.3 Results of Long-Run and Short-Run Coefficients Estimation

In this study, a combination of Akaike Information Criterion and individually determined lags were used to determine the optimal lag length per variable per function. These criteria were favoured over the other criteria because it produced parsimonious models with robust results. The optimal model selected culminated into ARDL(2,1,0,1,0,0,1,0,0); ARDL(2,0,0,1,1,0,1,0,2); and ARDL(1,0,0,1,1,0,0,0,0) in the functions where stock market development was proxied by stock market capitalisation (CA); total value of stocks traded (TV); and turnover ratio (TO), respectively._The results of the long-run and short-run coefficient estimations are summarised in Panels A and B in Table 4, respectively.

Table 4: The Long-Run and Short-Run Results of the Selected Models

	Model 1 (SMD = Stock market capitalisation)		**Model 2 (SMD = Total value of stocks traded)**		**Model 3 (SMD = Turnover ratio)**	
Regressor	**Coefficient**	**t-ratio**	**Coefficient**	**t-ratio**	**Coefficient**	**t-ratio**
Panel A: Long-Run Coefficients; Dependent Variable is UE						
CA	-0.019**	-3.333	-		-	
TV	-	-	-0.032**	-3.488	-	
TO	-	-	-		-0.112**	-3.147
y	-0.036**	-3.195	-0.051***	-3.268	-0.596***	-3.216
FI	-0.056**	-3.183	-0.366***	-3.936	-0.624**	-2.912
DI	-0308**	-2.965	-0.765***	-4.702	-0.750*	-2.580
HC	-0.037*	-2.790	-0.621**	-2.852	-0.421**	-3.048
NE	-0.639**	-3.084	-0.560**	-3.166	-0.141***	-3.558
IN	-0.247**	-3.186	-5.600***	-4.455	-0.856***	-3.158
ER	-0.111***	-3.667	-0.097***	-4.160	-0.134**	-2.920
INPT	69.509*	2.526	37.458**	3.966	61.438***	4.478
Panel B: Short-Run Coefficients; Dependent Variable is ΔUE						
ΔUE1	0.258***	3.951	0.848***	3.738	-	-
ΔCA	-0.072**	-3.164	-	-	-	-
ΔTV	-	-	-0.052*	-2.109	-	-
ΔTO	-	-	-	-	-0.140**	-3.148
Δy	-0.127***	-4.283	-0.220***	-3.235	-0.911*	-2.069
ΔFI	-0.131*	-2.251	-0.778*	-2.109	-0.825*	-2.074
ΔDI	-0.054*	-2.164	-0.428***	-3.251	-0.665	-1.303
ΔHC	-0.387**	-3.174	-0.787***	-3.129	-0.889**	-2.988
ΔNE	0.331	0.856	-0.339	-0.890	-0.564**	-2.317
ΔIN	-0.498*	-2.828	-0.117*	-2.724	-0.682**	-2.473
ΔER	-0.236*	-2.221	-0.065*	-2.614	-0.156***	-3.384
ΔER1	-	-	-0.333***	-3.714	-	-
ECM (-1)	-0.564***	-4.744	-0.640***	-4.071	-0.761***	-4.740
R-Squared	0.985		0.985		0.970	
R-Bar-Squared	0.919		0.869		0.730	
S.E. of Regression	0.580		0.652		0.937	
F-Stat[prob]	3.706[0.000]		6.306[0.000]		5.389[0.002]	
Res Sum of Sq	7.032		9.699		3.508	
AIC	-41.620		-28.502		-41.918	
SBC	-62.236		-55.082		-68.498	
DW statistic	2.241		2.104		2.030	

Notes: *, ** and *** denote 10%, 5% and 1% significant levels, respectively; Δ = first-difference operator; dFI1 = dUE1 = UE(-1)-UE(-2); dER1 = ER(-1)-ER(-2).

As reported in both panels in Table 4, the impact of stock market development on unemployment in South Africa has been found to be time- and proxy-invariant. Irrespective of the stock market development proxy used – stock market capitalisation; total value of stocks traded; or the turnover ratio – and regardless of whether estimation is in the long run or in the short run, the results of the study show that stock market development has a negative and statistically significant impact on unemployment in South Africa. These results are as expected and are also consistent with previous studies (see Epstein and Shapiro, 2018; Kanberoğlu, 2014).

The finding of this study implies that stock market development reduces unemployment. However, the unemployment statistics in the country under study reveal the consistently stubbornly high unemployment in the country even though its stock market is well developed and ranks among the most developed stock markets in the world. The problem could emanate from the structural challenges facing the labour market (SAG, 2019; Statistics South Africa, 2020).

The other results of the study show that, in the short run, unemployment in the previous period has a positive impact on unemployment in the current period. This is confirmed by the coefficient of ΔUE1 in Panel B of Table 4, but only when stock market development is measured in terms of stock market capitalisation and total value of stocks traded. Furthermore, consistent with the expectations, economic growth, foreign direct investment, household final consumption expenditure, inflation and exchange rate were found to have a negative and significant impact on unemployment in South Africa – in the long run and in the short run – irrespective of the stock market development proxy used.

However, the results of the impact of domestic investment and national expenditure on unemployment, though negative across all models in the long run, were inconsistent in the short run. In the short run, domestic investment was found to have a negative and statistically significant impact on unemployment only when stock market development is proxied by stock market capitalisation and total value of stocks traded, while it was found to be statistically insignificant when turnover ratio is considered as a measure of stock market development. On the same note, national expenditure was found to have a negative impact when turnover ratio was used to proxy stock market development, while it was found to have an insignificant impact on unemployment in the other two models.

The coefficient of ECM (-1) is also found to be negative and statistically significant, as expected, across all measures of stock market development. The regression for the underlying ARDL model fits well across all the three functions, as indicated by an R-squared of at least 97%.

To check the robustness of the results, four diagnostic tests were carried out – serial correlation, functional form, normality, and heteroscedasticity – and the results, showing that the model passes all the diagnostic tests, irrespective of the proxy used for stock market development, are presented in Table 5.

Table 5: Results of Diagnostic Tests

LM Test Statistic	**Statistic [Probability]**		
	Model 1 **SMD = CA**	**Model 2** **SMD = TV**	**Model 3** **SMD = TO**
Serial Correlation: CHSQ(1	1.728 [0.189]	0.823 [0.364]	1.647 [0.199]
Functional Form: CHSQ(1)	0.611 [0.434]	0.079 [0.929]	0.004 [0.953]
Normality: CHSQ (2)	0.070 [0.715]	1.521 [0.571]	2.594 [0.273]
Heteroscedasticity: CHSQ (1)	0.137 [0.711]	0.037 [0.848]	1.480 [0.224]

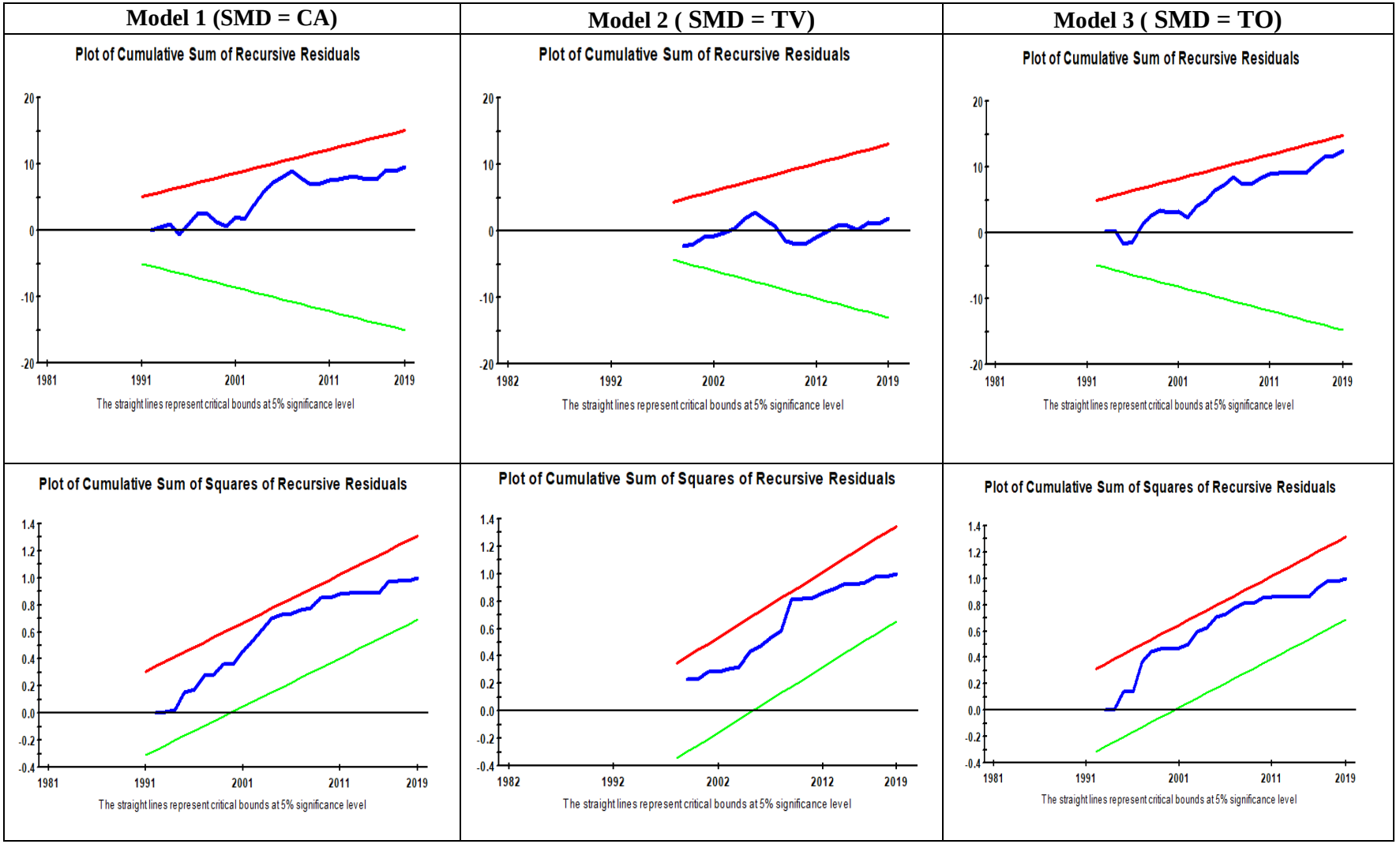
The Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) graphs of the estimated model, irrespective of the measure of stock market development, also confirm the stability of the model over the study period. These graphs are displayed in Figure 4.

5. Conclusion

In this paper, the impact of stock market development on unemployment in South Africa has been put to an empirical test using time-series data from 1980 to 2019. The study was motivated by the high level of structural unemployment facing the country, on the one hand, and a well-developed stock market, which compares favourably with those in advanced economies, on the other hand. In addition, there appears to be a dearth of studies on the impact of financial development, especially market-based financial development, on unemployment – which this study aimed to resolve. The study also aimed to add value to the finance–unemployment literature by using a range of stock market development proxies, namely stock market capitalisation, the total value of stocks traded and the turnover ratio. Using the ARDL bounds

testing method, the results of the study were found to be consistent, irrespective of the stock market development proxy used and the time frame considered. A negative relationship was confirmed between unemployment and all the three proxies of stock market development, implying that in South Africa, stock market development reduces unemployment in the long run and in the short run. Since all the three stock market development proxies – stock market capitalisation, the total value of stocks traded, and the turnover ratio – support a negative and significant relationship between the stock market development and unemployment, we can conclude that the stock market unambiguously promotes job creation in South Africa. The study, therefore, recommends that policymakers should continue to implement policies aimed at promoting stock market development in order to create more jobs, while at the same time ensuring that other structural challenges facing the labour market are also addressed.

Figure 4: Plot of CUSUM and CUSUMQ



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