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Understanding the relationship between business failure and macroeconomic business cycles: a focus on South African businesses

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ABSTRACT

This study examined the relationship between business failure and macroeconomic fluctuations within business cycles of South Africa's economy for the time period 1980 to 2016. The study also sought to understand where, if any, immediate and lag correlations between fluctuations and business failure could be established. To understand this connection, this study used longitudinal data sets of different macroeconomic factors and studied their influence on business failure. The vector error correction model (VECM) was used to determine the long-term relationship between failure and each of the other variables. Additionally, Granger Causality was applied to establish whether the macroeconomic variables investigated in this study can be constructed to predict the probability of business failures.

Three classes of macroeconomic predictor variables were considered. Firstly, well-known international variables in the form of GDP and CPI were used. Secondly, the study incorporated the three Composite Business Cycle indicators- leading, coincident and lagging. Lastly, behavioural indicators were used to incorporate the views of the actual businesses and their customers, which for this the study were the Business and Consumer Confidence Indices.

After examining the effects the 7 macroeconomic variables had on business failure, the study found that there is a long-run relationship between the Composite Lagging Business Cycle indicator, the Business Confidence and Consumer confidence, which influenced Business Failure. Additionally, it was noted that Business Failure influence the Composite Lagging Business Cycle indicator in the long-run. The study additionally found that Business Failure may Granger Cause the Composite Leading Business Cycle indicator

Outcomes of the study are potentially vital for entrepreneurs to understand the timing of entry into markets based on macroeconomic fluctuations through their cycles in certain industries. Business owners can make proactive financial and strategic decisions vital for survival of their business through the expansion and especially in the contraction cycles of the macroeconomic environments.

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DECLARATION

I, Marinus de Jager, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management from the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Signed at ……

On the …….. day of ……..…….2017

DEDICATION

I dedicate my research report to my family and many friends. A special feeling of gratitude to my loving and caring wife, Chantelle, whose words of encouragement and push for persistence kept me going. During this degree my wife and I was blessed with a healthy boy, Miller, whom put a smile on our faces when the tough got going.

I also dedicate this thesis to my colleagues who have supported me throughout the process as well as my employer who made this possible. I will always appreciate all they have done, especially Karen for whenever I needed help, from printing to spell checking. Additionally I would like to thank Dr Yudhvir Seetharam for assisting me with the framework and models for the statistical analysis.

Ultimately this would not have been possible without the grace of God: "…but he said to me, *"My grace is sufficient for you, for my power is made perfect in weakness." Therefore I will boast all the more gladly about my weaknesses, so that Christ's power may rest on me"* 2 Corinthians 12:9

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LIST OF ACRONYMS AND DEFINITIONS

BCI – RMB/BER Business confidence index

BER – Bureau of Economic Research

CCI – FNB/BER Consumer confidence index

CPI – Consumer price index

GDP – Gross domestic product

OECD -Organisation for economic cooperation and development

StatsSA – Statistics South Africa

CHAPTER 1: INTRODUCTION

1.1 Introduction

The privately owned business sector is a very complex environment, which is characterised by a great variety of influencing factors emanating from within the business (e.g. management, nature of business, etc.). According to Bhattacharjee, Higson, Holly, and Kattuman (2009) nearly 50% to 90% of new businesses end up failing as a result of micro and macroeconomic factors in the business environment. The firms' exits or bankruptcies are regarded as unlikely situations in the process of continuous corporate growth and development. Bhattacharjee et al. (2009) point out that firm exits are deemed to be cyclical in nature. Exits due to bankruptcies are often associated with bad economic times (the economic downturns), and acquisitions are often associated with recoveries. Presently, a lot of literature has focused on different aspects relating to business exits by concentrating mainly on endogenous factors as opposed to the influences of the macroeconomic factors (Balcaen & Ooghe, 2006; Bhattacharjee et al., 2009)

Despite the increasing knowledge about the influence of macroeconomic factors on business continuance, there is little research that investigates these effects. For instance, there is limited published research about investigating the impacts of macroeconomic instabilities on the propensity of firms to exit, or about the correlation between bankruptcy and acquisition and firms' exit. In this regard, various analyses have focused on single impact factors such as bankruptcy or acquisition and their influences on business exits (Chava & Jarrow, 2004; Claessens & Klapper, 2002). In more cases, analyses of the impacts of the macroeconomic factors have tended to focus primarily on the aggregate shocks on the overall amount of a firm's formation or dissolution (Delli Gatti, Gallegati, Giulioni, & Palestrini, 2003). The current research seeks to understand the connection between business failure and the fluctuations in the macroeconomic factors within the context of South African firms. The uniqueness of this study,

therefore, is derived from its ability to integrate various macroeconomic influences on business continuance at a national level.

The business continuance in emerging economies such as South Africa is influenced by serious macroeconomic issues since they depend largely on external influences. For instance, the global financial crisis from 2007-2009 presented a lot of challenges, not only to the emerging economies but also to the developed economies alike. In South Africa for instance, Redl (2015) observes that the recession has been followed by long periods of increasing output gaps raising the question of whether or not the potential growth rates were lower than they were estimated originally. Moreover, South Africa, like other emerging economies, is also affected by a slow recovery from the financial recession. This scenario has been aggravated by slow resolutions to curb the deficiencies of the euro areas (Redl, 2015). Long-term unemployment has been associated with slow growths in the industrial and production sectors, characterised by high rates of business failure.

Studies have indicated that there exists a correlation between firms' entries and exits. However, the nature of the relationships tends to differ significantly across the industries, as well as in ascending and descending phases of the businesses (Bachmann, Elstner, & Sims, 2013). Empirical studies have pointed to the relationships between the macro-environments and the performance of firms. These studies maintain that the movements in the aggregate businesses failure rates and business establishments tend to correspond to the changes occurring in the macroeconomic situations in the respective regions (Bachmann et al., 2013). The life cycle hypothesis described in Bachmann et al. (2013) highlights that the exit rates for businesses often arise during the economic downturns and the periods which follow them. The hypothesis further suggests that both the growths rates of businesses and exits vary in size depending on the financial stability of the firms and the nominal and real shocks occurring in the markets.

1.2 Background of the study

The South African economy beat the global analysts' history in 2006 with the Bureau of Economic Research (BER) second quarter of 2006 pointing to some of the outstanding facts. These included a GDP growth averaging about 4.9%, one of the fastest growth rates in the country since the short-lived spurt in 1984 (Haasje, 2006). During this time, the business cycle of the country was running at a record length of 19 months (Haasje, 2006). For South Africa, a country that has exhibited great positive growth potential over the past years, the post-recession period has seen it undergo a series of productivity growth shambles. For instance, 2010-2015 saw a considerable slowdown in economic growth of the emerging regions, characterised by a commodity slump (Redl, 2015). South Africa has not been an exception to these influences with the industrial production falling considerably as the agricultural sector was inflicted with a serious drought. Consumer demands registered anaemic performances during this period, characterised by a low consumer index. Business confidence was also depressed as a result of low consumer perceptions, high inflation rates, and low employment rates. Consequently, business exits in the country, especially in the private sector, have remained high during the period 2010-2015 (Redl, 2015). The principal objective of this research study is to investigate the connection between business failure in South Africa and the fluctuations in macroeconomic conditions. The objective of the current research resonates effectively with the currently observed scenario in the performance, continuance, and exit of businesses in South Africa in light of the incumbent macroeconomic factors.

1.3 The context of the problem

The primary concern of this research study is to identify the link between the business failure and the fluctuations in macroeconomic conditions in South Africa. In essence, the study seeks to understand the confluence, if any, in the immediate and lagged correlations existing between the fluctuations of the macroeconomic conditions and the failure of business enterprises, and if these

can be founded on the basis of explorative research. The private sector plays a significant role in economic development and continuance in South Africa, just as in other developing economies around the world. These, characterised by continued entrepreneurial activities through business innovation and growth are vital to creating employment opportunities for the people, enhancing consumer spending and overall growth of the economy (Magruder, 2012). Over half of the labour force is supported by the privately owned companies (Redl, 2015).

Owing to the important role that the private sector plays in developing every economy of the world, the sector is critical for ensuring economic growth and recovery. Studies have concentrated mainly on explaining why businesses fail but not in understanding the influences of macroeconomic conditions on the rates of such failure, despite the connection being suggested in the various literatures. This study is, therefore, unique in its address to this distinct area of concern to the business community and the development of every nation around the world. The connectedness of the global economies makes it possible for fluctuations in one region to bear significant influence on the economies that depend directly or indirectly on the affected regions. Emerging economies such as that of South Africa are affected largely by the international economies, which directly impact its macroeconomic positioning. In this context, the current study will measure some of the macroeconomic factors which are directly influence the business continuance.

1.4 Statement of the problem

A great deal of exploratory research has focused on delineating the reasons why businesses fail or exit from operations especially in economically volatile countries such as South Africa. Emerging economies like South Africa are highly sensitive to fluctuations in global economic conditions since they are largely commodity-driven and market dependent (Mark & Sul, 2003). Growths and stabilities in the international markets are associated with positive growths of such economies, and the adversities experienced in the international economies bear consequent side effects on the local economic performances and thus business continuance.

1.4.1 *Main problem*

What is the relationship between business failure and the fluctuations in macroeconomic environments in South Africa.

1.4.2 *Sub Problem*

Understanding the interconnectedness between macroeconomic variables and how this interconnectedness can predict and cause future business failure.

1.5 Significance of the study

This study seeks to develop an elaborate understanding of the connection between business failure and the fluctuations of the macroeconomic factors in the context of South Africa. The quality and uniqueness of this research lies solely on its ability to study unique characteristics of the business and economic realm that has remained largely ignored in the literature. The economy of South Africa is currently facing a lot of challenges including constrained consumers' ability to spend, high-interest rates, high taxation rates, falling per capita incomes, increased indebtedness, and notable credit extensions at the household levels, etc. These conditions are negatively suppressing GDP growths as consumer confidence continues to drop. In South Africa, household consumer index (HCI) accounts for 61% of the total GDP growth (Magruder, 2012). The collapse of consumers' confidence levels does not bode well for the country's GDP growth. The findings of this study will, therefore, be very instrumental in the following perspectives:

- The findings of this study will help to understand the role that fluctuations in the macroeconomic environments play in exacerbating business discontinuance or continuance in South Africa for prosperous decision making in the production sector.

- The outcomes of this study will be useful for the industry in helping to understand market timings for entry by delineating different macroeconomic factors and connecting these with business failures.

Such understanding would help to reduce the rates of discontinuance through correct positioning of businesses.

- The findings of this study would also be useful in comprehending the kind of pressures businesses face depending on where the business cycles lie within the macroeconomic environment.

1.6 Delimitations of the study

This study will focus solely on privately-owned businesses operating their business operations in South Africa. The assessments on macroeconomic factors will be based on the South African GDP, CPI, Composite Lead, Coincident, Lagged Business Cycles, Business Confidence Index, and Consumer Confidence Index. Other factors besides these, including the legal and regulatory frameworks, will not be considered in this research.

1.7 Definition of terms

1.7.1 *South African companies*

This research focuses primarily on privately-owned business entities. These entities will consist of companies (PTY) and closed corporations (cc's) as defined by the Companies and Intellectual Property Commission.

1.7.2 *Macroeconomics*

The macroeconomic factors refer to the economic factors which influence the national economy in its entirety and show predictable patterns and the trends in influencing one another to contribute to the overall development of the nation's production entities.

1.7.3 *GDP (Gross Domestic Product)*

The GDP is a macroeconomic factor that measures the national economic conditions in a quantitative manner. It is a quantitative measure of all finished goods and services produced within the borders of a nation at a specific time. The GDP is defined as the total of a country's consumption levels, government expenditure, investments, and exports less the imports.

(GDP = Consumption levels + Government Expenditure +Investment + Export – Imports)

1.7.4 *CPI (Consumer Price Index)*

The CPI is a measure of the weighted average of the prices of consumer goods and services including transportation, medical care, foods, etc. The CPI is determined by averaging the price changes in each item.

1.7.5 *BCI (Business Confidence Index)*

The business confidence index is determined through the assessment of production trends, orders, stocks, the current expectations, and the immediate future of the business scenario. The BER BCI is the unweighted mean of five sectorial indices: manufacturing, building and constructions, retail, wholesale, and the new vehicle dealers. The BCI is gauged on a scale of 0 – 100 with 0 indices indicating a total lack of confidence and 100 full confidence in the business scenario in the respective places.

1.7.6 *CCI (Consumer Confidence Index)*

The parameter measures consumers' level of confidence and is disaggregated by the income levels of the consumers, population groups, the administrative boundaries (province), and Living Standards Measure (LSM). It measures the degree to which consumers are optimistic about the status of their economy as expressed in savings and spending levels. This study will base its considerations of CCI on the BER definition which combines the results of three

measurements: the expected economic performance, the expected financial positioning of the households, and the ratings of the appropriateness of the present times to buy various durable goods.

Based on the BER determinations, the CCI is calculated as a percentage of the total respondents expecting improvements in the future (the good time to make a purchase for durable goods), less the percentage of the consumers expecting the deterioration of the economic times (the bad times to buy durable goods).

1.7.7 *Composite Business Cycle Indicators*

The Composite Business Cycle indicators consist of leading, coincident and lagging refer to the indices that are created by the South African Reserve Bank (SARB) Board Conference to help in forecasting the changes in the direction and shifts in the country's overall economy.

1.7.8 *Business Failure*

Business failure is a common occurrence in today's business world with competition rising from time to time and the factors influencing business continuance becoming more complex over time. This aspect of business failure is not as simple to define as it is to understand. A wide array of definitions has been provided to illustrate the meaning and inferences of the term "business failure" from different perspectives, depending on the incumbent factors resulting in the failure. In literature, one or several dimensions related to business failures, notably, the aspects of bankruptcy, closure, acquisition, and the failure to meet the desired expectations, have been attributed to business failure (Dias & Teixeira, 2014). Dias and Teixeira (2014) in their attempt to define business failure, observe that the same occurs when a business closes down its operations due to either financial reasons or the owners giving preference to another kind of business. Moreover, business failure can also be defined as a scenario in which a business closes down because it fails to meet the required expectations, such as poor performance, little growth, low returns on the investments, etc. A business may also fail due to personal or familial

reasons, such as relocation, retirement, etc., thus prompting closure or dissolution.

This study adopts the definition of business failure provided by Pretorius (2009) who observes that business failure is a process which occurs in three different stages: the pre-failure stage, the failure stage, and the post-failure stage. Each of the phases mentioned portrays unique characteristics which jointly contribute to the overall failure. According to Pretorius (2009), a business failure emerges from business decline, which is characterised by worsening performance in consecutive periods and is associated with the distress in continuing operations. The failure occurs when it is incapable of attracting new debts or equity funding to reverse the continued decline. Under such conditions, the business is incapable of continuing its operations under its current management or ownership. Failure, therefore, is observed as the endpoint in the discontinuance or bankruptcy. When failure is reached, the operations cease to take effect, and the judicial proceedings often begin.

1.7.9 *Business Cycles*

Business cycles are a core concern of today's research and economic watch for the success of the global economy and local economies at large. Business cycles are an important aspect worth understanding in this research due to the critical role that they play in determining the development prospects and downfalls at different times in different regions of the world. The term 'business cycles,' as the name suggests, describes the constant downwards and upwards movement of a country's or region's gross domestic products within and around its long-term trends of growth (Diebold & Rudebusch, 1996). The length of a business cycle is measured by determining a full phase of a single economic boom and a contraction within a single following sequence. A full phase of a business cycle is characterised by three main sub-phases: a period of rapid economic growth (also referred to as economic expansion), a period of economic stagnation, and a period of economic contraction.

Due to the constant focus on economic growths and underdevelopment, business cycles have also been considered as economic cycles. Zarnowitz (1992) defines a business cycle on two main features. First are the co-movements in the economic variables, taking into account the possible lags and leads in the timings in economic developments. In this feature, Zarnowitz (1992) considered the historical concordances based on hundreds of series, which include the measuring of commodity outputs, the income levels of the population, the interest rates, and amount of banking transactions, as well as the transportation services. The second feature in the definition involves dividing the business cycle into different divisions based on the contractions and expansions in the economic conditions of the GDP growths. The latest business cycle was marked by the great economic recession of the 2007-2009 financial crises that affected economies across the globe affected all nations of the world.

1.8 Assumptions

This study will be based on the following assumptions:

- That the secondary information referenced disclosed accurate and correct information regarding the reasons for business closure.
- The statistical analyses presented in the secondary reports which informed the consent of this report are correct and depict the correct position of the said scenarios within the context of South Africa.
- The information on deregistered businesses is assumed in this study to be correct regarding deregistration dates.

CHAPTER 2: LITERATURE REVIEW

The private sector performs a critical role in spurring development of the economies of the world through entrepreneurial activities and intersectoral growths aided by technology and innovation (Mark & Sul, 2003). Emerging economies that are commodity-driven, such as South Africa, are very sensitive to external influences through the actions of macroeconomic factors given that they have a global presence. In such cases, the impacts of macroeconomic factors are experienced in all production and distribution sectors of the economy (Ambler, Cardia, & Zimmermann, 2004). For firms to grow and continue operating in a profitable manner, they must measure, document, and predict the occurrences of various macroeconomic cycles and their influences on production and distribution channels to ensure sustainability of production. This study, therefore, explores the influences of fluctuations in different types of macroeconomic factors on business failure in South Africa.

2.1 Introduction

This section of the study provides an illustrative review of the literature focusing on the core concerns of the study's objectives from the research perspective. The review process commences with the understanding of business failure from the perspective of the available literature and how this is influenced by various macroeconomic factors. This section then draws a distinct conclusion on the position of the literature concerning the objectives of this study.

2.2 Business Failure

Business failure is a broad concept which has dominated the literature in the recent past due to the increasing business competition and complexities in the business environment. The definition of business failure, despite a widened focus it has received in the past, has varied within the available literature. Commonly, business failure is defined in the literature by two main tenets: bankruptcy and acquisition. For this study we will be focusing on business

failures only. Business failure can occur overnight as has been witnessed in numerous cases (Pretorius, 2009). The factors that result in business failures emanate both from within the business entities and from the macroeconomic environments in which they operate. While the internal (micro-factors) are easily controllable through the change of management, organisational restructuring, and redesign, the macroeconomic factors are beyond the firms' controls. Due to these changes, it is essential that the firms adjust their forecasts and operations to go through and overcome the anticipated fluctuations in the macroeconomic conditions.

In another sense, He and Kamath (2006) approach the concept of business failure from a generic point of view, illustrating that failure occurs after decline and cessation of business activities in the firm. The generic nature of these definitions further suggests that the time of entry to the business is essential in determining the impacts of the macroeconomic factors on the future operations. The generic definition of ‘business failure' can be applied comfortably to South Africa, and one can try to tie these to the understanding of South African researchers from the local perspectives. From the generic point of view, we notice that the macroeconomic fluctuations of the developed and the developing nations' economies on the South African businesses influence whether or not a firm in the region falls within the generic definition of ‘failure.' This observation tends to support researchers’ view that the late entry of South African businesses into the entrepreneurship field may be the main impact on rapid discontinuance of businesses in South Africa.

2.3 The theoretical underpinnings of Business Failure

According to Aldrich and Martinez (2007), theory is an important aspect in providing an interpretive lens for understanding every phenomenon of business failure. This opinion is further supported by Hair, Black, Babin, Anderson, and Tatham (2006) observe that theory provides a systematic, consistent and comprehensive explanation to various phenomena of interest to the analysts. Since the objective of this study is to determine the influence of macroeconomic factors on the failure of businesses, the correlation between the two variables

can be unveiled theoretically; an analysis of the cause of the failure helps promote an understanding of the failure's occurrence. Specifically, explanatory theories can be utilized to connect causes of the events leading to business failures.

Aldrich and Martinez (2007), from a theoretical perspective, concluded that following the rules and principles of business management are an essential aspect of ensuring the success of businesses. This indicates that the firms must comply with the impending rules of businesses, lest they risk being closing operation. This explanation underpins research of Hair et al. (2006) and their assertions on the principle of competition and adaptation in the business environment. Based on these observations, businesses' continuation is comprehended from the perspective of Darwinian Theory of survival of the fittest. In this respect, for the businesses to survive and become more competitive, they must continuously adapt to impending environments. Part of the adjustment/adaptation is to embrace the emerging competitive variations due to changes occurring in society and the business society as a whole (Aldrich & Martinez, 2007). Based on these observations, it is evident that understanding the nature of competition in any area of production is akin to understanding the ways of ensuring effective survival in the highly competitive business environment. The rule of strategic management is an essential component of ensuring the continuation of businesses in every scenario. The concept of strategic management is to develop clear strategies suitable for overcoming every possible obstacle.

2.4 The symptoms of Business Failure

There is no consensus in the literature as to how business failures occur, nor is there a definite point in time when a firm is declared failed (closed down). However, there are various signals that describe warning signs for the failure of businesses. For instance, He and Kamath (2006) described a series of stages which indicate the warning signs and symptoms of a failing business enterprise. Additionally, Pretorius (2008) defines a process of business failure that can occur in every stage of the steps, that eventually leads to business closure. This

individual step identifies the negative consequences and highlights the impact they have on the survival of businesses. Evidently, most of the symptomatic expressions signaling the onset of failure for businesses occur at the distress and crisis stages. (The distress stage is associated with the firm's inability to meet their present financial needs without having to borrow from other businesses or banks).

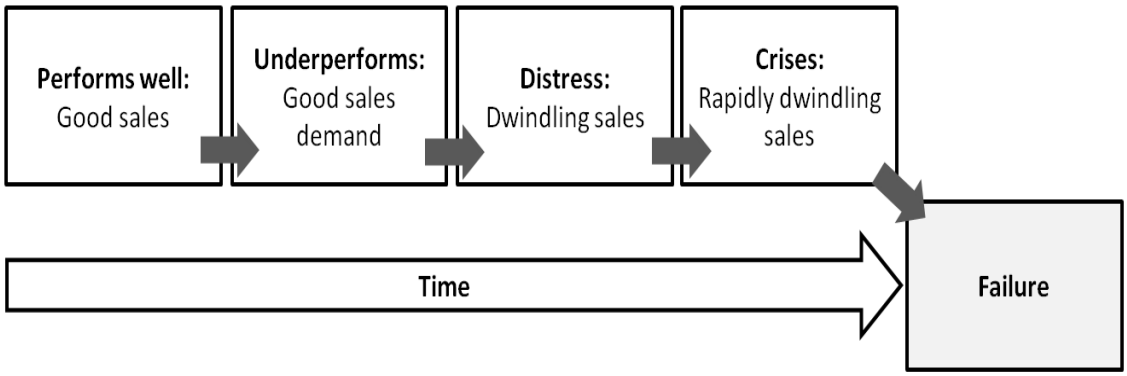

Figure 1: Process of business failure and the associated symptoms (Pretorius, 2008)

According to Honjo (2000), there exists a close relationship between the returns accrued from the business and the risks of its consequent operations. For these reasons, a primary determinant of the risks is the dwindling profitability of the firms. Low profitability conditions make it rather hard for the businesses to meet their current needs. Due to these, businesses resort to either borrowing or dipping into the financial reserves, thereby weakening their financial position for any unexpected need. When firms are incapable of meeting their current financial obligations, a crisis occurs. These two related stages (distress and crisis stages) are therefore key indicators of failing businesses.

2.5 Causes of Business Failure

2.5.1 *Endogenous Causes*

Endogenous factors relate to those that emanate from within the business environment. Various studies have investigated the correlation between various endogenous factors and the concept of failure of businesses. The most prominent issues relate to management practices and the financial conditions of the firms. Based on the Salman, Fuchs, and Zampatti (2015) study, these issues can be classified into two categories: management-related factors and financial-related factors. The most common endogenous factor that results in the failure of firms is poor management practices. Management practices, and especially management styles, are key to designing a suitable path for businesses to exist and operate with certainty, and thus ascertain the success of the respective firms in competitive environments.

According to Salman et al. (2015), the success of any management system is a definition of the ethical principles that govern business operations within the firm. Lack of proper ethical entrenchment, therefore, constitutes poor management and can easily result in failure of the businesses. Well-known examples that illustrate poor leadership and a lack of ethical management are Enron and Satyam. In other cases, the financial positioning of companies has also been associated with business failure. However, Everett and Watson (1998) attach the financial component more to exogenic factors than to endogenic contributions since the financial stability of a firm is determined primarily by their profitability, which, in turn, is a factor of various externalities as well.

a. ***Management related factors resulting to Business Failure***

The management practices adopted by any company's executive are the most common causes of failure or success of the business. In this section, literature has been analysed and presented with various scenarios, where poor

management practices have continued to lead to business failure. The most recent of these cases are Enron and Satyam, among others. A diversified content has focused on the contributions of management failures towards business failure to put the arguments into the perspective of this research (Altman, 1983; Balcaen & Ooghe, 2006; He & Kamath, 2006; Liu, 2004; Pretorius, 2009).

Lukason and Hoffman (2015) classify business failures into three categories of management-related factors: the voluntary internal actions undertaken by the management; the influences of the deterministic management environments; and the integrative factor between the two factors. In examining the prevalence of these factors towards contributing to business failure, the researchers concluded that the influence of internal decisions in contributing to the business failure is more rampant compared to the deterministic environmental factors of the integrative factors. Their study attributes the high prominence of voluntaristic factors causing business failure to various intuitional and approved theoretical underpinnings. These include the groupthink theory, the curse of success theory, the threat-rigidity theory, and the upper echelons theory, all competing in almost equal proportions to explain the reasons for failure. For this study, the voluntarist theories seem more relevant in explaining the causes of business failure in South Africa.

The voluntarist theories maintain that the decisions which result in business failure are voluntarily made by the management, highlighting the need to understand within which process step of failure the business is in (Pretorius, 2008). According to Dubrovski (2009), wrongful decision-making is an essential explanation of businesses failing to continue. Some of the most commonly referred to and analysed voluntarist theories include the echelons theory and the threat-rigidity effect theory. Both theories concur that voluntary decisions made by management are the primary causes of failure of businesses. The theories are based on the observation that a lot of failures that occur in the business field are a result of the business owners/managers making poor decisions regarding the manner in which they run and operate their businesses. Consequently, poor management choices lead to discontinuance, if proper

intervention mechanisms are not put in place in time to reverse the effects. The preferred strategic management sources would favor continuance over discontinuance of businesses since they tend to reflect how the management perceives the progress of their businesses at various times. These include the decision-making process and how they are achieved within the context of the businesses.

b. *Comparing small and large firms Business Failure*

Comparing small firms and large firms in terms of flexibility in decision-making and the contributions of these to the business continuance, Franco and Haase (2009) maintain that small businesses are well-placed when it comes to decision-making and flexibility. As a result, they can correct all the wrongs in time to save the company, before grievous effects mar their business successes. The study attributes such high flexibility to the simple ownership and management structures that allow quick decision-making. For instance, the researchers notice that a majority of small-scale businesses are owned and managed by an individual, a small group of owners or, on most occasions, families. This makes it easy for the top managements to consult quickly to enable quick, easy, and effective decisions considered healthier to the life of the businesses. On the other hand, the decision-making processes in large companies are often slow and procedural. These procedural processes tend to delay decision-making processes. The ease in decision-making is determined basically by the levels of management involved, the number of people involved, and the chartered procedures that the firms consider necessary for decision-making. Particularly, the processes of collecting and disseminating the decision information from and to the concerned persons and the overall time involved inhibit quick responses to adverse conditions such as the presence of a crisis. These slow responses tend to exacerbate the negative effects, due to delayed handling of the eminent adversities. This observation by Franco and Haase (2009) resonates with Dubrovski (2009) who believes that in the event of a crisis within the business, a quick response is often necessary. Delaying such actions would result in worsening the adverse conditions (Pretorius, 2008).

2.5.2 *Exogenous factors*

The onus of this research is to investigate the effects of macroeconomic factors (exogenous factors) on business failure. Exogenous factors are those factors that emanate from outside the business environment, and which are beyond the firms' control. They are comprised of macroeconomic factors, such as the inflation rate, the consumer confidence index, the consumer perception index, the GDP growth rate, and trade connections with external partners like supply chain orientations, the market prospects, etc. These factors are discussed in section 2.3 on the influence of macroeconomic factors on business failure.

2.6 Macroeconomic effects on Business Failure

Several macroeconomic factors have been associated with business failure in various literature findings. This section reviews some of these associations from the perspective of the existing research. One of the landmark studies in this aspect is reported by Bhattacharjee et al. (2009). The study investigated macroeconomic instability as the key determinants of business exit (bankruptcy and acquisition) in firms in the UK. Specifically, the study investigated how macroeconomic conditions in the UK influenced the firms' bankruptcy and acquisition. The study established that the macroeconomic instability bears an adverse effect on business hazards such as bankruptcy and acquisition. Particularly, macroeconomic instability was found to escalate the hazards related to bankruptcy and lowered the possibilities of acquisition due to weak operational and financial power of the associated firms. Also, the study established that the macroeconomic factors in partnering countries, such as the US also bore direct negative impacts on the bankruptcy of UK firms (despite bankruptcy hazards of these firms being counter-cyclical). Macroeconomic instabilities in the US were in fact found to be better predictors of acquisition hazards of UK firms (despite the acquisition hazards of UK firms being pro-cyclical in nature).

Again, these findings reflect those of Redl (2015) who suggested that the interconnectedness between world market economies have a direct impact on

each other. For instance, South Africa's firms trade much with Africa, Europe, and the United States. As a result, macroeconomic instabilities of these economies bear a significant impact on the operations of the firms at the local level. The poor business performance and eventual exit of many firms in South Africa, documented in Redl (2015), is a clear indication of such instabilities affecting business continuance in the region. The USD and the GBP, which are regarded as the world's strongest currencies and the most common units of trade and exchange, are affected by such instabilities, and will in turn affect international economies in terms of currency stabilities. Therefore, they bear direct negative consequences on South African firms (Smit, Frankel, & Sturzenegger, 2006). In related research, Liu (2004) assessed whether macroeconomic factors, including credit conditions, profitability of firms, inflation, etc., influenced the observed fluctuations in business failure among UK firms for the period 1966-2003 using a VECM approach. The findings established that the firms' entry times, access to credit, profit conditions, and inflation in the UK influenced business failures. The study also found that deregulation policies established by the government of Margaret Thatcher altered the relationship between the failure rates of the firms and the impending macroeconomic indicators' values during the same period. These findings further point to study by Redl (2015), Smit et al. (2006), about interconnectedness of different sectors of the economies around the world.

The last century has seen an intensive expansion of the global economies as the world becomes more connected and markets expand. As these economies grow, more products continue to rise, and firms realise the importance of their ability to thrive and satisfy rising global demands. Due to the demand for trade between economies, the global trade policies developed by a country and the attitudes towards establishing new businesses and making them thrive are intricately connected to the macro and microeconomic scales. Khader, Rajan, and Sen (2014) examined the effects of various macroeconomic factors that influenced the ease of doing businesses across different countries. Their study indicated that the various macroeconomic factors, such as lending rates, access to the internet and its safe use to spur development, and the growth rates in the GDPs had a direct and significant impact on the survival of businesses. In a

similar way, it is agreed that liquidity constraints in each economy are essential macroeconomic factors determined by GDP growths and that they bear significant influence on business successes. Fairlie and Krashinsky (2012) observed that a greater asset base is often associated with increased rates of business entry. Consequently, the sustainability of these businesses is determined primarily by the country's GDP growth prospects, inflationary conditions, consumer purchase capacities, and the interconnectedness of different markets.

It is evident that macroeconomic factors, macroeconomic conditions, adaptation, and forecasts about economic dynamics influence business continuance and business failures. Hence, the following sub-sections highlight specific macroeconomic factors and how they impact businesses.

2.7 Economic performance of the country

Economic recessions present some of the most unpredictable events in the life of a business; they need to be monitored in order to effectively determine the success and continuance of businesses. Fluctuations of the economic performances of counties are characterised by peaks and troughs. The trough represents bad economic times while the peaks signal good fortune in terms of economic growth during certain times of its existence. Economic insolvencies are capable of causing declines/discontinuance of businesses, if not handled carefully. Sudden declines in the economic performance at the international or national level bear significant impacts on the performance of businesses (Liu, 2009). For instance, declines in economic performances are consequential in influencing the declines in particular activities conducted by organisations. Consequently, declines in business activities result in declines in returns and may easily lead to insolvency of the businesses (Liu, 2009).

Regarding the changes in economic performance regionally, nationally or internationally, Everett and Watson (1998) looked at the influence of changes in clients' purchasing trends on a company's performances from time to time. Specifically, the study focused on the impacts of declines in the purchasing

power of a country as results of hard economic times (recessions) and their impact on the business continuance. The study found that declining purchasing power (associated with the CPI) affects the performance of the businesses negatively, and consequently, the failure of the businesses. Declining consumption patterns can be alleviated by working out strategies to improve the customers' perception about the products. Some of the adjustment practices that Lukason and Hoffman (2015) recommend include improving the marketing practices, price modeling strategies and branding in distinct markets among other relevant strategies. The study, which covered a total of 50 medium scale enterprises, found that the changes in consumers' buying patterns are influenced by a series of events, including the socio-political occurrences at the local and international levels. Accordingly, Everett and Watson (1998) concluded that adapting to the external political and social conditions in the environments in which the respective businesses operate is an essential aspect of ensuring sustainability of the businesses in the long run.

Competition with other big companies, e.g. multinationals, is another important aspect that contributes to recessions in business performance over time. A business recession is characterised by poor performance (low returns from sales of products and services rendered). These factors impact the quality of businesses by deteriorating financial stabilities (De Loecker & Van Biesebroeck, 2016). Unbalanced competition with businesses from highly established regions/developed regions tends to impact local businesses adversely. For instance, the entry of large multinational companies into local markets, aided by free trade, may bear consequential impacts on the price conditions and fluctuations in local markets. The large companies are capable of segmenting local markets by using them as dumping sites for their products. As De Loecker and Van Biesebroeck (2016) highlight, most of these large companies produce at cheaper prices and subsidized costs compared to local small or medium enterprises, thereby pushing smaller local enterprises out of businesses.

In an example to justify the influence of free trade on the development of businesses in the developing countries, Shaw, Cooper, and Antkiewicz (2007) used the scenario of Asian multinationals in local economies and their

competitive effects on local African business ventures. A lot of the Asian multinationals (e.g. Japanese, Taiwanese, Chinese or Indian multinational companies) dump their products, (e.g. assembled motor vehicles) in African markets at cheaper prices than the locally assembled ones. This makes it hard for African companies to sell their products locally. If such unbalanced competition is not strictly supervised, local businesses may find it too difficult to cope with the competition and eventually discontinue their businesses due to the inability to compete. To regulate such competition and enhance the growth of local companies, the governmental trade policies are essential. Shaw et al. (2007) recommend implementing regulatory measures for the entry and operation of foreign companies in local markets, such as increasing taxes for foreign companies selling their products in local markets, so that they can sell at relatively fair prices.

2.8 Business Cycles

It is observed that under capitalist economies, the aggregate economic variables undergo constant trending fluctuations, which tend to depict almost the same characteristics. These anomalies posed major challenges to economists in ancient times and formed the basis for economic analyses. Following the development of Keynes's General Theory, economists came forward to develop an illustration for this challenging anomaly, leading to the development of the business cycle theory (Mankiw, 1989). Under normal circumstances, a cycle describes recurrent phases of the same complete event at different times under different influencing conditions.

In the last few decades, the concept of business cycles has attracted the attention of economists and researchers around the globe. Since the pioneering works of Burns and Mitchell (1946), a lot of attention has been paid to business cycles and the factors that influence them. Mainly, the connection between business cycles and the macroeconomic influences has been the center of focus in numerous studies conducted in the recent past. Due to the increasing focus on this aspect, defining the concept of ‘business cycle’ has also been fluid in the existing literature. This section discusses the influence of macroeconomic

factors on the business cycles around the globe. However, to understand the connection between the two, it is essential to first define business cycle.

The concept of the business cycle has had various definitions in scholarly literature. One of the earliest definitions of the concept was provided by Burns and Mitchell (1946). They defined a business cycle as a series of fluctuations evident in the aggregate economic activities of a nation, which are evident in the nations' organisation of its business activities. A complete cycle is made up of various expansions occurring at almost the same time, and affects various economic activities followed by a similar recession, contraction, and revival in economic performance which merge up into the next expansion phase. According to the definition, a full business cycle is comprised of two main features. The first feature represents the co-movement within the economic variables individually and takes into account the possible leads and lags in their timings. The emphasis laid on the existence of a pattern in the co-movements among the economic variables during the phases of the business cycle led to the coinage of the composite leading, coincident and lagging indices by Shiskin (1961) as measures for determining business growths at a macro-level.

The second significant feature in Burns and Mitchell (1946) definition of business cycle is the division of the cycle into different phases, also referred to as business regimes. In this approach, the analyses treated economic expansions from the associated contractions. This notion of the cycle approves the observation by Shiskin (1961) by maintaining that some series are categorised as leading, while some others fall under the lagging indicators for the different stages of the cycle. These phases are influenced greatly by the overall state or conditions of the respective businesses. Apart from the post-WWII economists, the latest economists have utilised these features immensely in describing the economic conditions of different regions and their consequent influences on business activities (growth and discontinuance).

Other scholars have also provided different definitions of the concept of the business cycle in an effort to illustrate its understanding and replication in the modern scenario. For instance, Mohr (2005) defined the business cycle as a

series of patterns characterised by expansion and contraction of the aggregate economic activity. A business cycle is measured by the real gross domestic product. According to this definition, the growth phases (regarding leaps and bounds) are clear indicators of the overall trends, which can be utilised in determining the onset and cessation of different cycles. The sequences of change (defining the phases of business cycles) are considered to be recurrent in nature but are not periodic. Concerning duration of existence, or from one cycle to another, the time varies significantly (one year, five years, ten years, etc.). Each phase is divided into various shorter cycles with similar characteristics or amplitudes of their approximations. This is because each phase tends to portray similar patterns. Figure 2 shows the different expansion and contraction phases of the business cycle from a theoretical perspective.

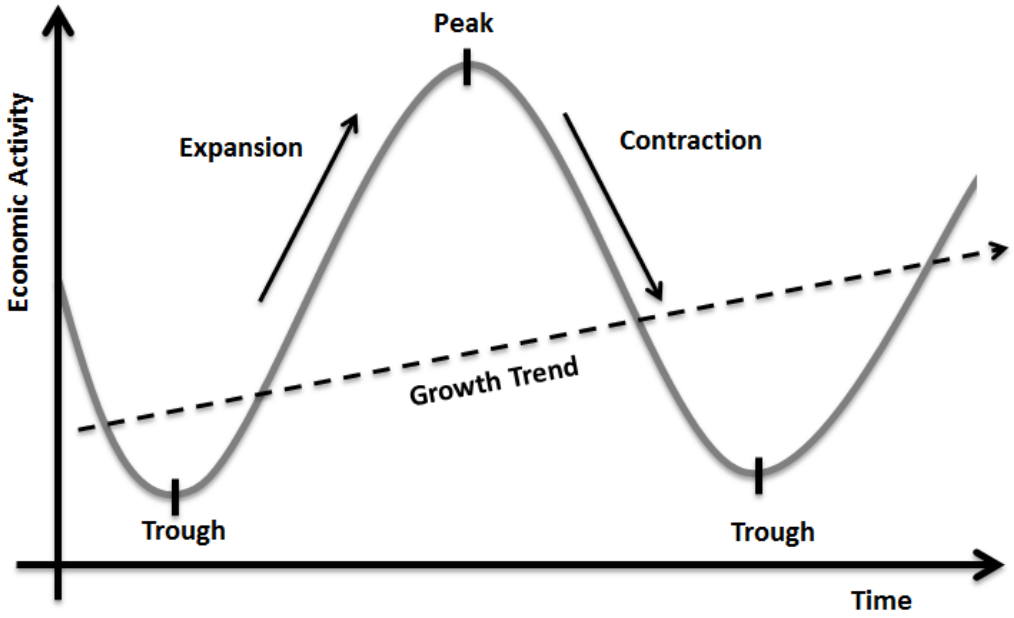

Figure 2: Business cycle example (Mohr, 2005)

From the observations in the diagram, a new business cycle begins at the lowest GDP position characterised by low economic growths. At the end of the trough growth, expansion is often characterised by a sustained increment in economic activities until the expansion reaches the highest level of GDP growth in that phase. This highest phase of the cycle is referred to as the peak and is regarded as the third element of the business cycle. After the peak, the economy begins to decline with economic activities shrinking from time to time.

This is the decline stage characterised by a falling GDP and decreasing economic activity. The decline is referred to as the GDP contraction and is the last phase ensuring the beginning of a new cycle. The events characterised by these phases are illustrated in Table 1.

Table 1: Phases of business cycles

Expansion Phase	Peak Phase	Contraction Phase	Trough Phase
- Level of economic activities increase - More goods and services are realized - Household expenditure levels increase - Interest rate decreases - Inflation levels increase	- The economy consumes most of the resources, e.g. skilled labor and capital - There is an upward pressure on prices and the balance on the current account worsens as a result of higher imports	- Level of economic activity decreases - Fewer goods and services are produced - Spending begins to decline - Interest rates begin to increase - Inflation also decrease - Unemployment rates increases	- Turning point is realized at the end of the contraction phase - Lower inflation rates allow the central banks to begin lowering the interest rates - Current accounts begin to improve due to low costs of exports and lack of domestic demand for imports

Keynes on the other hand, attributed the fluctuations in the economy to the fluctuations in investment spending (Brue & Grant, 2012). This is because investments bear a direct impact on the economic development of countries by attracting income and exchange. According to the Keynesian view Mankiw (1989) of business cycles and recessions, governments tend to take extraordinary measures such as increasing money circulation, increasing spending on investments, etc. to counter the adverse effects of the recessions and create a multiplier effect to the economy at large. At inflation swings, measures such as reduction in money supplies, contraction of spending and rising of taxes are common practices to keep the economy stable and to steady business performance.

Composite leading, coincident and lagging indicators have been utilised in the modern economic analysis scenario to predict and chart business cycles. Figures 2 & 3 shows the relationship between GDP and the leading, coincident and lagging indicators at different times of the business cycles.

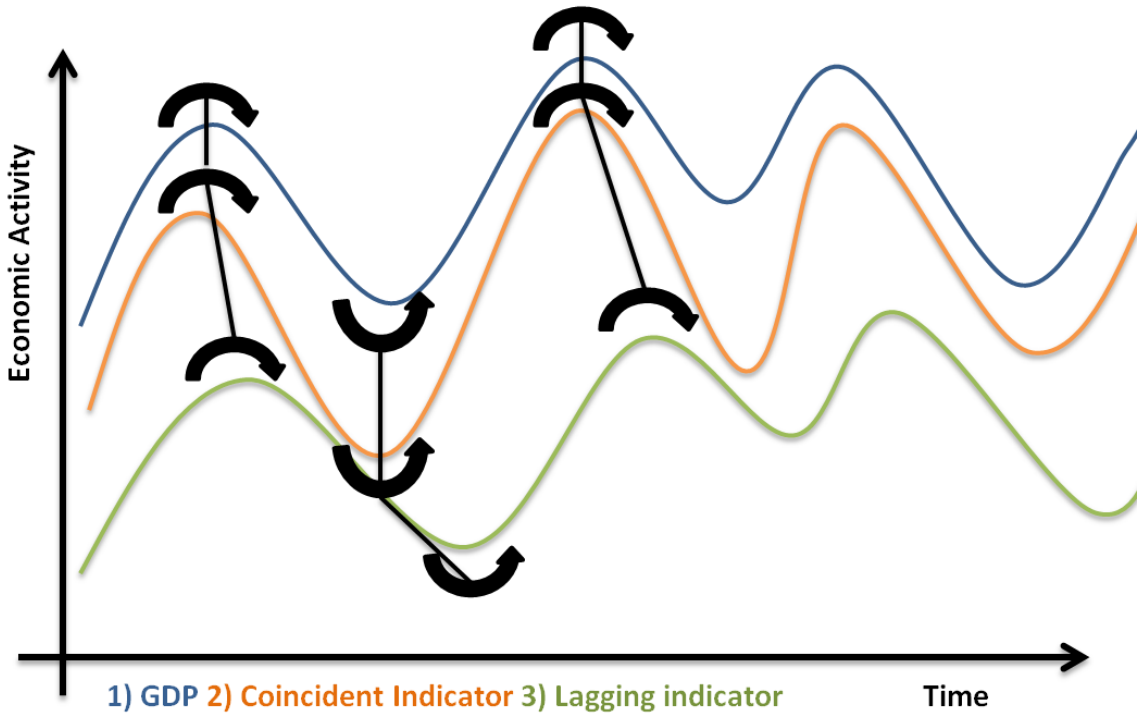

Figure 3: Idealised business cycle indicators in relation to GDP (Board, 2001)

2.8.1 *Breaking down the Business Cycle*

The economic environment of any country is a very complex aspect of analysis; its correct delineation requires an absolute and comprehensive consideration of various factors affecting economic growth. It includes all internal and external factors that influence economic growth patterns at different times. The phase of the cycles is an essential aspect for planning a firm's productivity and growth. Since the business cycles occur in stages, as illustrated by Diebold and Rudebusch (1996), their onsets set an important platform for businesses to brace for hard times. This way, peak economic times can be used by companies to capitalise on their returns and compensate for any losses incurred

during the low economic growth phases. It is, therefore, important for traders to analyse and interpret the cycle phases to aid in making correct decisions to enhance their productivity.

Ideally, during the peak cycles, the economies exhibit positive growths regarding the intensification of the economic activities, including improved employment conditions, increased industrial productivity, low inflation rates, improved sales and good income levels for individuals, countries, and regions. During the low peaks, i.e. recessions, the economic growth is negative, characterised by shrinking demand, and attenuation of economic conditions.

As Ambler et al. (2004) and Redl (2015) observe, in the present nested economies, the cycles of major economies, such as those in the developed world, affect the cycles in other regions that depend directly or indirectly on them. Although the South African economy is currently classified under the fastest growing economies of the world (the BRICS nations), its growth is dependent to a large extent on the growth of other developed nations such as the US, the UK, and China. For these reasons, to ensure stable and consistent growth, the government of South Africa and the firms within must pay close attention to the business cycles of other countries. This study analyses the nature of business cycles within the context of theory and practical application from the South African scenario to larger global contexts. The analyses are then used to predict the future scenarios on the movement of business cycles in South Africa.

2.8.2 *Business Cycles and global Interconnectedness*

The world is increasingly connected through technology, increased mobility of people, goods and services, and political influences, and thus, there is economic interdependence. Global interconnectedness is augmented primarily by the expansions in technology and increasing demands for goods and services in regions that lack the same. However, the mode of relationships and dependence between countries and regions is imbalanced because of dependence on growth rates, productivities, and economic conditions.

Developing countries and the least developed countries depend largely on the developed economies for their continual growth, as with the case in South Africa's resource exports to developed economies (Ambler et al., 2004). The flow of goods and services in different markets through trade is also significant to the relational characteristics and dependence between different states in the modern global economies. The developed countries, e.g. the United States, European countries, China, etc., are often viewed as the economic hubs of the world whose economic stabilities affect the other developing economies a great deal.

2.8.3 *The global business cycle and its changing dynamics*

Empirical studies show that the rate at which the global economy is growing presently is higher than it was about three decades ago (Stock & Watson, 2005). Historically, the world is in its fifth year of a string expansion since the last depression of 2007-2009. Comparisons between the current and past growth trends, however, reveal an inconsistent growth phase, which economists describe as unusual. To put this into perspective, in the 1960s the GDP growth, accounting for demographic shifts, was averaged at about 3.4%. This was 0.2% higher than the averages of the growth experienced in the last decade. These findings imply that just one feature of the current expansion is essential in creating an imbalance in economic growth. However, Stock and Watson (2005) observe that even though an expansion is evident presently, the length of the present expansion is still far from reaching the historical highs experienced in the past. Stock and Watson (2005) say that the present cycle is only half the length of expansions registered in the 1980s and 1990s. This trend is clearly evident in both the underdeveloped economies of Africa, the developing economies of Asia and Latin America, and the developed economies of the western countries. For instance, in the United States, the present cycle of expansion is lower than the expansions recorded during the 1980s and 1990s. Consequently, the same low expansion levels are evident in Europe's major economies, such as the United Kingdom, Germany, and France. The length of Europe's current expansion size seems to stack up against those registered

during the 1950s and 1960s which were longer than presently. These observations are supported by the high growth trends in the region's economies.

According to Del Negro and Otrok (2008), a close comparison between the past business cycles evident during the past centuries indicates a secular increment in the lengths of the expansion periods and a decrease in the lengths of the recession periods (the amount of times that the countries spend to go through the full length of the recessions). In fact, the researchers observe that in the more advanced economies, the stable economies of the developed countries' recessions have disappeared since the end of the Second World War. However, in the developing countries and other emerging markets, their long-term development trends geared towards improving the dynamics of their business cycles appears to be more mixed than smoothly trended as in the case with the developed countries. Stock and Watson (2005) associated these observations with the dynamics of growth factors influencing the economic developments of these countries, as opposed to the more stable economies of the developed nations.

Still, in regards to Asian countries, the current business cycle expansion has recorded long-term trends in China and India, which are similar to the trends observed in the Post-World War II scenarios recorded in the major European economies, Japan, and other newly industrialised Asian economies. Increased industrialization and of the Asian markets from oil and gas exports, and diversification of the region's economies, have seen them stabilising their cycles over time. By stabilising the economies, de Haan, Inklaar, and Jong-A-Pin (2008) observe that the governments of the above mentioned countries must shield local production activities and the growth factors from external interference (by foreign agents). The developed economies, such as the United States, have protected their economy by restricting the goods sold in their local markets from the outside, while maximising exports. In contrast, the developing countries produce little for the foreign markets and thus import most goods, making their economies susceptible to external interferences. Such interferences destabilise the economic performance and development, hence,

the noted lack of consistency in the business cycles of these economies compared to their developed counterparts.

The Latin American region, however, has shown opposite results regarding the trends in its business cycles. For instance, the four largest economies of Latin America, including Brazil, Mexico, Argentina, and Colombia, have failed to record notable expansions in terms of duration since the 1970s when the region recorded the longest expansion period. This lack of expansion is attributed to the recurrent currency crisis in the region, which has resulted in economic and trade imbalances. In the same manner, the share of the times which these economies have spent in the recession periods has not declined notably since the 1970s. These invariabilities in the expansion events in the developed and the developing economies has been associated largely with the unstable global economic conditions that show a lack of consistency and growth (Del Negro & Otrok, 2008). These include unusual sustainable fiscal and external economic imbalances, tightening monetary policies, rising inflation, cross-country inflation spillovers, constant swings in the prices of commodity and assets, and related financial squeezes.

2.9 Hypothesis statement

H1: Fluctuations in CPI causes business failure

H2: Fluctuations in GDP causes business failure

H3: Fluctuations in the Composite Leading Business Cycle index causes business failure

H4: Fluctuations in the Composite Coincidence Business Cycle index causes business failure

H5: Fluctuations in the Composite Lagging Business Cycle index causes business failure

H6: Fluctuations in Business Confidence Index causes business failure

H7: Fluctuations in Consumer Confidence Index cause business failure

2.10 Conceptual framework model

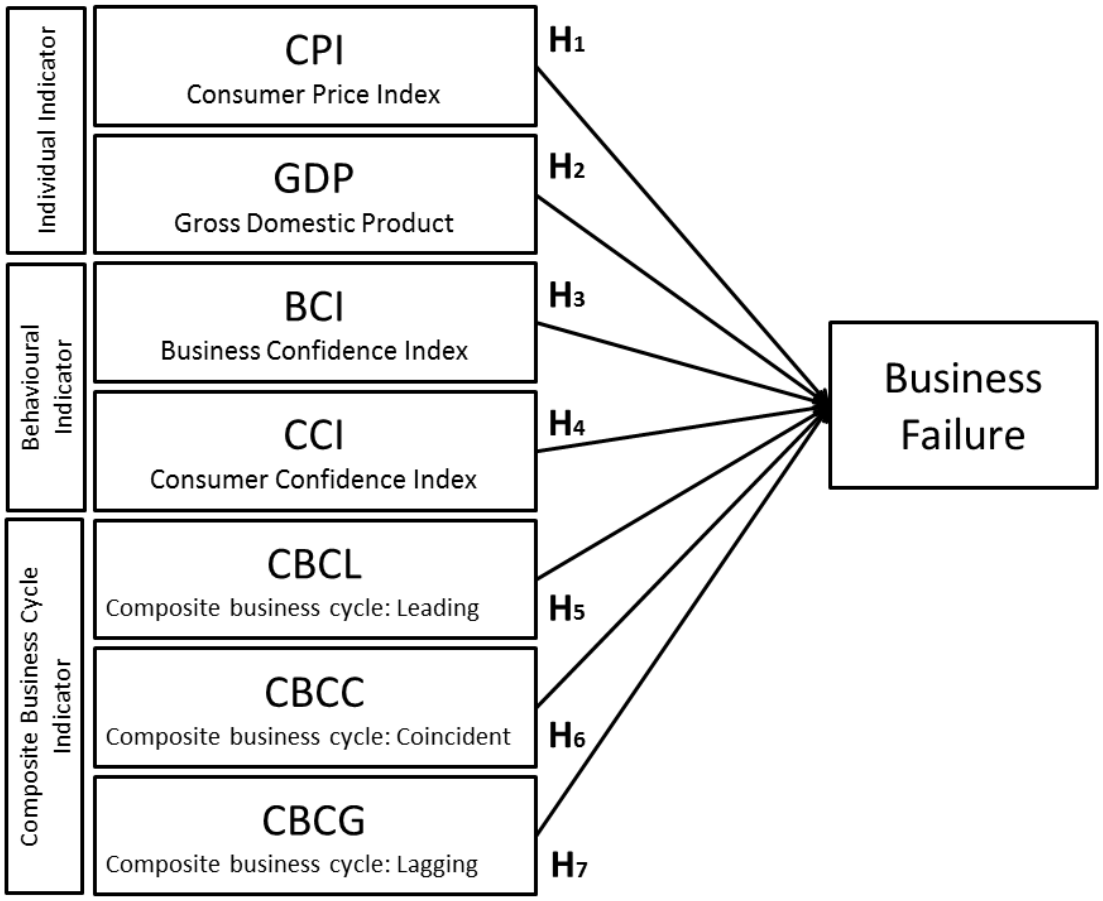

Figure 4: The study's conceptual framework (Author)

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Strategy and Design

The study adopts the cause-effect approach used commonly in exploratory studies such as the current study. This has been enabled by restructuring the research questions in the form of the hypothesis. Empirical evidence, which illustrates cause and effect relationships and research analysis, will be communicated from various published research studies. Data will be sourced from macroeconomic databases that are published and where the data is publicly available.

To understand cause and effect relationships and apply them quantitatively, researchers in the social sciences have put forth some assumptions, paradigms, and theories that underlie this study and its methodology. The subsequent sections discuss epistemological and ontological paradigms, approaches of positivism and interpretivism, and the need to form a basis for these paradigms in order to proceed with the necessary research design.

3.1.1. Epistemology and ontology

3.1.1.1. Epistemology

Epistemology is the consideration of what constitutes knowledge within the scientific and research realms. It is a paradigm of understanding the way we know the truth about something and how we explain it (Collis & Hussey, 2013). Owing to the fluidity in its definition, the term epistemology has been defined in a varied manner in literature. For instance, Collis and Hussey (2013) describe epistemology as the creation and dissemination of tenets of knowledge in specific areas of scientific inquiries. In terms of the epistemological stance, the researcher must consider the specific data or resources that describe the required outcomes.

a. *Data collection*

This study will be represented using secondary data through the normal process of data collection and analysis of facts. According to Collis and Hussey (2013), objectivity in epistemological undertakings must be guaranteed by ensuring that the data sets collected for use to justify the positions and facts minimize bias. This can be achieved through the researcher's detachment from the study in order to reduce personal influence. Consequently, accuracy and soundness of the data used in this study will be of top priorities to the researcher. It is essential that the data/information collected from the primary sources is well-maintained and secure from any kind of interference, thus guaranteeing the level of objectivity needed in the study. The soundness of the data collected in this study, the data retrieved from the primary and secondary sources will be used in their raw statuses without any form of modification or prior processing. This will ensure that the results obtained are outstanding and meet the standard ethical and objectivity conditions (Collis & Hussey, 2013). Financially compiled secondary data will be used in this study, including opinions from interviews and discussions, which are prone to personal biases and interpretations. This said, business and consumer confidence indices are measured through surveys of the respective sectors.

b. *Data interpretation*

There are two principles of data interpretation that are influenced by the level of independence the researcher allows in his or her studies: positivism and interpretivism approaches. Positivism, as a research philosophical stance, does not include the opinions of the researcher interpreting the results of the study or manipulating the data to derive the desired outcomes. The more the researcher desists from injecting his or her opinions into the study outcomes, the more objective the results will be. In the study, it is believed that by using quantitative data on GDP, CCI, CPI, etc., the influence of the researcher will be eliminated to make the findings sound, outstanding, and objective.

Further, the study adopts post-positivism as the preferred epistemological view focused on understanding the connection between business failure in South

Africa and the impending macroeconomic factors. The CPI and GDP data will be derived from real economic and financial information published on secondary data, while CCI and BCI data will be surveyed and tested against the critical and realistic philosophical basis.

A deductive quantitative approach will be used for this research based on longitudinal secondary data. The data will be retrieved from accredited, published, secondary sources to increase as much as possible the ensure reliability and sustainability of results.

3.1.2 *Ontology*

Previously highlighted was the epistemological perspective that explained what constitutes knowledge from an individual's perspective in a particular field of knowledge. On the other hand, the ontological perspective to knowledge derivation explains the nature of the reality attained through the epistemological explanations. However, far from the epistemological concerns, the ontological approaches tend to raise the questions concerning assumptions made in coming up with the suggested realms of knowledge explained and the commitment that they hold to retain such views (Crotty, 2003). For any particular view one holds concerning any perspective of knowledge, it is imperative that a certain degree of assumptions needs to be made.

The two aspects of ontological perspectives described in this section will have independent devotees to the operations and outcomes of this study. Key in ontological perspective is objectivism, meaning various social entities exist in their unique realities which are external to the social actors that govern their existences. Second is the subjectivism aspect, meaning that social phenomena are often created from personal opinions and perceptions and that the consequent actions of these social phenomena (actors) prove their existences (Crotty, 2003).

The current study adopts the ontology of the social world of meanings and the ontology of the realistic world. In the first ontological assumption, the study is developed on the assumption that the world being investigated is made up of

humans with different thoughts, opinions, and interpretations of various issues happening around them. This ontological perspective is clearly demonstrated in the choice for the use of different research methods for data collection and manipulation approaches (The methods are described in the subsequent sections of the study). These include data on macroeconomic factors such as GDP growth patterns, etc. and the number of failed businesses within the selected periods analysed through various statistical approaches to derive the connection between the two sets. The composite business cycles, leading, coincident and lagging, will provide the opinion-based interpretation of the South African Federal Reserve Bank concerning the factors influencing the ease of doing businesses in the region, as well as the macroeconomic influences on the business cycles to influence survival and continuation over time.

The second ontological aspect used in the study is the realistic ontology, which maintains that the interactions between ‘cause' and ‘effect' factors in the physical world result to the presented outcomes of the phenomena. This is different from the ontological approaches of the mechanical causes, which are often intertwined in the cause-effects relationships. In the current study, the researcher assumes that there are different types of realities that influence the ultimate outcomes of the final research. For instance, the seven macroeconomic factors (discussed earlier), have the potential to influence the continuance of the businesses in South Africa. In this respect, the study assumes that the nature of the interactions follow the realistic ontological approaches and can be viewed as a causal reality (Crotty, 2003). This position is consistent with the observation of Crotty (2003) that one’s purpose of research is to explain the existing case or what has occurred. That is, to examine what is likely to happen if certain scenarios/factors are left constant or interventions are made in the model. These observations are shown clearly in the aim of the study, which is to develop an understanding of the relationship between the fluctuations in macroeconomic factors and business failure in South Africa. This means that the study seeks to understand what results in business failure and if a certain macroeconomic factor or a set of macroeconomic factors are in existence for this failure. The study’s outcomes

are, therefore, rely on the assumption that any failure in business in the region is a result of the influence of one or more macroeconomic factors.

3.2 Conceptual framework and the data

This section defines different variables used in the study in as much detail as needed for the sake of adopting an appropriate methodology, analysis, and interpretation. The dependent variable in the study is the Business Failure Rate, and the independent variables are the macroeconomic factors. Business Failure Rate is considered for a period of 10 years.

3.2.1 *Business failure rate*

The study will identify the variable for the failure of businesses influenced by macroeconomic variables. Two different variables have been used in literature to determine the aggregate business failure. First, Altman (1983) used the business failure rate as a percentage. Second, Melicher and Hearth (1988) used the failure in numbers. According to Chava and Jarrow (2004), business failure in numbers on a time series closely mimics the numbers in percentage. The study will make use of Statistics South Africa information on liquidated companies and closed corporations to represent the relevant data related to business failure, since this data is spread across all industries, provinces and businesses.

3.2.2 *Macroeconomic factors*

Understanding that there are many macro factors that influence the rate of failures for business, this study will attempt to have a combination of generic statistical macro factors and behavioural diffusion indices. The following categories of aggregate economic behaviour are specified as potentially revealing indicators of business failure:

- Economic growth activity
- Price level changes

- Business confidence
- Consumer confidence
- Composite business cycles

a. ***Economic growth activity***

Economic stress in the economy generally highlights the impact of business pressure. Economic recessionary cycles are assumed to have a bigger impact on the rate of failure in business. The negative consumer activity in tough cycles will have a direct impact on the business variability. For the study, the first explanatory variable GDP will be a test of a predictor on business failure (Altman, 1983). This variable is used extensively in the literature and has been found to have a significant negative effect on business failure.

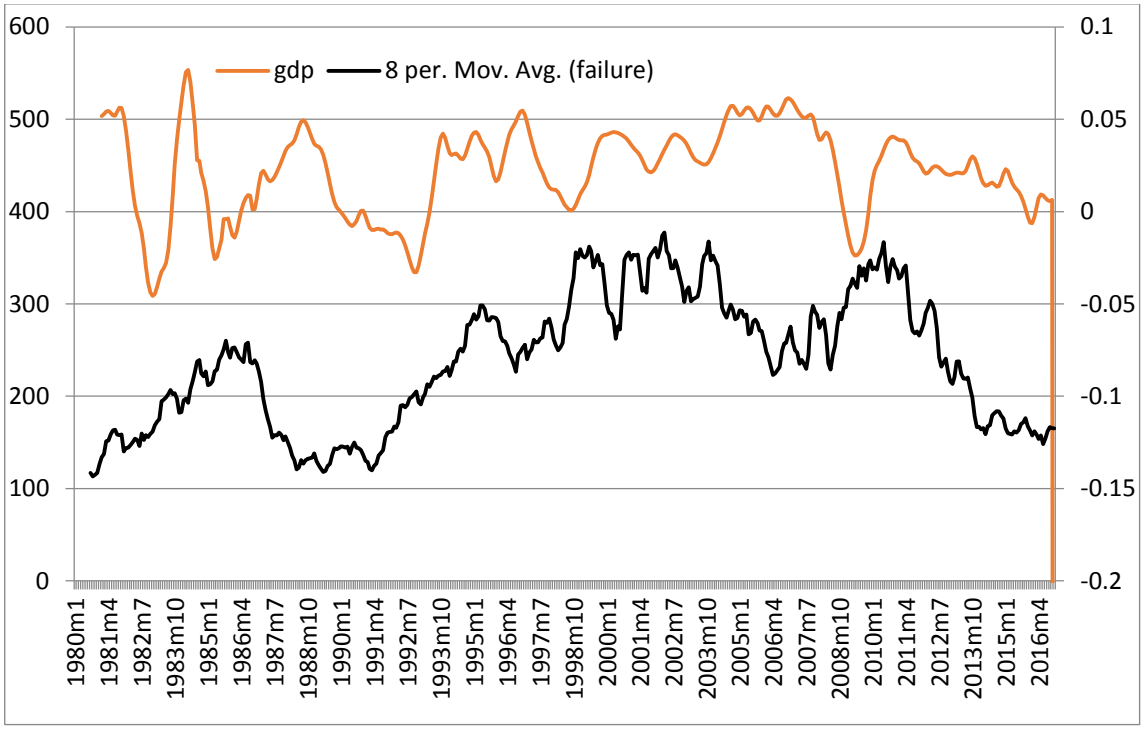

Figure 5: Economic growth (GDP in South Africa from 1980-2016) StatsSA (2016)

b. *Price level changes*

The rate of inflation can ultimately influence the price of goods. Even though this increase in inflation is passed on to consumers, there is a high probability of the markets becoming increasingly exposed to exploitation in pricing and quality of goods. Poorly managed companies can still manage to repay debt at cheaper rates and benefit from bigger margins on low-inflation cycles. However, when price levels increased dramatically in the period of 2008-2009, there were arguments that the markets would witness more failures. This is the reason that the period is included in the study. Evidence from research suggests that inflationary fluctuations can lead to business failure (Liu, 2004, 2009; Wadhwani, 1986)

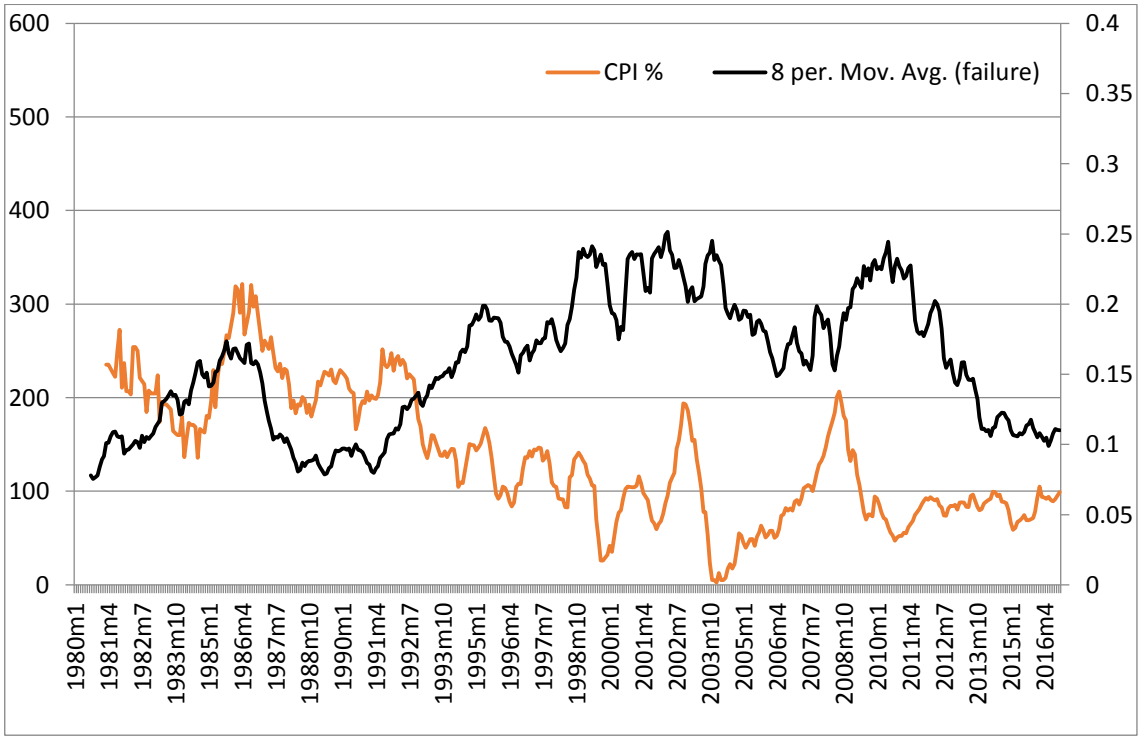

Figure 6: Consumer Price Index. Source: StatsSA (2016)

c. *Business confidence*

Business confidence indices are generally based in a survey study done in the country by leading businesses. The surveys also have sectoral and regional

focuses. The study will make use of the Business Confidence Index (RMB/BER BCI). A typical question will be:

- Do you find the current prevailing business conditions satisfactory of unsatisfactory?

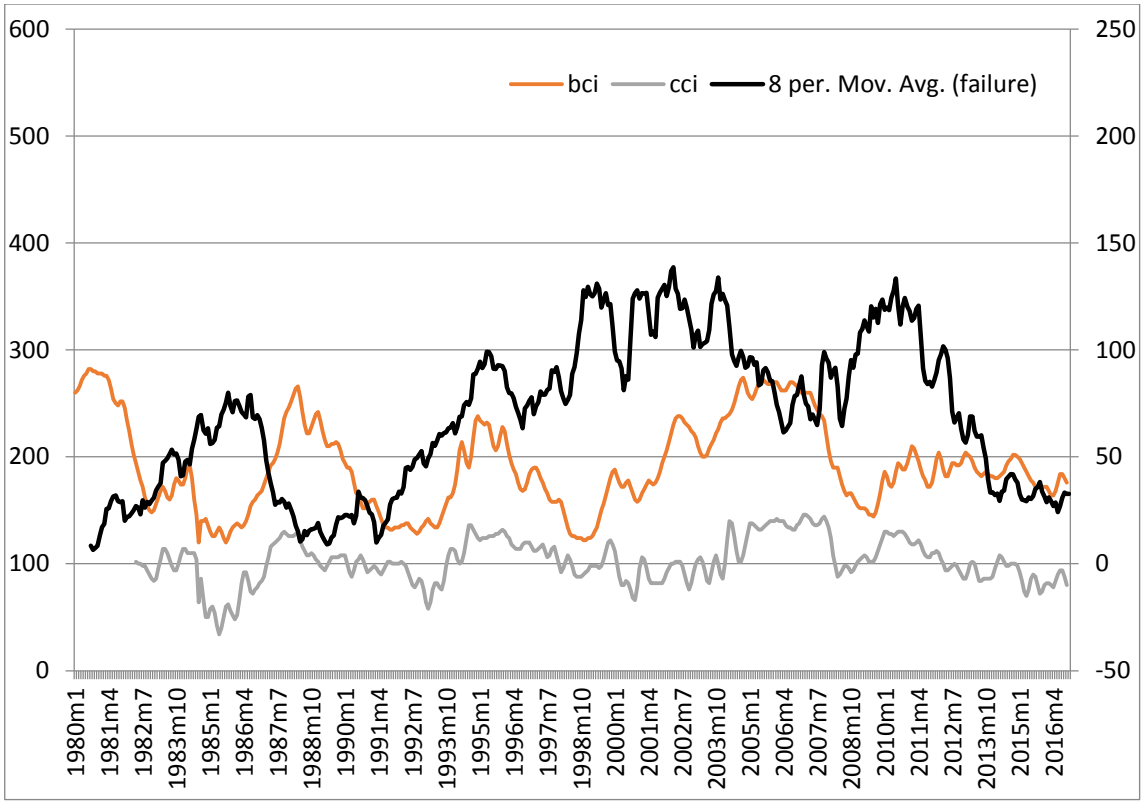

Figure 7: Business and Consumer Confidence Indicies. Source: BER (2016)

d. *Consumer confidence*

A consumer's purchasing power is the primary revenue-generating factor. When consumers are pressured through the macroeconomic factors, their confidence in the economy is decreased. In cycles of high inflation, consumers tend to decrease erratic spending; this directly influences the profitability of businesses. This study will make use of the FNB/BER Consumer Confidence Index (CCI) that combines questions asked to adults living predominantly in urban areas. Consumers are asked questions about the following topics:

- Expectation of the performance in the economy
- The financial position of the consumer
- If the present time is it appropriate to buy durable goods

3.3 The population and data

This study is not restricted to specific types of industries. Secondary databases as per Figure 1 will be used to extract and mine data via specified statistical analysis software for the period of 1980-2016.

3.3.1 *Quarterly data*

Because our dependent variable of business failure is published on a monthly cycle, quarterly data will be interpolated to monthly using the cubic spline method. This will give the study finer details. According to Kershoff (2000), the quarterly business confidence index cycle relationship with economic cycles has proven to be a useful indicator for economic growth and has served as a strong and leading indicator of business cycles in South Africa.

3.3.2 *Business Failure*

For this analysis, secondary data extracted from Stats SA will be used. Data will only focus on the total number of liquidated companies and closed corporations. Information published from Stats SA is sourced from the Registrar of Companies and Close Corporations and Trade and Industry. These data sets include both voluntary and compulsory liquidations of these businesses. Liquidation refers to the winding-up of the affairs of a company or close corporation when liabilities exceed assets and it can be resolved by voluntary action or by an order of the court. A voluntary liquidation takes place when a company or close corporation, by own choice, resolves to wind-up its affairs.

The business failure rates in numbers mimic closely the failures in percentage (Chava & Jarrow, 2004). Given the purpose of this study to identify the

relationship between business failure and macroeconomic variables, we are trying to identify the dynamic interdependencies between economic fluctuations and failure rates. Based on these diverse independent variables according to their time series dependency, this study will use business failures in numbers.

3.3.3 *GDP*

Economic growth is considered an important variable because it can have a direct influence on business sales. Consecutive declines spanning over a longer time period are considered a recession, which has an impact on sales. Without capital reserves, businesses gradually decline and eventually fail.

3.3.4 *Composite Business Cycle Indicators*

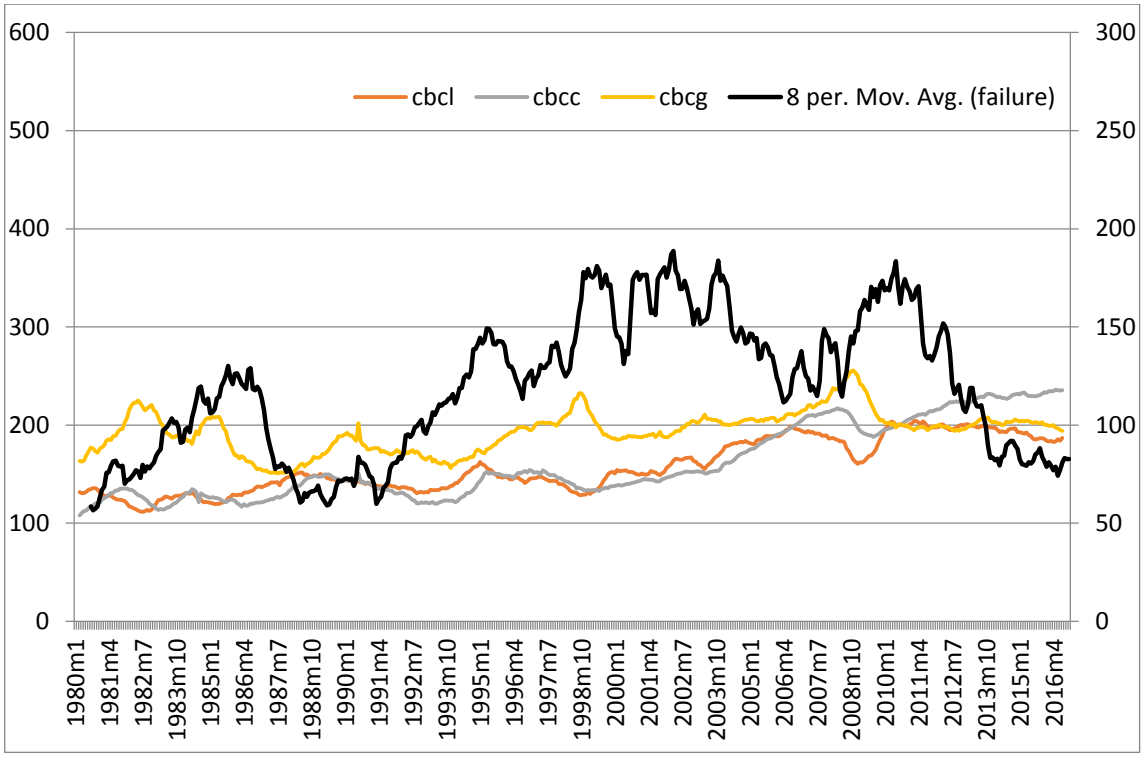

Figure 8: Composite Business Cycle Indicators. Source: SARB (2016)

It is important for every country to monitor domestic and international economic conditions in order to determine cycle phases for proportional and continued

growth. In South Africa, fluctuating economic cycles are monitored centrally by the South African Reserve Bank Magruder (2012) in order to observe peaks and troughs of economic conditions and to research necessary steps to control economic performance.

Table 2: SARB composite business indicators

Component time series of the composite business cycle indicators		
Leading indicator	**Coincident indicator**	**Lagging indicator**
Job advertisement space in the Sunday Times newspaper: percentage change over twelve months	Gross value added at constant prices, excluding agriculture, forestry and fishing	Cement sales (in tons)
Number of residential building plans passed for flats, townhouses and houses larger than 80m'	Total formal non-agricultural employment	Value of non-residential buildings completed at constant prices
Interest rate spread: 10-year government bonds less 91-dat Treasury bills	Value of retail and new vehicles sales at constant prices	Ratio of gross fixed capital formation in machinery and equipment to final consumption expenditure on goods by households
Real M1 money supply (deflated with CPI)" six-month smoothed growth rate	Industrial production index	Ratio of inventories to sales in manufacturing and trade
Index of commodity prices (in US dollar) for a basket of South African-produced export commodities	Utilisation of production capacity in manufacturing	Nominal labour cost per unit of production in the manufacturing sector: percentage change over twelve months
Composite leading business cycle indicator of South Africa's major trading partner countries: percentage changes over twelve months		Predominant prime overdraft rate of banks
Gross operating surplus as a percentage of gross domestic product		Ratio of consumer instalment sale credit to disposable income of households
RMB/BER Business Confidence Index		
New balance of manufacturers observing an increase in the average number of hours worked per factory worker (half weight)		
Net balance of manufacturers observing an increase in the volume of domestic order received (half weight)		
Number of new passenger vehicles sold: percentage change over twelve months		

3.3.5 *Consumer Price Index (CPI)*

Inflation can be contradictory in its effects on aggregate business failure rates. The contentious issue with inflation is that it can be two-fold. Altman (1983) argued that inflation can be inversely correlated with business failure rates because businesses can repay their debt quicker by paying less interest. However, lower inflation can cause less competition within the micro and macro environments. So, inflation can cause more failure rates by influencing the business's earnings, ultimately diminishing the capability to repay its debt (Wadhwani, 1986). In this way, inflation can lead to higher business bankruptcies too (Liu, 2004, 2009; Wadhwani, 1986). This is the reason inflation is included in the current study.

3.3.6 *Business Confidence (BCI - RMB/BER BCI: Business confidence index)*

BER takes the percentage of respondents that rate prevailing conditions as satisfactory as the indicator or proxy of business confidence. The composite RMB/BER Business Confidence Index (BCI) is the unweighted mean of five sectoral indices, namely manufacturing, building, contracting, retail, wholesale and new vehicle dealers. Business confidence can vary between 0 and 100, where 0 indicates an extreme lack of confidence, 50 indicates neutrality, and 100 indicate extreme confidence.

3.3.7 *Consumer Confidence (FNB/BER CCI: Consumer confidence index)*

CCI has provided detailed data on consumer confidence that is disaggregated by income, Living Standards Measure, and population groups

Consumer confidence is expressed as a net balance, which is calculated as the percentage of respondents expecting an improvement (good time to buy durable goods), less the percentage expecting a deterioration (bad time to buy durable goods). CCI is measure on a scale of between 0 – 100.

3.4 Methods

This study adopts a quantitative approach, which will facilitate the use of secondary data through statistical analyses.

3.5 Model strategy

Liu (2004) and Vlieghe (2001) addressed the shortcomings of separating the short-run and long-run reactions of business failure relating to macroeconomic variables by introducing time-series cointegration and error correction models. Supporting this, Santoro and Gaffeo (2009) argue that this research has an empirical importance and can contribute to the implications of theoretical models of economic and productivity growth. They have also indicated that from an economic point of view, the analysis follows three distinct steps. First, variables must be tested for stochastic properties by means of panel unit root tests. This study will use the Augmented Dickey Fuller test for stationarity (ADF). Secondly, the model will test for cointegration among the identified variables and for this the analyses the study will use the Johansen test for Co-Integration. This test will assess if there is a long-run relationship. Third, the residuals of the integration step were used to test as an n error correction term with a panel (VECM).

Additionally the study will propose if business failure can be predicted through the business cycles mirroring Santoro and Gaffeo (2009) study for long-run growth. For this test Granger Causality will be formulated. Finally, the study will incorporate a lag within the variables. Zavgren (1985) was sceptical about solely focusing on the financial ratios to predict business failure and introduced the presence of a time lag in receiving these financial factors.

3.5.1 *Augmented Dickey Fuller (ADF) test for stationarity*

The Augmented Dickey Fuller Test was conducted to assess the stationarity of time series variables. This is vital to ensure that the series are stationary before

any model is fitted; otherwise the relationship that will be determined using the model will be inaccurate.

Non-stationarity and data instability may have severe effects for the traditional failure prediction models that can lead to poor predictive abilities in future dated samples (Mensah, 1984). Additionally, data instability causes prediction models to be unstable and fragile over time will cause other coefficients on new data. Consequently, traditional prediction models may need redevelopment and updating (Joy & Tollefson, 1975; Keasey & Watson, 1991; Mensah, 1984; Taffler, 1982). Lastly, traditional failure prediction models based on pooled estimation samples may be constructed on distorted data, resulting in inconsistent coefficient estimates that can lead to low accuracy levels. (Platt, Platt, & Pedersen, 1994)

Co-integration implies that the linear combination of some nonstationary time series is stationary. The plots of the time-series movements of the independent variables and failure rates can potentially drift together and suggest that they may be co-integrated. To establish co-integration, we first test whether each series contains a unit root and is integrated in each sub-period using the augmented Dickey–Fuller (ADF) test.

3.5.2 *The Johansen test for co-integration*

The Johansen test for Co-Integration was conducted to assess if there was a long-term equilibrium relationship between failure and each of the independent variables. This is to test if the variables move together, that is, if one variable increases the other one increase, or the former decreases back to the same level with the latter.

3.5.3 *The Vector Error Correction Model (VCEM)*

The Vector Error Correction Model was fitted to assess whether there was a long-term relationship between failure and each of the other variables. The presence of cointegration between variables would have suggested there being

a long-term relationship between the variables. The VECM assesses the relationship but does not assess the direction of the relationship.

3.5.4 *Granger Causality*

Granger causality is a model in which the past values of variable A contains information that can be used to predict the future values of another variable B. In that case, past values of B will contain less information to predict future values of B than the combination of past values for A and B. If that is the case, A is said to granger cause B. In other words, granger causality assesses the direction of the relationship

Unlike linear regression where the r-square is very important, in time series the standard regression fails when dealing with non-stationary variables. The regression of time series produces spurious regressions that suggest relationships even when there are none. Thus r-square is not very useful.

The conceptualisation of the Granger Causality is attributed to the works of Wiener (1956) who conceived the notion as a scientific approach to demonstrating knowledge and understanding in scientific research. Ganger causality is premised on the fact that if predictions in a particular time series are enhanced in a scientific study by incorporating the knowledge of an additional series to the existing one, the later series is said to influence the outcomes of the previous one. This idea was later formalised by Granger (1980) using linear regression models to approve the correlational approaches attributed to formulation. The improvement of the predictions is then undertaken by determining the ratio of the variance in the error terms. If the ratio is larger than one, then there is an improvement in the second time series, thus qualifying a causal connection between series one and two.

Granger causality is significantly important to this study since it investigates the cause-effect relationships between the macroeconomic factors in South Africa and failures in businesses. To understand the relationship between the changes in macroeconomic factors and business failures, we are investigating the causal effects of macroeconomic fluctuations on business failure in South Africa, a

factor which qualifies the use of Granger Causality for this research. The Granger Causality is utilised to establish whether or not the macroeconomic variables investigated in this study can be employed to predict the probability of business failures. This is based on the assumption that macroeconomic factors contribute to business failure. In undertaking these effects, f-tests will be used to determine the lag effects of the business failure approach following fluctuations in explanatory variables.

3.6 Limitations of datasets

- The study will focus only on private companies and close corporations
- The interpolation of quarterly data can potentially lean to bias
- Business failure does not happen overnight and in general, panel data can specify the date at which the company was officially liquidated and did not consider the process of company failure.

3.7 The validity and reliability of research

The reliability and validity scales of research qualities are important aspects of research studies, which determine the extent to which the results obtained are meaningful to the end consumer. A research study is considered reliable when it gives similar results when tested on the population with the same characteristics at different times. This section discusses the validity and reliability conditions ensured in this study.

3.7.1 *Validity*

Validity of a research study defines the accuracy of a measure used as a variable or just the extent to which the scores obtained from an analysis represent the real concept studied. That is, the extent to which the models used is capable of testing the factors as designed. There are three types of research

validities with which researchers must be concerned. These are discussed in the subsequent sections of this study.

a. ***Face validity***

Face validity or content validity defines the level of agreement between the experts in a particular field that a certain truth is proven within the realms of the available knowledge. In this definition, the face validity concept ensures the usefulness and accuracy of a given method in achieving the desired outcome based on the consideration of previous research.

To ensure face validity in this study, a comprehensive review of the previous literature has been performed to establish the similarities between the ideas and methodologies used in the current research as recommended and utilised by various researchers in other studies. Additionally, an extensive consultation with experts has also been conducted prior to and after performing the literature review to validate the findings obtained, presented, and utilised in deriving the success of this study. Triangulation method, used and recommended by Thomas and Magilvy (2011), has been utilised in coming up with the appropriate verifications of the current study.

b. ***Internal validity***

The internal validity of research illustrates the researcher's attempt to ensure that the data collected and analysed are free from biases and thus reflect the true opinions and facts of the study (Thomas & Magilvy, 2011). Although it is assumed that the information collected will be factual, the data and information acquired from various databases will not be edited in order to maintain their authenticity and reliability for use.

c. ***External validity***

The external validity describes the extent to which the findings of a research study can be replicated and thus be generalised as true representations of the scenario in the studied population (Thomas & Magilvy, 2011). A wide array of historical data on industries across the various regions spanning from 1980 to

2016 will enhance accuracy and thus guarantee representativeness and reliability for replicability purposes. The large sample size (all private corporations) and the longitudinal approach to data collection will ensure external validity.

3.7.2 *Reliability*

The reliability aspect of research, on the other hand, defines how consistent the findings of a scientific research study are for the accuracy of the methods of data collection and data analysis adopted (Bush, 2007). In this way, the reliability of a research study is a measure of the internal consistency of the research findings. According to Hair et al. (2006) , the reliability is a test of the degree of consistency exhibited in different measurements of the response from an individual versus the idea of ensuring that the responses provided maintain the consistency and similarity across different situations and times. That is, if the same test was performed under the same scenario with the same circumstances, similar results should be obtained. This is what Bush (2007) referred to as the test-retest method. Although there are several methods used to test for reliability, this study uses the most common one: the *Cronbach alpha coefficient* with 0.7 used as the minimal acceptance level for reliability. Specifically, the reliability of the data and the information obtained in this study will be guaranteed by using static, public data drawn from authentic sources and used in their original forms without editing. They can then be verified easily through statistical analyses.

3.7.3 *Ethical considerations*

Before beginning to collect data and subsequent analysis, the researcher will seek permission and approval for research from the Ethics Committee to ensure compliance with ethical regulations of research throughout the session. Once used, the collected information will be destroyed through burning to maintain required privacy.

CHAPTER 4: PRESENTATION OF RESULTS

This chapter will include details of the data used, analysis of data, and interpretation. For this purpose, tools used for analysis, method of analysis, and the results of analysis are explained. Investigating the effects of how macroeconomic factors influence business failure (failure), the study incorporates macroeconomic variables in a 3-phased approach. In the first phase, the study will include general macro variables including Gross Domestic Product (GDP) and Consumer Price Index (CPI). In the second phase, the analysis will be done using composite business cycle variables published by the South African Reserve Bank. These variables include the composite leading (CBCL), composite coincident- (CBCC), and composite lagging (CBCG) business cycle indicator. In the third phase, the study will adopt a more behavioural indicator based on surveys done in the relevant sectors, namely Business Confidence Index (BCI) and Consumer Confidence Index (CCI) developed by the Bureau for Economic Research (BER). Longitudinal data for this study was used over a period of 36 years ranging from 1980 to 2016.

In this empirical study, data analysis was done using the Vector Error Correction Model (VECM) to look at the relationship between business failures and the considered macroeconomic factors, and the interactions between these respective dependent and independent variables. Liu (2009) adopted a Vector Auto Regression (VAR) approach and argued that using VAR models is a suitable approach to analyse the dynamics of business failures in the business cycles. Liu (2009) also observed the interactions between the systems of macroeconomic variables and business failure. According to the researcher, it is well-known that the majority of economic panel data is non-stationary, although in the long run it tends to be cointegrated.

If a VAR has a cointegration specification, it restricts the long run convergence of endogenous variables to their relationship, while allowing for a wide range of short-run dynamics. As mentioned above, Liu (2009) supports Santoro and Gaffeo (2009) by introducing the Engle and Granger (1987) representation theorem where one first needs to establish if the series contain a unit root and is

integrated in each sub-period, using the ADF test. Liu (2009) used the Johansen (1988) model to test the number of cointegrating vectors. This test was done on the maximum eigenvalues and tested the null hypothesis.

The experimental methodology adopted in this study was the same strategy as what Liu (2009) analysed in his study of macroeconomic risk. The study uses the VAR model as a convenient way to analyse the relationship and interactions between business failure and macroeconomic variables. Because it is well-known that a majority of economic series data is non-stationary, to include a case of potential long-run cointegration this study will be adopting the VECM. The benefits of the VECM are that the resulting VAR from VECM representation has more efficient coefficient estimates.

4.1 Data preparation

The subsequent sections detail the steps followed in preparing the data and analysing it.

4.1.1 *Interpolating data*

Cubic Spline Interpolation was used to obtain estimates of data between known data points. Thus, cubic splining of quarterly figures were used to generate monthly estimates. According to Chava and Jarrow (2004) the use of monthly observation intervals will distinctly improve the predictability of the models used. This study's dependent variable of business failure is published monthly, and that is why the quarterly data to monthly has been interpolated, to improve the number of observations. Only GDP, BCI and CCI were interpolated using the cubic spline interpolation method.

4.1.2 *Time series plots*

A time series plot CBCL, CBCG, CCI, CPI, CBCC and BCI, together with the number of business failures (Failure) shown below, discloses that the series are

trending and thus a potential I(1) process may exist. This means that the series are nonstationary, but the first differences might be stationary.

4.1.3 *The Augmented Dickey-Fuller (ADF) test for stationarity*

The Augmented Dickey-Fuller test was conducted to ascertain if each CPI and failure were nonstationary. The test uses the following hypotheses:

H0: The series (Failure or GDP or CPI or cpc1 or cbcc or cbcg or bci or cci) has unit root/ not stationary

H1: There series (Failure or GDP or CPI or cpc1 or cbcc or cbcg or bci or cci) is stationary

When the absolute value of the test statistic > 5% critical value, we reject the null hypothesis.

The following are the results of tests conducted for all the considered variables.

a. ***Failure***

```
. dfuller failure

Dickey-Fuller test for unit root                   Number of obs   =       437

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -8.748            -3.445            -2.873            -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

b. ***CPI:***

```
. dfuller cpi

Dickey-Fuller test for unit root                   Number of obs   =       437

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
```

```
 Z(t)              1.278           -3.445           -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9965

. dfuller dcpi


Dickey-Fuller test for unit root                   Number of obs   =       436

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -34.455           -3.445           -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

c. ***CBCL:***

```
dfuller cbcl

Dickey-Fuller test for unit root                   Number of obs   =       437

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -0.559           -3.445           -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.8800

. dfuller dcbcl

Dickey-Fuller test for unit root                   Number of obs   =       436

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -13.835           -3.445           -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

d. ***CBCC***

```
. dfuller cbcc

Dickey-Fuller test for unit root                   Number of obs   =       437

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)              0.649           -3.445           -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9888

. dfuller dcbcc
```

```
Dickey-Fuller test for unit root                   Number of obs   =       436

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -17.290           -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

e. ***CBCG***

```
. dfuller cbcg

Dickey-Fuller test for unit root                   Number of obs   =       437

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -1.798           -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.3817

. dfuller dcbcg

Dickey-Fuller test for unit root                   Number of obs   =       436

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -16.696           -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

f. ***GDP***

```
. dfuller gdp

Dickey-Fuller test for unit root                   Number of obs   =       437

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             1.538           -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9977

. dfuller dgdp

Dickey-Fuller test for unit root                   Number of obs   =       436

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -28.587           -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

g. ***BCI***

```
Dickey-Fuller test for unit root                   Number of obs   =       437

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)              -1.975            -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2978

. dfuller dbci

Dickey-Fuller test for unit root                   Number of obs   =       436

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)              -9.132            -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

h. ***CCI***

```
. dfuller cci

Dickey-Fuller test for unit root                   Number of obs   =       437

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)              -3.016            -3.445            -2.873           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0334
```

4.1.4 *Smoothening*

To use VECM, we took the presence of autocorrelation seriously as we have used economic time series. Autocorrelation in economic and financial time series is a common issue. Consequently, if the series is not corrected for trend and seasonality, and therefore non-stationarity and autocorrelation, the final VECM model can be unstable. Especially important is the non-existence of autocorrelation in the residuals. After doing the unit root tests, we tested for autocorrelation, more specifically, for autocorrelation in seasonality, because we considered monthly data and consumption data. To smooth out the seasonality,

we used the moving average and weighted moving averages using the function *tssmooth.* The nature of the two-way line plots reiterated that the line graph was much smoother than the raw series. New smoothed variables were obtained in this way.

4.1.5 *Lag determination*

After plotting the series, it was important to determine the number of lags that could be utilised to perform further analysis and also because past values may have affected current values for the different series considered. Several statistics can be used to determine the number of lags. In this case, the Akaike Information Criterion (AIC) was used.

The optimal number of lags per series was derived from the Lag estimation (pre-estimation) statistics. The maximum lag considered was 12 because the study used monthly data. Smoothed variables were tested for lags. The minimum of AIC, HQIC and SBIC statistics was decided as the optimal number of lags per series.

a. *Failure:*

```
. varsoc failure, maxlag(12)
```

Selection-order criteria
Sample: 13 - 438 Number of obs = 426

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-2497.6				7278.37	11.7305	11.7343	11.7401
1	-2359.6	276.01	1	0.000	3825.53	11.0873	11.0948	11.1064
2	-2345.35	28.493	1	0.000	3594.87	11.0251	11.0364	11.0537
3	-2335.39	19.928	1	0.000	3446.72	10.9831	10.9981	11.0211
4	-2329.05	12.673	1	0.000	3361.44	10.958	10.9768	11.0056
5	-2323.12	11.86	1	0.001	3284.53	10.9349	10.9574	10.992*
6	-2320.7	4.855	1	0.028	3262.59	10.9282	10.9545	10.9948
7	-2319.57	2.2464	1	0.134	3260.71	10.9276	10.9576	11.0037
8	-2319.26	.62903	1	0.428	3271.23	10.9308	10.9646	11.0164
9	-2316.24	6.0337	1	0.014	3240.41	10.9213	10.9589	11.0165
10	-2314.57	3.3348	1	0.068	3230.28	10.9182	10.9595	11.0229
11	-2311.29	6.5719	1	0.010	3195.81	10.9075	10.9526	11.0217
12	-2304.13	14.316*	1	0.000	3104.75*	10.8785*	10.9274*	11.0023

Endogenous: failure
Exogenous: _cons

b. CPI:

```
. varsoc dcpi_wma221, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -131.492                      .109061   .622028   .625788   .631545  |
|  1 | -7.14035   248.7    1  0.000  .061117   .042912   .050432   .061947  |
|  2 |  8.05544  30.392    1  0.000  .057177  -.023734  -.012456   .004818  |
|  3 |  8.05744    .004    1  0.950  .057445  -.019049  -.004011   .019021  |
|  4 |  19.6896  23.264    1  0.000  .054648  -.068965  -.050167  -.021378  |
|  5 |  67.1525  94.926    1  0.000  .043938  -.287101  -.264543  -.229996  |
|  6 |  72.9564  11.608    1  0.001  .042958  -.309655  -.283338  -.243032  |
|  7 |  73.2836  .65425    1  0.419  .043094  -.306496  -.276419  -.230356  |
|  8 |  74.9391  3.3111    1  0.069  .042962  -.309573  -.275737  -.223916  |
|  9 |  104.823  59.767*   1  0.000  .037514  -.445176   -.40758* -.350002* |
| 10 |  106.055  2.4647    1  0.116  .037473* -.446267* -.404912  -.341575  |
| 11 |   106.85  1.5905    1  0.207  .037509  -.445306  -.400191  -.331096  |
| 12 |  107.517  1.3346    1  0.248  .037568  -.443744  -.394869  -.320017  |
+---------------------------------------------------------------------------+
Endogenous:  dcpi_wma221
Exogenous:  _cons
```

c. GDP:

```
. varsoc dgdp_wma221, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -4268.67                      3.0e+07   20.0454   20.0492   20.0549  |
|  1 | -3963.96  609.42    1  0.000  7.1e+06   18.6195    18.627   18.6386  |
|  2 | -3947.52  32.886    1  0.000  6.6e+06    18.547   18.5583   18.5756  |
|  3 |  -3946.9  1.2232    1  0.269  6.7e+06   18.5488   18.5639   18.5869  |
|  4 | -3943.28  7.2447    1  0.007  6.6e+06   18.5365   18.5553   18.5841  |
|  5 | -3897.18  92.206    1  0.000  5.3e+06   18.3248   18.3473   18.3819  |
|  6 | -3881.34  31.675    1  0.000  5.0e+06   18.2551   18.2814   18.3217  |
|  7 | -3881.34  .01183    1  0.913  5.0e+06   18.2598   18.2899   18.3359  |
|  8 | -3879.35  3.9788    1  0.046  5.0e+06   18.2551    18.289   18.3408  |
|  9 | -3860.22  38.251    1  0.000  4.6e+06     18.17   18.2076   18.2652  |
| 10 | -3852.05  16.345*   1  0.000  4.4e+06*  18.1364*  18.1777*  18.2411* |
| 11 | -3851.99  .11971    1  0.729  4.4e+06   18.1408   18.1859    18.255  |
| 12 | -3851.33  1.3208    1  0.250  4.4e+06   18.1424   18.1913   18.2661  |
+---------------------------------------------------------------------------+
Endogenous:  dgdp_wma221
Exogenous:  _cons
```

d. CBCL:

```
. varsoc dcbcl_wma221, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -387.655                      .363053   1.82467   1.82843   1.83419  |
|  1 |   67.617  910.54    1  0.000  .043027  -.308061  -.300542  -.289026  |
|  2 |  214.953  294.67    1  0.000  .021645  -.995083  -.983804   -.96653  |
|  3 |  219.135  8.3651    1  0.004  .021324  -1.01002  -.994986  -.971955  |
|  4 |   219.15  .03035    1  0.862  .021423   -1.0054  -.986603  -.957814  |
|  5 |  233.819  29.337    1  0.000  .020092  -1.06957  -1.04702  -1.01247  |
|  6 |  287.688  107.74    1  0.000  .015675  -1.31778  -1.29147  -1.25116  |
|  7 |  302.214  29.053    1  0.000  .014711  -1.38129  -1.35121  -1.30515  |
|  8 |  303.132   1.835    1  0.176  .014717   -1.3809  -1.34706  -1.29524  |
|  9 |  303.139  .01394    1  0.906  .014786  -1.37624  -1.33864  -1.28106  |
| 10 |  323.687  41.097*   1  0.000  .013489  -1.46802  -1.42666* -1.36332* |
| 11 |  325.368  3.3611    1  0.067  .013446* -1.47121*  -1.4261    -1.357  |
| 12 |  325.537  .33787    1  0.561  .013499  -1.46731  -1.41843  -1.34358  |
+---------------------------------------------------------------------------+
Endogenous:  dcbcl_wma221
Exogenous:  _cons
```

e. CBCC:

```
. varsoc dcbcc_wma221, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -320.541                      .264928   1.50958   1.51334    1.5191  |
|  1 |  147.363  935.81    1  0.000   .02959  -.682456  -.674937  -.663421  |
|  2 |  225.817  156.91    1  0.000  .020569  -1.04609  -1.03481  -1.01754  |
|  3 |  228.681  5.7288    1  0.017   .02039  -1.05484   -1.0398  -1.01677  |
|  4 |  229.319  1.2764    1  0.259  .020425  -1.05314  -1.03434  -1.00556  |
|  5 |  249.127  39.616    1  0.000  .018698  -1.14144  -1.11889  -1.08434  |
|  6 |  294.948   91.64    1  0.000   .01515  -1.35187  -1.32555  -1.28524  |
|  7 |  297.382  4.8679    1  0.027  .015049   -1.3586  -1.32852  -1.28246  |
|  8 |  297.453  .14314    1  0.705  .015114  -1.35424   -1.3204  -1.26858  |
|  9 |  302.849  10.792    1  0.001  .014806  -1.37488  -1.33728   -1.2797  |
| 10 |   323.74  41.782    1  0.000  .013486  -1.46826  -1.42691  -1.36357  |
| 11 |  328.334  9.1878*   1  0.002   .01326* -1.48514* -1.44002* -1.37093* |
| 12 |  328.334  .00015    1  0.990  .013323  -1.48044  -1.43157  -1.35672  |
+---------------------------------------------------------------------------+
Endogenous:  dcbcc_wma221
Exogenous:  _cons
```

f. CBCG:

```
. varsoc dcbcg_wma221, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -560.053                      .815603   2.63405   2.63781   2.64357  |
|  1 | -112.092  895.92    1  0.000  .100035   .535645   .543164    .55468  |
|  2 | -25.2767  173.63    1  0.000  .066862   .132755   .144033   .161307  |
|  3 | -25.0638   .4258    1  0.514   .06711    .13645   .151488    .17452  |
|  4 |  -24.718  .69175    1  0.406  .067316   .139521   .158319   .187108  |
|  5 |  7.08401  63.604    1  0.000  .058253  -.005089   .017468   .052016  |
|  6 |  61.1205  108.07    1  0.000  .045413  -.254087   -.22777  -.187465  |
|  7 |  62.8038  3.3666    1  0.067  .045267  -.257295  -.227218  -.181155  |
|  8 |   63.741  1.8745    1  0.171  .045281     -.257  -.223164  -.171343  |
|  9 |  67.0341  6.5861    1  0.010  .044796  -.267766   -.23017  -.172591  |
| 10 |  89.2807  44.493    1  0.000  .040543  -.367515  -.326159  -.262823* |
| 11 |  91.2568  3.9523*   1  0.047  .040358* -.372098* -.326983* -.257888  |
| 12 |  91.2977  .08182    1  0.775  .040541  -.367595   -.31872  -.243868  |
+---------------------------------------------------------------------------+
Endogenous:  dcbcg_wma221
Exogenous:  _cons
```

g. BCI:

```
. varsoc dbci_ma515, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -791.572                      2.41843     3.721   3.72476   3.73051  |
|  1 | -173.678  1235.8    1  0.000  .133574   .824779   .832298   .843814  |
|  2 | -51.2585  244.84    1  0.000  .075536   .254735   .266013   .283287  |
|  3 | -41.8294  18.858    1  0.000  .072605   .215162     .2302   .253231  |
|  4 |   -32.76  18.139    1  0.000  .069906   .177277   .196075   .224864  |
|  5 | -29.8834  5.7531    1  0.016  .069293   .168467   .191024   .225571  |
|  6 |  2.05179   63.87    1  0.000  .059926   .023231   .049548   .089853  |
|  7 |    34.65  65.197    1  0.000  .051664  -.125118  -.095041  -.048978  |
|  8 |  41.3076  13.315    1  0.000   .05031  -.151679  -.117842  -.066022  |
|  9 |  45.6764  8.7378    1  0.003  .049521  -.167495  -.129899   -.07232  |
| 10 |  46.0536  .75428    1  0.385  .049666  -.164571  -.123215  -.059879  |
| 11 |  46.1081  .10895    1  0.741  .049887  -.160132  -.115017  -.045922  |
| 12 |  64.4908  36.765*   1  0.000  .045978* -.241741* -.192866* -.118014* |
---------------------------------------------------------------------------


Endogenous:  dbci_ma515
Exogenous:  _cons
```

h. CCI

```
. varsoc cci_ma616, maxlag(12)

Selection-order criteria
Sample:  13 - 438                               Number of obs      =       426
+---------------------------------------------------------------------------+
|lag |    LL      LR      df    p      FPE       AIC      HQIC      SBIC    |
|----+----------------------------------------------------------------------|
|  0 | -1539.47                     80.9952   7.23227   7.23603   7.24178  |
|  1 |     -539  2000.9    1  0.000  .742323   2.53991   2.54743   2.55894  |
|  2 | -86.8132  904.37    1  0.000  .089259   .421658   .432937   .450211  |
|  3 | -32.9673  107.69    1  0.000  .069647   .173555   .188594   .211625  |
|  4 | -30.8936  4.1473    1  0.042  .069296   .168515   .187313   .216102  |
|  5 | -16.3459  29.095    1  0.000  .065026    .10491   .127468   .162015  |
|  6 | -9.92033  12.851    1  0.000  .063391   .079438   .105755    .14606  |
|  7 | -7.85203  4.1366    1  0.042  .063074   .074423   .104499   .150562  |
|  8 | -5.18453   5.335    1  0.021  .062582   .066594    .10043   .152251  |
|  9 | -4.98678  .39548    1  0.529  .062818    .07036   .107956   .165535  |
| 10 | -.947843  8.0779    1  0.004  .061929   .056093   .097449   .160785  |
| 11 |  8.47288  18.841*   1  0.000  .059528*  .016559*  .061674*  .130769* |
| 12 |   8.7482  .55064    1  0.458  .059731   .019962   .068836   .143689  |
+---------------------------------------------------------------------------+
Endogenous:  cci_ma616
Exogenous:  _cons
```

4.1.6 *Cointegration, VECM and Granger Causality tests*

We performed the Johansen cointegration test to find out the number of cointegration equations in the model. We did this for pairs of each IV with the DV. The number of lags chosen for cointegration was 11 and 12 for all IVs because, as the lag estimation statistics indicated, the minimum number of lags for all except the DV Failure was 10, and the maximum number of lags suggested was 12. For the VECM we relied on the number of lags closely suggested for the dependent variable failure, which were 4.

The VECM output is presented in terms of the speed of adjustment coefficients, which are the lagged error coefficient terms, the short-term relationship and the long-term relationship. Granger Causality for the pairs of variables is also performed.

4.2 Hypothesis results

4.2.1 *Hypothesis 1: CPI causes business failure*

A time series plot of Failures and CPI were done as shown in Figure 1.

a. ***Johansen test for co-integration***

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic critical value is > 5%, then reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out, and the results are shown below:

```
. vecrank failure  dcpi_wma221, trend(constant) lags(12)

                       Johansen tests for cointegration
Trend: constant                                          Number of obs =     426
Sample:  13 - 438                                                 Lags =      12
-------------------------------------------------------------------------------
                                                            5%
maximum                                          trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0      46     -2195.7035           .     19.4272    15.41
    1      49     -2187.3196     0.03860      2.6594*    3.76
    2      50     -2185.9899     0.00622
-------------------------------------------------------------------------------
```

A total of 426 observations were used for the time period July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. The Johansen test shows presence of cointegration, the VEC model (VECM) is the logical choice instead of the VAR model.

b. ***The Vector Error Correction Model (VCEM)***

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and *CPI*. The VECM model was fitted and estimates are shown below:

```
Vector error-correction model

Sample:  5 - 438                                        No. of obs      =       434
                                                        AIC             =  10.88701
Log likelihood = -2345.481                              HQIC            =  10.94999
Det(Sigma_ml)  =  169.5105                              SBIC            =  11.04655

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_failure              8     57.7708   0.2573   147.5446   0.0000
D_dcpi_wma221          8     .229813   0.2739   160.6878   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05 which point to a good fit for the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

```
------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
D_failure    |
         _ce1 |
          L1. |  -.0040475   .0026853    -1.51   0.132    -.0093105    .0012155
              |
      failure |
          LD. |  -.5329755   .0471834   -11.30   0.000    -.6254533   -.4404977
         L2D. |  -.3844906   .0504734    -7.62   0.000    -.4834166   -.2855646
         L3D. |  -.2216039   .0469765    -4.72   0.000    -.3136761   -.1295317
              |
  dcpi_wma221 |
          LD. |   13.51001   12.61653     1.07   0.284    -11.21792    38.23795
         L2D. |   5.929373   12.02872     0.49   0.622    -17.64649    29.50524
         L3D. |   -6.74676   11.90221    -0.57   0.571    -30.07466    16.58114
              |
        _cons |   .0001999   2.776318     0.00   1.000    -5.441282    5.441682
-------------+----------------------------------------------------------------
D_dcpi_wma221 |
         _ce1 |
          L1. |   .0001167   .0000107    10.93   0.000     .0000958    .0001376
              |
      failure |
          LD. |    .000073   .0001877     0.39   0.697    -.0002948    .0004409
         L2D. |  -.0002123   .0002008    -1.06   0.290    -.0006058    .0001813
         L3D. |   -.000405   .0001869    -2.17   0.030    -.0007712   -.0000387
              |
  dcpi_wma221 |
          LD. |   .3571686   .0501888     7.12   0.000     .2588003    .4555368
         L2D. |   .0313922   .0478505     0.66   0.512     -.062393    .1251775
         L3D. |   .2246699   .0473472     4.75   0.000      .131871    .3174687
              |
        _cons |   .0069344   .0110442     0.63   0.530    -.0147119    .0285808
------------------------------------------------------------------------------
```

ii. In the output, it is clear that though the lagged error coefficient is negative (-0.00404), it is insignificant. Therefore, the speed of adjustment of Failure towards long run equilibrium cannot be concluded clearly. CPI is positive (0.000116) and significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. CPI seems near 0, but nothing can be said about the long-term effect of CPI on Failure. A positive value of lagged error coefficient of CPI may mean sustained deviation from long-term equilibrium.

c. *Granger Causality*

If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980). By having already concluded that *CPI* and failure are cointegrated, implicitly this means that there is a long-term causal relationship between them. So, the test below is the short-term Granger causality test.

H_0: Lagged variables of CPI cannot explain business failure.

```
test ([D_failure]: LD.dcpi_wma221 L2D.dcpi_wma221 L3D.dcpi_wma221)

 ( 1)  [D_failure]LD.dcpi_wma221 = 0
 ( 2)  [D_failure]L2D.dcpi_wma221 = 0
 ( 3)  [D_failure]L3D.dcpi_wma221 = 0

           chi2(  3) =    2.46
         Prob > chi2 =    0.4829


. test ([D_dcpi_wma221]: LD.failure L2D.failure L3D.failure)

 ( 1)  [D_dcpi_wma221]LD.failure = 0
 ( 2)  [D_dcpi_wma221]L2D.failure = 0
 ( 3)  [D_dcpi_wma221]L3D.failure = 0

           chi2(  3) =    6.07
         Prob > chi2 =    0.1083
```

iii. The same is indicated by Granger causality tests that neither Failure nor CPI granger cause each other in the short-term. This also means that in the long-term, as well as in the short-term, fluctuations of CPI do not significantly affect business failure as shown by an error correlation term value of (-0.00334). Thus, there is no long-term causality or short-term causality between CPI and Business failure.

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   1   121.1201   0.0000
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restriction imposed
------------------------------------------------------------------------------
        beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
_ce1         |
     failure |          1          .       .       .            .           .
 dcpi_wma221 |  -4360.014   396.1683   -11.01   0.000     -5136.49   -3583.538
       _cons |   884.0952          .       .       .            .           .
------------------------------------------------------------------------------
```

But the series do cointegrate in the long-term in the sense that CPI and business failure run together. This is illustrated by the cointegrating vectors in the model:

Failure → -4360.014 + 884.0952

(396.168)

We reject the null hypothesis that CPI causes business failure. We accept that CPI cannot explain business failure.

4.2.2 *Hypothesis 5: GDP causes Business Failure*

a. *Johansen test for co-integration*

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic > 5% critical value, then reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out and the results are shown below:

```
. vecrank failure    dgdp_wma221, trend(constant) lags(12)

                      Johansen tests for cointegration
Trend: constant                                       Number of obs =     426
Sample:  13 - 438                                             Lags =      12
```

```
--------------------------------------------------------------------------------
                                                              5%
maximum                                           trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0       46     -6156.3392           .     35.6358    15.41
    1       49     -6140.1343     0.07326      3.2260*    3.76
    2       50     -6138.5213     0.00754
--------------------------------------------------------------------------------
```

A total of 427 observations were used for the time period July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. The Johansen test shows presence of cointegration, the VEC model (VECM) is be the logical choice instead of the VAR model.

b. *The Vector Error Correction Model (VECM)*

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and GDP. The VECM model was fitted and estimates are shown below:

```
. vec failure   dgdp_wma221, trend(constant) lags(4)

Vector error-correction model

Sample:  5 - 438                                        No. of obs      =       434
                                                        AIC             =  29.47331
Log likelihood = -6378.708                              HQIC            =  29.53628
Det(Sigma_ml)  =  2.00e+10                              SBIC            =  29.63285

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_failure              8     57.8884   0.2542   145.2158   0.0000
D_dgdp_wma221          8     2493.48   0.1840    96.0435   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05 which point to a good fit of the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_failure						
_ce1						
L1.	-.018351	.0167653	-1.09	0.274	-.0512104	.0145084
failure						
LD.	-.5157239	.0493101	-10.46	0.000	-.61237	-.4190778
L2D.	-.3682113	.0515385	-7.14	0.000	-.4692248	-.2671977
L3D.	-.2126738	.0472972	-4.50	0.000	-.3053746	-.1199729
dgdp_wma221						
LD.	.0018241	.001086	1.68	0.093	-.0003045	.0039526
L2D.	.000502	.0011127	0.45	0.652	-.0016788	.0026827
L3D.	-.0013449	.0011003	-1.22	0.222	-.0035014	.0008116
_cons	.2282887	2.779398	0.08	0.935	-5.219232	5.67581
D_dgdp_wma221						
_ce1						
L1.	5.407372	.7221477	7.49	0.000	3.991988	6.822755
failure						
LD.	-2.608654	2.123983	-1.23	0.219	-6.771584	1.554275
L2D.	-4.979367	2.219966	-2.24	0.025	-9.33042	-.6283137
L3D.	-6.425122	2.037277	-3.15	0.002	-10.41811	-2.432132
dgdp_wma221						
LD.	.3226427	.0467795	6.90	0.000	.2309566	.4143288
L2D.	-.0636732	.0479269	-1.33	0.184	-.1576081	.0302617
L3D.	.133162	.0473933	2.81	0.005	.0402729	.2260511
_cons	.0007748	119.7197	0.00	1.000	-234.6455	234.647

ii. In the VECM output, it is clear that though the lagged error coefficient is negative (-0.0183), it is insignificant. Therefore, the speed of adjustment of Failure towards long-term equilibrium cannot be concluded clearly. GDP is positive (5.4073) and is significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. A positive value of lagged error coefficient of GDP may mean sustained deviation from long-term equilibrium.

c. *Granger Causality*

If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980).

H_0: Lagged variables of GDP cannot explain business failure.

```
. test ([D_failure]: LD.dgdp_wma221 L2D.dgdp_wma221 L3D.dgdp_wma221)

 ( 1)  [D_failure]LD.dgdp_wma221 = 0
 ( 2)  [D_failure]L2D.dgdp_wma221 = 0
 ( 3)  [D_failure]L3D.dgdp_wma221 = 0

           chi2(  3) =    5.72
         Prob > chi2 =    0.1262

. test ([D_dgdp_wma221]: LD.failure L2D.failure L3D.failure)

 ( 1)  [D_dgdp_wma221]LD.failure = 0
 ( 2)  [D_dgdp_wma221]L2D.failure = 0
 ( 3)  [D_dgdp_wma221]L3D.failure = 0

           chi2(  3) =   10.82
         Prob > chi2 =    0.0128
```

iii. The same is indicated by granger causality tests also. Neither GDP nor Failure granger cause each other in the short-term.

However, there is a long-term cointegrating relationship illustrated by the following model:

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   1    59.2348   0.0000
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restriction imposed
------------------------------------------------------------------------------
       beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
_ce1        |
     failure |          1          .        .       .            .           .
 dgdp_wma221 |  -.0358218   .0046543    -7.70   0.000    -.0449441   -.0266994
       _cons |  -103.2974          .        .       .            .           .
------------------------------------------------------------------------------
```

Failure → -0.00358 – 103.297

(0.00465)

We do not accept the null hypothesis that GDP causes business failures. We accept the null hypothesis that lagged GDP cannot explain business failure.

4.2.3 *Hypothesis 2: CBCL causes business failure*

a. *Johansen test for co-integration*

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic > 5% critical value, reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out, and the results are shown below:

```
. vecrank failure   dcbcl_wma221, trend(constant) lags(12)

                     Johansen tests for cointegration
Trend: constant                                       Number of obs =     426
Sample:  13 - 438                                           Lags =      12
------------------------------------------------------------------------------
                                                            5%
maximum                                          trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0      46     -1985.4502           .     43.8141    15.41
    1      49     -1964.7517     0.09260      2.4172*    3.76
    2      50     -1963.5431     0.00566
------------------------------------------------------------------------------
```

A total of 427 observations were used emanating from a span period for the time period July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration, against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. The Johansen test shows presence of cointegration, the VEC model (VECM) is be the logical choice instead of the VAR model.

b. *The Vector Error Correction Model (VECM)*

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and *CBCL*. The VECM model was fitted, and estimates are shown below:

```
. vec failure   dcbcl_wma221, trend(constant) lags(4)

Vector error-correction model

Sample:  5 - 438                                  No. of obs      =       434
                                                  AIC             =  9.962101
Log likelihood = -2144.776                        HQIC            =  10.02508
Det(Sigma_ml)  =  67.22233                        SBIC            =  10.12164

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------------------
D_failure              8     58.2511   0.2448   138.1241   0.0000
```

```
D_dcbcl_wma221        8     .144003   0.5450   510.1706   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05 which point to a good fit of the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

```
------------------------------------------------------------------------------
               |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
D_failure      |
          _ce1 |
           L1. |  -.0013114   .0135126    -0.10   0.923    -.0277955    .0251728
               |
       failure |
           LD. |  -.5253858   .0486882   -10.79   0.000     -.620813   -.4299586
          L2D. |  -.3813373   .0512195    -7.45   0.000    -.4817257   -.2809489
          L3D. |  -.2188258    .047741    -4.58   0.000    -.3123964   -.1252552
               |
  dcbcl_wma221 |
           LD. |  -21.87181   18.48167    -1.18   0.237    -58.09523     14.3516
          L2D. |   36.86734   23.88366     1.54   0.123    -9.943771    83.67846
          L3D. |   -22.4678   19.44809    -1.16   0.248    -60.58535    15.64974
               |
         _cons |   .0073582   3.788804     0.00   0.998    -7.418561    7.433278
---------------+--------------------------------------------------------------
D_dcbcl_wma221 |
          _ce1 |
           L1. |   .0002264   .0000334     6.78   0.000     .0001609    .0002919
               |
       failure |
           LD. |  -.0001439   .0001204    -1.20   0.232    -.0003798     .000092
          L2D. |  -.0001831   .0001266    -1.45   0.148    -.0004313    .0000651
          L3D. |    .000205    .000118     1.74   0.082    -.0000263    .0004363
               |
  dcbcl_wma221 |
           LD. |   .8016765   .0456886    17.55   0.000     .7121286    .8912245
          L2D. |  -.1408979   .0590429    -2.39   0.017    -.2566197    -.025176
          L3D. |  -.0127205   .0480777    -0.26   0.791    -.1069509      .08151
               |
         _cons |   .0426179   .0093663     4.55   0.000     .0242603    .0609755
------------------------------------------------------------------------------
```

ii. The number of cointegration equations suggested was at least 1 (at r=1). In the VECM output, it is clear that, though the lagged error coefficient is negative (-0.0013), it is insignificant. Therefore, the speed of adjustment of Failure towards long-term equilibrium cannot be concluded clearly. CBCL is positive (0.0002264) and is significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. A positive

value of lagged error coefficient of CPI may mean sustained deviation from long-term equilibrium.

c. *Granger Causality*

If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980).

H_0: Lagged variables of CBCL cannot explain business failure.

```
. test ([D_failure]: LD.dcbcl_wma221 L2D.dcbcl_wma221 L3D.dcbcl_wma221)

 ( 1)  [D_failure]LD.dcbcl_wma221 = 0
 ( 2)  [D_failure]L2D.dcbcl_wma221 = 0
 ( 3)  [D_failure]L3D.dcbcl_wma221 = 0

           chi2(  3) =    2.56
         Prob > chi2 =    0.4646

. test ([D_dcbcl_wma221]: LD.failure L2D.failure L3D.failure)

 ( 1)  [D_dcbcl_wma221]LD.failure = 0
 ( 2)  [D_dcbcl_wma221]L2D.failure = 0
 ( 3)  [D_dcbcl_wma221]L3D.failure = 0

           chi2(  3) =   10.08
         Prob > chi2 =    0.0179
```

In the short run, CBCL may not cause Business Failure, but Business Failure may granger cause CBCL. This is indicated by a significant Chi-square value ($p<0.05$ at 0.0179). There may be short-term causality from Business Failure to CBCL.

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   1   49.90696   0.0000
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restriction imposed
------------------------------------------------------------------------------
        beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
_ce1         |
     failure |          1          .       .       .            .           .
dcbcl_wma221 |  -416.9756   59.02419    -7.06   0.000    -532.6609   -301.2903
       _cons |  -402.5974          .       .       .            .           .
------------------------------------------------------------------------------
```

Also, the series exhibit cointegration in the long-term in the form of:

Failure → -416.9756 – 402.5974

(59.024)

We accept the null hypothesis that CBCL causes business failure, albeit in the short-term. However, we do not accept the hypothesis that lagged variables of CBCL cannot explain business failure.

4.2.4 *Hypothesis 3: CBCC causes business failure*

a. *Johansen test for co-integration*

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic > 5% critical value, then reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out and the results are shown below:

```
. vecrank failure    dcbcc_wma221, trend(constant) lags(12)

                      Johansen tests for cointegration
Trend: constant                                       Number of obs =     426
Sample:  13 - 438                                           Lags =      12
------------------------------------------------------------------------------
                                                              5%
maximum                                          trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0      46     -1973.6723           .     34.0449    15.41
    1      49     -1958.3475     0.06942      3.3954*    3.76
    2      50     -1956.6498     0.00794
------------------------------------------------------------------------------
```

A total of 426 observations were used from a time period dating July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. Since the Johansen test shows presence of cointegration, the VEC model (VECM) is be logical choice instead of the VAR model.

b. *The Vector Error Correction Model (VECM)*

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and CBCC. The VECM model was fitted and estimates are shown below:

```
. vec failure  dcbcc_wma221, trend(constant) lags(4)

Vector error-correction model

Sample:  5 - 438                                        No. of obs      =       434
                                                        AIC             =  9.907564
Log likelihood = -2132.941                              HQIC            =  9.970539
Det(Sigma_ml)  =  63.65444                              SBIC            =  10.06711

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_failure              8     58.0095   0.2511   142.8329   0.0000
D_dcbcc_wma221         8     .140904   0.3469   226.2351   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05, which point to a good fit of the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

```
------------------------------------------------------------------------------
               |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
D_failure      |
          _ce1 |
           L1. |  -.0016745   .0094049    -0.18   0.859    -.0201077    .0167587
               |
       failure |
           LD. |  -.5305367   .0482892   -10.99   0.000    -.6251817   -.4358916
          L2D. |  -.3705517   .0511037    -7.25   0.000    -.4707131   -.2703903
          L3D. |  -.2154764    .047322    -4.55   0.000    -.3082259    -.122727
               |
  dcbcc_wma221 |
           LD. |   16.08839   19.20868     0.84   0.402    -21.55994    53.73672
          L2D. |   26.84761    22.4632     1.20   0.232    -17.17946    70.87468
          L3D. |  -36.19826   19.67204    -1.84   0.066    -74.75476    2.358235
               |
         _cons |   .0014651    3.08455     0.00   1.000    -6.044142    6.047072
---------------+--------------------------------------------------------------
D_dcbcc_wma221 |
          _ce1 |
           L1. |   .0001365   .0000228     5.97   0.000     .0000917    .0001812
               |
       failure |
           LD. |   -.000023   .0001173    -0.20   0.845    -.0002529    .0002069
          L2D. |  -.0002175   .0001241    -1.75   0.080    -.0004608    .0000258
          L3D. |  -.0002098   .0001149    -1.83   0.068    -.0004351    .0000155
```

```
             |
dcbcc_wma221 |
          LD. |   .6167041   .0466575    13.22   0.000      .525257    .7081512
         L2D. |  -.1534473   .0545627    -2.81   0.005    -.2603883   -.0465064
         L3D. |   .0567299    .047783     1.19   0.235    -.0369231    .1503829
              |
        _cons |   .0179788   .0074923     2.40   0.016     .0032942    .0326635
------------------------------------------------------------------------------
```

In the VECM output, it is clear that though the lagged error coefficient is negative (-0.00167), it is insignificant. Therefore, the speed of adjustment of Failure towards long-term equilibrium cannot be concluded clearly. CBCL is positive (0.0001365) and is significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. A positive value of lagged error coefficient of CBCL may mean sustained deviation from long-term equilibrium.

c. *Granger Causality*

H_0: Lagged variables of CBCC cannot explain business failure.

```
. test ([D_failure]: LD.dcbcc_wma221 L2D.dcbcc_wma221 L3D.dcbcc_wma221)

 ( 1)  [D_failure]LD.dcbcc_wma221 = 0
 ( 2)  [D_failure]L2D.dcbcc_wma221 = 0
 ( 3)  [D_failure]L3D.dcbcc_wma221 = 0

           chi2(  3) =    6.14
         Prob > chi2 =    0.1049

. test ([D_dcbcc_wma221]: LD.failure L2D.failure L3D.failure)

 ( 1)  [D_dcbcc_wma221]LD.failure = 0
 ( 2)  [D_dcbcc_wma221]L2D.failure = 0
 ( 3)  [D_dcbcc_wma221]L3D.failure = 0

           chi2(  3) =    5.10
         Prob > chi2 =    0.1645
```

ii. The same is confirmed by the Granger causality tests. Neither Failure nor CBCC granger cause each other in the short-term. Thus, there is no long-term causality and short-term causality between CBCC and Business failure.

```
 Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                  1   34.10901   0.0000
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restriction imposed
------------------------------------------------------------------------------
        beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
_ce1         |
     failure |          1          .        .       .            .           .
dcbcc_wma221 |  -612.2888   104.8387    -5.84   0.000    -817.7689   -406.8087
       _cons |  -290.5598          .        .       .            .           .
------------------------------------------------------------------------------
```

iii. However, the series do cointegrate in the long-term in the sense that CBCC and business failure run together. This is illustrated by the cointegrating vectors in the model:

Failure → -612.288 -290.559

(104.838)

We reject the null hypothesis that CBCC causes business failure. We accept that lagged variables of CBCC cannot explain business failures.

4.2.5 *Hypothesis 4: CBCG causes Business Failure*

a. *Johansen test for co-integration*

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic > 5% critical value, then reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out and the results are shown below:

```
. vecrank failure   dcbcg_wma221, trend(constant) lags(12)

                       Johansen tests for cointegration
Trend: constant                                         Number of obs =     426
Sample:  13 - 438                                                Lags =      12
------------------------------------------------------------------------------
                                                          5%
maximum                                        trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0      46     -2215.6474           .     33.8395    15.41
    1      49      -2199.833     0.07156      2.2109*    3.76
    2      50     -2198.7276     0.00518
```

A total of 427 observations were used for the time period July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration, against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. Since the Johansen test shows presence of cointegration, the VEC model (VECM) is the logical choice instead of the VAR model.

b. *The Vector Error Correction Model (VECM)*

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and CBCG. The VECM model was fitted and estimates are shown below:

```
. vec failure  dcbcg_wma221, trend(constant) lags(4)

Vector error-correction model

Sample:  5 - 438                                        No. of obs      =       434
                                                        AIC             =  11.12798
Log likelihood = -2397.773                              HQIC            =  11.19096
Det(Sigma_ml)  =  215.7001                              SBIC            =  11.28753

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_failure              8     57.9217   0.2534   144.5588   0.0000
D_dcbcg_wma221         8     .258686   0.3765   257.2255   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05 which point to a good fit of the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

```
------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
D_failure    |
         _ce1 |
          L1. |   .0040817   .0045092     0.91   0.365    -.0047562    .0129196
             |
     failure |
          LD. |  -.5326548   .0474645   -11.22   0.000    -.6256835   -.4396262
         L2D. |  -.3798133   .0503101    -7.55   0.000    -.4784192   -.2812073
```

```
          L3D. |  -.2219844   .0470793    -4.72   0.000    -.3142581   -.1297107
               |
  dcbcg_wma221 |
           LD. |   22.57436   10.27853     2.20   0.028     2.428821     42.7199
          L2D. |  -21.06643   12.15683    -1.73   0.083    -44.89338    2.760513
          L3D. |  -6.787486   10.80429    -0.63   0.530     -27.9635    14.38853
               |
         _cons |   .0001885   2.796399     0.00   1.000    -5.480653     5.48103
---------------+------------------------------------------------------------------
D_dcbcg_wma221 |
          _ce1 |
           L1. |  -.0001306   .0000201    -6.49   0.000    -.0001701   -.0000912
               |
       failure |
           LD. |   .0000388    .000212     0.18   0.855    -.0003767    .0004543
          L2D. |   .0001839   .0002247     0.82   0.413    -.0002565    .0006243
          L3D. |  -.0003238   .0002103    -1.54   0.124    -.0007359    .0000884
               |
  dcbcg_wma221 |
           LD. |   .6167346   .0459052    13.43   0.000     .5267621    .7067072
          L2D. |  -.0656945    .054294    -1.21   0.226    -.1721087    .0407198
          L3D. |   .0203837   .0482533     0.42   0.673    -.0741911    .1149585
               |
         _cons |   .0058896   .0124891     0.47   0.637    -.0185885    .0303677
------------------------------------------------------------------------------
```

ii. In the VECM output, it is clear that, though the lagged error coefficient is positive (0.004087), it is insignificant. Therefore, the speed of adjustment of Failure towards long-term equilibrium cannot be concluded clearly. CBCG is negative (-0.0001306), which is a value very near to 0 and is significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. This indicates that 0.013 percent of this disequilibrium is corrected within a month (since it is monthly data that we have used). It will revert to long-term equilibrium.

c. *Granger Causality*

If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980).

H_0: Lagged variables of CBCG cannot explain business failure

```
. test ([D_failure]: LD.dcbcg_wma221 L2D.dcbcg_wma221 L3D.dcbcg_wma221)

 ( 1)  [D_failure]LD.dcbcg_wma221 = 0
 ( 2)  [D_failure]L2D.dcbcg_wma221 = 0
 ( 3)  [D_failure]L3D.dcbcg_wma221 = 0

           chi2(  3) =    7.42
         Prob > chi2 =    0.0597

. test ([D_dcbcg_wma221]: LD.failure L2D.failure L3D.failure)
```

```
( 1)  [D_dcbcg_wma221]LD.failure = 0
( 2)  [D_dcbcg_wma221]L2D.failure = 0
( 3)  [D_dcbcg_wma221]L3D.failure = 0

           chi2(  3) =    5.16
         Prob > chi2 =    0.1605
```

i. Further, the Granger causality tests indicate that there is no short-term causality between the two variables.

However, there is long-term cointegrating relationship illustrated by the following model:

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   1   43.70393   0.0000
-------------------------------------------

Identification:  beta is exactly identified

                Johansen normalization restriction imposed
------------------------------------------------------------------------------
       beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
_ce1         |
     failure |          1          .        .       .            .           .
dcbcg_wma221 |    784.479   118.6646     6.61   0.000     551.9007    1017.057
       _cons |  -201.1519          .        .       .            .           .
------------------------------------------------------------------------------
```

Failure → 784.479 + 201.151

(118.664)

We fail to accept the null hypothesis that CBCG does not cause business failures. We accept the null hypothesis that CBCG cannot explain business failure.

4.2.6 *Hypothesis 6: BCI causes Business Failure*

a. *Johansen test for co-integration*

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic > 5% critical value, then reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out and the results are shown below:

```
. vecrank failure   dbci_ma515, trend(constant) lags(12)

                     Johansen tests for cointegration
Trend: constant                                          Number of obs =     426
Sample:  13 - 438                                              Lags =      12
------------------------------------------------------------------------------
                                                              5%
maximum                                          trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0       46     -2233.1249           .     20.5152    15.41
    1       49     -2224.1995     0.04104      2.6644*    3.76
    2       50     -2222.8673     0.00623
------------------------------------------------------------------------------
```

A total of 426 observations were used for the time period July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration, against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. Since the Johansen test shows presence of cointegration, the VEC model (VECM) is the logical choice instead of the VAR model.

b. *The Vector Error Correction Model (VECM)*

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and BCI. The VECM model was fitted and estimates are shown below:

```
Vector error-correction model

Sample:  5 - 438                                        No. of obs      =       434
                                                        AIC             =  11.13799
Log likelihood = -2399.944                              HQIC            =  11.20096
Det(Sigma_ml)  =   217.869                              SBIC            =  11.29753

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_failure              8     57.3482   0.2681   156.0287   0.0000
D_dbci_ma515           8     .262357   0.4950   417.5428   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05 which point to a good fit of the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_failure						
_ce1						
L1.	-.1266208	.0376342	-3.36	0.001	-.2003825	-.052859
failure						
LD.	-.4413365	.0540646	-8.16	0.000	-.5473011	-.3353718
L2D.	-.31672	.0537029	-5.90	0.000	-.4219757	-.2114643
L3D.	-.1812947	.0481062	-3.77	0.000	-.2755812	-.0870082
dbci_ma515						
LD.	2.260985	10.23813	0.22	0.825	-17.80538	22.32735
L2D.	-18.66435	12.88167	-1.45	0.147	-43.91195	6.583257
L3D.	18.60156	10.19622	1.82	0.068	-1.382668	38.58578
_cons	6.98e-06	2.754054	0.00	1.000	-5.397839	5.397853
D_dbci_ma515						
_ce1						
L1.	.0004548	.0001722	2.64	0.008	.0001174	.0007922
failure						
LD.	-.0003771	.0002473	-1.52	0.127	-.0008619	.0001077
L2D.	.0001943	.0002457	0.79	0.429	-.0002872	.0006759
L3D.	.0001381	.0002201	0.63	0.530	-.0002932	.0005695
dbci_ma515						
LD.	.7403007	.0468375	15.81	0.000	.648501	.8321005
L2D.	-.0574733	.0589312	-0.98	0.329	-.1729762	.0580297
L3D.	-.2268684	.0466458	-4.86	0.000	-.3182924	-.1354444
_cons	.0019377	.0125993	0.15	0.878	-.0227564	.0266318

ii. In the VECM output, it is clear that though the lagged error coefficient is negative (-0.1266), it is significant. Therefore, the speed of adjustment of Failure towards long-term equilibrium may be around 12%. This indicates that 12% of this disequilibrium is corrected within a month (since it is monthly data that we have used). It will revert to long-term equilibrium. BCI is positive (0.00045) and is significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. A positive value of lagged error coefficient of BCI may mean sustained deviation from long-term equilibrium.

c. ***Granger Causality***

If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980).

H_0: Lagged variables of BCI cannot explain business failure.

```
. test ([D_failure]: LD.dbci_ma515 L2D.dbci_ma515 L3D.dbci_ma515)

 ( 1)  [D_failure]LD.dbci_ma515 = 0
 ( 2)  [D_failure]L2D.dbci_ma515 = 0
 ( 3)  [D_failure]L3D.dbci_ma515 = 0

           chi2(  3) =    3.88
         Prob > chi2 =    0.2750

. test ([D_dbci_ma515]: LD.failure L2D.failure L3D.failure)

 ( 1)  [D_dbci_ma515]LD.failure = 0
 ( 2)  [D_dbci_ma515]L2D.failure = 0
 ( 3)  [D_dbci_ma515]L3D.failure = 0

           chi2(  3) =    6.39
         Prob > chi2 =    0.0943
```

i. The same is indicated by granger causality tests. Neither BCI nor Failure granger cause each other in the short-term.

However, there is long-term cointegrating relationship illustrated by the following model:

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   1   5.120705   0.0236
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restriction imposed
------------------------------------------------------------------------------
       beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
_ce1        |
    failure |          1          .       .       .            .           .
  dbci_ma515 |   -26.3067   11.62523    -2.26   0.024    -49.09172   -3.521672
      _cons |  -243.6233          .       .       .            .           .
------------------------------------------------------------------------------
```

Failure → -26.306 – 243.6233

(11.625)

We accept the null hypothesis that BCI causes business failures. We accept the null hypothesis that lagged BCI cannot explain business failure.

4.2.7 *Hypothesis 7: CCI causes business failure*

a. *Johansen test for Co-Integration*

The Johansen test for Co-integration was then used to determine if there were any cointegrating equations. When the test statistic > 5% critical value, then reject the null hypothesis of at most r (where r = rank) cointegration equations.

The cointegration test is then carried out and the results are shown below:

```
. vecrank failure  cci_ma616, trend(constant) lags(12)

                     Johansen tests for cointegration
Trend: constant                                       Number of obs =     426
Sample:  13 - 438                                           Lags =      12
------------------------------------------------------------------------------
                                                              5%
maximum                                          trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0      46     -2291.0738           .      9.3987*   15.41
    1      49     -2287.2288     0.01789      1.7087     3.76
    2      50     -2286.3745     0.00400
------------------------------------------------------------------------------
```

A total of 426 observations were used for the time period July 1980 to November 2016. Line 1 of the table (Rank 0) tests the null hypothesis of no cointegration against the alternative hypothesis that there is at least 1 cointegration equation. The hypothesis is H_0: r = 0. Since the Johansen test shows presence of cointegration, the VEC model (VECM) is the logical choice instead of the VAR model.

b. *The Vector Error Correction Model (VECM)*

The presence of cointegration between variables suggests a long-term relationship among the variables *failure* and CCI. The VECM model was fitted and estimates are shown below:

```
. vec failure  cci_ma616, trend(constant) lags(4)

Vector error-correction model

Sample:  5 - 438                                        No. of obs      =       434
                                                        AIC             =  11.13568
Log likelihood = -2399.443                              HQIC            =  11.19866
Det(Sigma_ml)  =  217.3673                              SBIC            =  11.29523

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_failure              8     57.5354   0.2633   152.2466   0.0000
D_cci_ma616            8     .261073   0.9075   4178.424   0.0000
------------------------------------------------------------------
```

In the VECM, the output above contains information about the sample size. It also contains information about the fit of each equation and overall model fit statistics. The p-values for the equations are less than 0.05 which point to a good fit of the model.

i. The number of cointegration equations suggested was at least 1 (at r=1).

```
------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
D_failure    |
        _ce1 |
         L1. |  -.1142186   .0338546    -3.37   0.001    -.1805723   -.0478649
             |
     failure |
         LD. |  -.4504907   .0527071    -8.55   0.000    -.5537947   -.3471866
        L2D. |  -.3214418   .0528576    -6.08   0.000    -.4250408   -.2178428
        L3D. |  -.1811262   .0477918    -3.79   0.000    -.2747965    -.087456
             |
   cci_ma616 |
         LD. |  -5.380224    10.6224    -0.51   0.613    -26.19974    15.43929
        L2D. |   20.31966   17.43716     1.17   0.244    -13.85654    54.49586
        L3D. |  -16.51186   10.57562    -1.56   0.118     -37.2397    4.215972
             |
       _cons |  -1.98e-06   2.763171    -0.00   1.000    -5.415717    5.415713
-------------+----------------------------------------------------------------
D_cci_ma616  |
        _ce1 |
         L1. |   .0004337   .0001536     2.82   0.005     .0001326    .0007348
             |
     failure |
         LD. |  -.0003155   .0002392    -1.32   0.187    -.0007842    .0001533
        L2D. |  -.0003329   .0002398    -1.39   0.165     -.000803    .0001372
        L3D. |  -.0000297   .0002169    -0.14   0.891    -.0004547    .0003954
             |
   cci_ma616 |
         LD. |   1.431403   .0482002    29.70   0.000     1.336932    1.525874
        L2D. |  -.6050207   .0791229    -7.65   0.000    -.7600988   -.4499427
        L3D. |   .0806452    .047988     1.68   0.093    -.0134095    .1746999
             |
```

```
       _cons |  -.0005084   .0125382    -0.04   0.968    -.0250827     .024066
------------------------------------------------------------------------------
```

ii. In the VECM output, it is clear that though the lagged error coefficient is negative (-0.1142), it is significant. Therefore, the speed of adjustment of Failure towards long-term equilibrium may be around 11.42%. This indicates that 11.42% of this disequilibrium is corrected within a month (since it is monthly data that we have used). It will revert to long-term equilibrium. CCI is positive (0.00043) and significant at 5%. The lagged error coefficient must be between -1 and 0 and must be significant. A positive value of lagged error coefficient of BCI may mean sustained deviation from long-term equilibrium.

c. *Granger Causality*

If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980).

H_0: Lagged variables of BCI cannot explain business failure.

```
. test ([D_failure]: LD.cci_ma616 L2D.cci_ma616 L3D.cci_ma616)

 ( 1)  [D_failure]LD.cci_ma616 = 0
 ( 2)  [D_failure]L2D.cci_ma616 = 0
 ( 3)  [D_failure]L3D.cci_ma616 = 0

           chi2(  3) =    2.54
         Prob > chi2 =    0.4685

. test ([D_cci_ma616]: LD.failure L2D.failure L3D.failure)

 ( 1)  [D_cci_ma616]LD.failure = 0
 ( 2)  [D_cci_ma616]L2D.failure = 0
 ( 3)  [D_cci_ma616]L3D.failure = 0

           chi2(  3) =    2.89
         Prob > chi2 =    0.4091
```

i. The same is indicated by granger causality tests. Neither CCI nor Failure granger cause each other in the short-term.

However, there is long-term cointegrating relationship, illustrated by the following model:

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   1   6.223363   0.0126
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restriction imposed
------------------------------------------------------------------------------
        beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
_ce1         |
     failure |          1          .       .       .            .           .
   cci_ma616 |  -5.504075   2.206337    -2.49   0.013    -9.828416   -1.179735
       _cons |  -233.3705          .       .       .            .           .
------------------------------------------------------------------------------
```

Failure → -5.504 – 233.370

(2.206)

We accept the null hypothesis that CCI causes business failures. We accept the null hypothesis that lagged CCI cannot explain business failure.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter will seek to relate and compare the results presented and analysed in Chapter 4 pertaining to the hypotheses, and link the findings to the relevant academic literature presented in Chapter 2. Findings are compared and analysed by individual hypotheses and research questions. After ascertaining if there is a relationship between these findings and those of other academics, this research is concluded, having noted any discrepancies and relationships that are of significance. Therefore, the chapter addresses the following areas: explaining the models used in this study, their limitations, and the data results, and lastly how the different hypotheses are addressed. The data analysis for this study was conducted using STATA Version 12.

The study has empirically examined the business failure of companies in South Africa by modelling business failure and macroeconomic variables. Macroeconomic variables in the study include GDP and CPI. The CPI is modelled as a proxy to inflation. The other macroeconomic variables include those of recent and past business cycle, which are the composite leading (CBCL), composite coincident (CBCC), and composite lagging (CBCG) indicators. Additionally, there are variables of business confidence index (BCI) and consumer confidence index (CCI), which are more behaviour-based. The study uses both consumption-based variables to understand the aspect of purchasing power indirectly, and some behaviour-based variables to understand what motivates buying. Moreover, Composite Business Cycles were used to understand if macro factors based on their cycle of lead, coincident, and lag influence business failure. However, it is more likely that the generic macro factors are not sufficient in explaining failure over time. The study, therefore, added behavioural confidence indices in the model in the form of Business and Consumer Confidence Indices.

The majority of research that was conducted on business failure emphasised the one-way causality from macroeconomic variables to aggregate business

failure. While the case for reverse causality from business failure has been tested in the process, it has not been the focus of the study. One can point out that business failure can also be modelled as an independent variable, and it can be constituted as a causal factor for fluctuations or changes or volatility of macroeconomic factors, but that is beyond the scope of this study.

The rest of the study is organized as such: models used in the study are discussed, also giving the econometric details of each model; the results obtained for the tests that are derived from the models; a summary of findings; and a conclusion.

5.2 Models used in the study

Models used were based on the nature of the data. The study uses secondary data for the analysis. Though the credibility of the source of data can be established, the data being economic in nature cannot be undermined.

Different models were employed to allow for systemic analysis of the data into information that can be interpreted easily and hence help in testing the set hypotheses.

5.2.1 *Augmented Dickey Fuller Test*

The first step in analysis was to understand the stationarity of the series under consideration. Since the study uses economic data, issues like non-stationarity and autocorrelation are commonplace. So, the first test was a stationarity test. The most commonly employed test is the Augmented Dickey-Fuller test (ADF) (Dickey & Fuller, 1979). This is the unit root test for stationarity. Unit roots can cause spurious results in the time series analysis. Non-stationarity and data instability may have severe repercussions for the traditional failure of prediction models that can lead to poor predictive abilities in future dated samples (Mensah, 1984). The model used in the study is an augmented version of the Dicker fuller test and can handle larger and more complex sets of time series

models than the prior version. The ADF model is nothing but a regression model, which is as follows:

$$\Delta y_t = \alpha + \beta y_{t-1} + \delta t + X_{k\, j=1}\, \zeta_j \Delta y_{t-j} + e_t$$

where y is the dependent variable, α is the constant, β is the coefficient, δt is the time trend, k is the number of lags in the model, and e is the error term or disturbance. The null hypothesis for the ADF test is:

H_0 : The series contain a unit root (or in other words, the series is a random walk).

The ADF statistic used in the test is a negative number in which the stronger the negative, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence. Considering that the data being investigated by this study is time dependent, the choice of this method of testing was made with the aim of testing the null hypothesis of a Unit root in the time series of information on business failures in South Africa.

It is important to inspect the available data before running an ADF test so as to figure out an appropriate regression model. For example, a non-zero mean indicates the regression will have a constant term. After the selection of a regression model, it is important to then use the ADF to add lagged differences to these models.

In the analysis in the previous chapter the Augmented Dickey-Fuller test was conducted to ascertain if the series were non-stationary. In each case, for each series, the p-value was observed. If the p-value was below 0.05 (at 95% significance), then the null hypothesis was rejected, and it was concluded that the series was stationary. This method’s major limitation is that there is a size distortion for most tests, so the null distribution is available only asymptotically. Moreover, it is often argued that the finite sample distribution is differs substantially from the asymptotic one, leading to actual rejection rates that differ substantially from the nominal level. Classic statistical failure prediction models assume that the relationship between the independent and dependant variables are stable over time and remain the same through the panel time-series data

(Edmister, 1972; Mensah, 1984; Zavgren, 1985). However the result from Mensah (1984) and Wood and Piesse (1987) implies stationary data, which is the stable relationship between the independent and dependant variable and stable relationship between all the independent variables. According to Altman and Eisenbeis (1978) and Zmijewski (1984), to successfully have a predictive model, the variables must be stationary and stable over time. All variables except the variables Failure and CCI were found to be non-stationary. So, the non-stationary variables were first-differenced, and then the differenced variables were again checked for stationarity. They were stationary. The variables Failure and CCI were already stationary without differencing, so, they were used raw.

Since time series of economic data were used, there was a high probability of serial correlation in the data. Serial correlation or autocorrelation is a feature where there is a relationship between the current error terms (ε_t) and their past values. In other words, it is a situation where the error terms are correlated to their lags. This may happen due to general economic and financial phenomenon, the nature of the variable, the longitudinal nature of the issue on hand, or spatial and inter-temporal reasons.

Autocorrelation has some serious disadvantages. The first and foremost is the overfitting of the final regression model (in this case, VECM). Most of the standard deviations and minimum variances would be false and inconsistent. The estimates would be inefficient. In consumption variables like GDP and CPI, where the variables increase over time or even change over time, there is every chance that the residual variances are underestimated, and the fit of the model is overestimated. This means that the resulting model will be biased and spurious.

To confirm that there is serial correlation, we applied the *corrgram* function to test for serial correlation. The *corrgram* test produces a table (correlogram) of autocorrelations (ac), partial correlations (pc), and portmanteau (Q) test statistics. We later drew a line graph of ac and pc, and confirmed that the series were auto-correlated.

In fact, when consumption variables are considered in the data, such behaviour is warranted and expected. There is a need to manage autocorrelation by de-trending or removing seasonalities in the series. All the series of independent variables were smoothened because of evident seasonalities (time series plots provided for the data show these seasonalities).

When a time series is obtained, it is important to separate the signal and noise. The noise is what generates autocorrelation, and this noise must be removed to smoothen the series. STATA does not have an option for seasonal unit root testing for monthly data. The available test root stands good for testing quarterly data. So, we could not do much with a small test. This is the reason we went ahead with smoothening. For smoothening, we used the moving average and weighted moving average methods. Moving averages are linear filters that are applied as either simple moving averages or weighted moving averages. The model goes as:

$$\widehat{x}_t = \frac{\sum_{i=-l}^{f} w_i x_{t+i}}{\sum_{i=-l}^{f} w_i}$$

where $\hat{x}_t$ is the moving average, w is the weight, and xt is the independent variable to be smoothed.

When series were smoothed with moving average, the following model was generated:

(1/5)*[x(t-2) + x(t-1) + 1*x(t) + x(t+1) + x(t+2)]; x(t)= independent variable

where x is the independent variable, the (1/5) indicates the number of leads and lags considered, and t-1, t+1 and t+2 do the same.

With the weighted moving average, the model was slightly different:

(1/9)*[1*x(t-2) + 2*x(t-1) + 3*x(t) + 2*x(t+1) + 1*x(t+2)]; x(t)= independent variable, where (1/9) defines the total weight assigned to the lead, lag, and coincident variables, and 1, 2, 3 and 1 define the specific weights.

Creating these filters was dependent on the noise reducing phenomenon. Each time a moving or weight moving average was applied, the line graph for the noise was checked. Both moving averages and weighted moving averages were applied to the series until the noise was reduced sufficiently and the autocorrelation was removed to the largest extent possible. Smoothening was applied to all independent variable series, and thereafter, the smoothed series were used for further analysis.

5.2.2 *The Johansen test for co-integration*

We have already seen that the series are first difference stationary, in other words, integrated to the order 1 or I (1). It is not a covariance stationary process or an I (0).

Cointegration is again a feature that is unique to time series, especially economic and financial data. Cointegration is defined as the movement of two time series together, over time in simple terms (Johansen, 1988). So, two independent variables or the dependent and independent variables are said to be cointegrated when there is a parameter a, which forms a relationship like:

$u_t = DV_t - aIV_t$

So, if xt1 and xt2 are two independent variables that are I(1) and both have random walk, then a linear combination of them will also have a random walk and a common stochastic trend. This is cointegration, and the variables are cointegrated with a cointegrating vector β.

While such a relationship is expected of economic and financial series, and especially of time series, it is important to know this relationship and incorporate this in the final model so that the regression is complete with short-term and long-term relationships between the variables.

The Johansen test for Co-Integration was conducted to assess if there was a long-term cointegrating relationship between failure and each of the independent variables (Johansen, 1988).

If the test statistic is less than the critical value, you reject the null hypothesis of at most the rank co-integration equations. The number of lags was selected via the *varsoc* (pre-estimation test) in STATA. We chose 12 lags for the lag determination exercise, giving importance to the nature of the data that we selected (monthly data). As a result, the number of lags determined for each variable was 10, 11 or 12. For Failure, the number of lags determined was 5.

The cointegration test was done for each variable, and the test indicated at least one cointegration model that would be present.

5.2.3 *The Vector Error Correction Model (VCEM)*

To sustain equilibrium, there must be forces that pull the cointegrated variables towards equilibrium. So, if two independent variables or an independent and dependent variable are cointegrated, an error correction model must be present to pull them towards equilibrium. The Vector Error Correction Model is just that. The VECM's clarity is in its values of error coefficients. For the disequilibrium to be filled up, at least one lagged error coefficient needs to be negative (and significant at 5%); for one independent variable we need α1 to be negative, and the other needs to be positive.

The VECM model is an adjusted model of the vector autoregressive model to take into accounts the co-integrating relationships and non-stationarity among the variables.

The Vector Error Correction Model was fitted to assess whether there was a long-term relationship between failure and each of the other variables (CPI). The presence of co-integration between variables would have suggested a long-term relationship between the variables exists. The VECM assesses the relationship but does not assess the direction in terms of the flow of the relationship. The vector correction model states that the total change in y can be decomposed in response a response to the last period's disequilibrium, a moving average of past changes, and white noise (Liu, 2009).

In our study, we found that CPI and business failure are not related in the long-term, which is the case with CBCC, CBCL, and GDP. But in the case of CBCG, it was found that the error coefficient was positive (0.004087) and insignificant. Therefore, the speed of adjustment of Failure towards long-term equilibrium cannot be concluded clearly. However, CBCG was negative (-0.0001306), which is a value very near to 0 and is significant at 5%. This indicates that 0.013 percent of this disequilibrium is corrected within a month (since it is monthly data that we used). It will revert to long-term equilibrium. It may be concluded that Failure causes CBCG. CBCG is the composite lagging business cycle. When there are business failures, the composite lagging business cycle changes in the short-term. The long-term relationship is illustrated by the cointegrating relationship. BCI and CCI are also explained by the VECM. In the VECM output, it is clear that though the error coefficient is negative (-0.1266), it is significant. Therefore, the speed of adjustment of Failure towards long-term equilibrium may be around 12%. This indicates that 12% of this disequilibrium is corrected within a month (since it is monthly data that we have used). It will revert to long run equilibrium. Similarly, in case of CCI, the speed of adjustment of Failure towards long-term equilibrium may be around 11.42%. This indicates that 11.42% of this disequilibrium is corrected within a month (since it is monthly data that we have used). It will revert to long-term equilibrium.

5.2.4 *Granger Causality*

Granger causality is a model that predicts if past values of the first variable are useful in predicting past values of the second variable. In other words, granger causality assesses the direction of the relationship, which cannot be determined by the VCEM. It is a statistical hypothesis of determining whether one-time series is useful in forecasting another. If a variable Granger-causes another, this can be better predicted using the past values of both the variables than it can by using the history of one variable alone (Granger, 1980). Granger causality is employed to establish whether or not the macroeconomic variables investigated in this study can be utilized to predict the probability of business failures. In this case, it evaluates the effect of one on the other and vice versa.

It was found that business failures can granger-cause CBCL.

5.3 Summary of findings

This hypothesis that CPI causes business failures is not supported, and it is concluded that the number of business failures do not respond to disequilibrium between consumer price index and failure. In the same way, CPI also does not respond to disequilibrium between consumer price index and failure. This means that changes in the CPI do not affect the business failure in the case of South Africa. This is in contrast to the study by Everett and Watson (1998) who found that a declining consumer price index leads to business failure due to a fall in purchasing power of the consumer. In the long run, there is no causality between CPI and the number of business failures. This can also mean that in South Africa inflation and fluctuations of the CPI do not make a difference to number of business failures.

The hypothesis that GDP causes business failure rates is not supported, and it is concluded that GDP does not cause business failure and business failures do not contribute to GDP changes. The gross domestic product, therefore, is not directly related to the number of business failures in South Africa, which translates to too few failed businesses. It is agreed that liquidity constraints in each country are an essential macroeconomic factor determined by the GDP growths, which bears significant influence on business success. This can in fact be proven; greater asset base is often associated with increased rates of business entry during times of economic growth (Fairlie & Krashinsky, 2012). Also, this is supported by research by Liu (2009) who noted that sudden declines in the economic performance at the international or national levels bear significant impacts on the performance of businesses. However, GDP seems a far-fetched case in this study, as businesses (and consequently, the number of business failures) seem a microeconomic variable in terms of relating them to GDP. GDP is a macroeconomic consumption variable, which accounting for not just business consumption, but also household consumption, including imports, exports, and much more. So, business failures may be too small to actually affect GDP, at least directly.

The hypothesis that CBCL causes business failures is not supported, and it is concluded that CBCL does not affect business failure and the number of business failures also do not affect CBCL. However, there was short-term causality running from failure of businesses to CBCL, indicating that the composite leading business cycle indicator may be useful in predicting business failures. This is logical because business cycles and their trends are used by businesses to understand future prices and economics, and therefore, it is possible that business failures can be predicted by composite lead indicators of business cycles.

The hypothesis that CBCC causes business failures is not supported, and it is concluded that CBCC does not affect business failure. Conversely, number of business failures does not affect CBCC. There is no long-term relationship between the variables.

The hypothesis that CBCG causes business failures is supported. Business failure causes the composite lagging business cycle indicator to change. Labour cost per unit of production, ratio of inventories to sales in the manufacturing and trade sectors, other operational variables, and predominant prime overdraft rate of banks and other similar components form the lagging business indicators (Van der Walt, 1983; Van der Walt & Pretorius, 1994; Venter & Pretorius, 2004; Venter, 2004). Past values of these variables logically affect current time period's business performance. This is indicated well by the VECM result. Whenever there is a shortage of labour, high unemployment, saturation in the labour market, or low supply of labour, the cost of labour in businesses is affected, which would in turn affect the performance of the business. Moreover, since there are other operational variables also in the lagging indicator, this affects businesses. This, in the long term, may lead to exit or failure. The time period (Δ) considered for the study is a month. In this sense, the previous month's labour market variables would most likely affect the current month's business performance.

The hypothesis that BCI causes business failures is supported, and it is concluded that an increase in BCI leads to a decrease in business failures. In

addition, that business failure also affects BCI and the previous values of business failures affect BCI. For example, in South Africa business recession is characterized by poor performance in annual turnover and consumer appeal to its products. These factors impact on the quality of the businesses, such as deteriorating financial stabilities (De Loecker & Van Biesebroeck, 2016). As can be noted declining business failure rates are characterized by low production levels, few or no orders, and low stock levels, which are the main variables for computation of the business confidence index. They also relate to the labour productivity in manufacturing of business personnel in the company. This justifies the findings of Honjo (2000), who concluded that a close relationship between the returns accrued from the business and the risks of its consequent operations exists.

The hypothesis that CCI causes business failures is supported, and it is concluded that CCI affects business failure though the number of business failures do not affect CCI. This is because consumers tend to decrease erratic spending in high inflationary cycles, which directly influences profitability of the business. Consumers are the sole revenue generating source for businesses, so if they cut their spending it leads to business failures. Consumer confidence is influenced by the individual consumer's perception of the economy on the expected future patterns of growth or recession, which directly impacts savings and spending. It is measured by the consumer purchasing trends mostly on high-end items compared to basic necessities.

5.4 Conclusion

Past research on the relationship between macroeconomic aggregates and business failures have been limited to the short-term relationships between the variables. Research analysis on this study has used an error-correction model (VECM) to explore the causes of South African business failures by modelling the short- and long-term behaviours of business failure rates in relation to macroeconomic business cycles over the period 1980-2016.

The objective of this study was to analyse the relationship between business failure and fluctuations associated with the macroeconomic business cycles focusing on South African businesses over a 36-year period. Based on the analysis, the association between business cycles and the macroeconomic influences has been significant to the business failures and fluctuations. This empirical study indicates that there exists a normal, dynamic relationship between macro economy and corporate failure rates.

The VECM analysis confirms the positive impact the Macroeconomic variables have on business failure rates. Though it is not indicated in this study, there is an econometric, as well as economic impact, of inflation on business failures. This has in fact been indirectly shown via the relationship of business confidence and consumer confidence indices with business failures. Therefore, it is safe to reiterate that high rates of inflation may indicate long-term issues within the country's economy, as well as salaries being linked to inflation potentially hurting the business bottom line (Everett & Watson, 1998). Wadhwani (1986) argued that in the absences of index-linked loans, increased inflation implies higher liquidation rates, and Millington (1994) reported inflation as a significant correlation to business failure rates.

Results in the research by Liu (2009) indicate that the long-run and short-run effects of inflation shock indicate that high inflation rates lead to a rise in business failure rates. According to Liu (2009), this finding lends credibility to the argument that high inflation rates can be costly to the economy.

Furthermore, the positive shock to inflation generates an initial short-lived fall in business failures followed by a long-term rise in both periods. Its adverse effect ultimately falls on the rate of business failures, and the effect is shown to be five times stronger in the pre-1980 period to reflect the influence of the inflationary economy in the period. The findings from the two periods lend support to the claim of Wadhwani (1986) that inflation raises the bankruptcy rate for businesses. The pattern of the responses of business failure rates to the business birth rate shock appears to be similar in both periods, with the stronger effect seen in the pre-1980 period. We observe the significant but opposite role

of business incorporations in business failures over time. In the short-run, an increase in new company incorporations results in a decrease in failure rates within the first few periods of establishment, confirming the ‘honeymoon’ effect reported by Altman (1983) and Hudson (1986). However, in the medium to long-run, they are positively correlated.

According to Santoro and Gaffeo (2009), they have established that the bankruptcy rate closely moves together with macroeconomic variables and that the identification of the long-run proportional relationship has effects for academics and corporate businesses by informing institutions of credit risk management. Santoro and Gaffeo (2009) have identified the causal running from macroeconomic variables to bankruptcies but have not found this to hold true the other way around. Additionally, Santoro and Gaffeo (2009) have established short-term aggregate shocks on the bankruptcy rate to be the same as long-term.

Business confidence plays a significant role in understanding behavioural aspects of business owners as well as consumers. The BCI developed in South Africa is the indicator for prevailing business and economic conditions. This affects business failures and exits because businesses form important parts of value chains in an economic environment, small or large. This is directly related to the consumer confidence index (CCI) because consumers form the other end of the chain. The burden of prices or the rewards of discounts are passed on to consumers whose purchasing power matters the most. Business operations, maintenance, and failures are all dependent on consumers and their confidence because businesses produce for consumers. In fact, the types of consumers may be more in number than the types of business owners, because most business owners are also consumers. This means that CCI affecting business failures is quite a logical relationship found by the model in this study.

Table 3: Summary of Findings

S.No.	Variables	Hypothesis	VECM	Cointegration Result (long-run)	Granger Causality (short-run)
1.	CPI and Business Failure	CPI causes Business Failure	No long-run relationship between CPI and Failure, both ways	Failure → -4360.014CPI + 884.0952 (396.168)	Neither Failure not CPI granger cause each other in the short-run
2,	CBCL and Business Failure	CBCL causes Business Failure	No long-run relationship between CBCL and Failure, both ways	Failure → -416.9756CBCC – 402.5974 (59.024)	Business Failure may granger cause CBCL
3.	CBCC and Business Failure	CBCC causes Business Failure	No long-run relationship between CBCC and Failure, both ways	Failure → -612.288CBCC - 290.559 (104.838)	Neither Failure not CBCC granger cause each other in the short-run
4.	CBCG and Business Failure	CBCG causes Business Failure	Long run relationship between Failure and CBCG, in that direction. 0.013 percent of this disequilibrium is corrected within a month. It will revert to long run equilibrium. It may be concluded that Failure causes CBCG.	Failure → 784.479CBCG + 201.15 (118.664)	Neither Failure not CBCG granger cause each other in the short-run
5.	GDP and Business Failure	GDP causes Business Failure	No long-run relationship between GDP and Failure, both ways	Failure → -0.00358GDP – 103.297 (0.00465)	Neither Failure nor GDP granger cause each other in the short-run
6.	BCI and Business Failure	BCI causes Business Failure	The speed of adjustment of Failure towards long-run equilibrium may be around 12%. This indicates that 12% of this disequilibrium is corrected within a month (since it is monthly data that we have used). It will revert to long-run equilibrium.	Failure → -26.306BCI – 243.6233 (11.625)	Neither Failure not BCI granger cause each other in the short-run
7.	CCI and Business Failure	CCI causes Business Failure	The speed of adjustment of Failure towards long run equilibrium may be around 11.42%. This indicates that 11.42% of this disequilibrium is corrected within a month. It will revert to long run equilibrium.	Failure → -5.504CCI – 233.370 (2.206)	Neither Failure not CCI granger cause each other in the short-run

CHAPTER 6: CONCLUSIONS OF THE STUDY

6.1 Introduction

The study sought to understand business failure due to changing business cycles using set indicators relevant to South Africa. In this chapter conclusions of the study are presented, followed by implications, recommendations, and suggestions for future research.

6.2 Conclusions of the study

The research study makes a significant contribution towards academic literature by indicating the importance of systemic and un-systemic risk that relates to business failure. The importance of business failure risk, governmental policies, such as monetary and financial ones that must be adopted to reduce risk of business failure, and the policies that individual businesses must adopt, are detailed.

The study has adopted quantitative research techniques to analyse time series economic data. This has provided interesting results that are in agreement with both theory and practical applications. It is understood that the influence of macroeconomic factors on the business cycles around the world cannot be underestimated. Business cycles, per se, are key components of understanding and forecasting business performance, failure and exit. Economic expansions and contractions are categorised as leading, lagging, and composite variables in the study, to take into account different stages of the business cycle and to understand different variables that influence business failures at different points in the cycle.

Economic cycles in their decline phase also affect business profitability Geroski and Machin (1993) and have a direct impact on a company's sustainability reducing revenue, thereby influencing business failures (Everett & Watson, 1998). It is important to note that a business cycle comprises various expansions occurring at almost the same time, this affects various economic

activities followed by a similar recession, contraction, and revivals in economic performance which merge up into the next expansion phase. In his research, Liu (2009) found that in the medium to long-term, business failures increase as a consequence of a rise in new business incorporations within the economy. This results from the entry of multi-national corporations attracted by a growing GDP, leading to the sudden failure of small unstable businesses in the same field.

Apart from the post-war economists, contemporary economists have utilised these variables often to describe the economic conditions of different regions and their consequent influences on business activities.

There are various reasons for business failures in South Africa. The most common reasons are poor business plans, inflation, bankruptcy, and global recession. The study adopts an appropriate approach to investigate the effects of such variables on the dependent variable, which is the number of business failures. To investigate the effect on failure rates, an error-correction model was utilized, as it aided the interpretation of the properties of the business failure model within a framework of the long-term equilibrium, coupled with its short-term dynamic adjustment process of the economic variables.

The leading business cycle indicators of South Africa are: commodity price index for South Africa's main export commodities; business confidence index, the composite leading business cycle indicator for South Africa's major trading-partner countries; number of building plans approved; interest rate spread, real m1; and more. The business confidence index is a significant indicator for the business cycle in evaluating and determining the macroeconomic fluctuations, and this was weak. Reports such as those by Bishop (2016) indicated that business owners were dissatisfied with the business climate in South Africa, and therefore, a weak growth was expected in 2016. However, in general, there were no predictions of business failures or exits.

Lagging business indicators in South Africa include: employment and labour components like employment and unemployment in agriculture; the number of

appointments per 100 production workers; consumption and trade orders; labour costs in production; and other allied variables (Van der Walt, 1983; Van der Walt & Pretorius, 1994; Venter, 2004). All these are operational variables which affect business performance directly. So, it is logical that lagging composite business cycle indicators showed a relationship with business failures.

Coincident business cycle indicators did not show any relationship, reiterating the fact that businesses are affected more by past values of factors and variables rather than current values of factors and variables.

It was observed that business confidence index and consumer confidence index had individual relationships with business failures. Both these indices predict the business environment in the economy and drive sales, production and employment. These three variables form the pillars of an economy, especially household consumption and industrial consumption, which are driven by the confidence indices. The analysis in this study showed appropriate and respective relationships.

6.3 Implications and recommendations

In order to understand the impact of business failures on the economy, it is also important to describe how businesses are impacted by the various indicators in the economy and how to counter them. Falling consumer confidence means that there is low spending within the economy, which may mean that businesses must adjust their production schedules significantly. This requires lowering the output and creating a scarcity within the economy to enhance demand. Such production cuts mean that it is easy to reduce overhead costs in relation to sales achieved, which enhance profitability of a business during hard economic times.

Government regulations to appropriate low purchasing power of the consumers are directly related to the ease of capital borrowing and interest rates on loans borrowed. This relates to corrective policies on interest and inflation, which

affect consumer access to capital. Findings from the research on this paper go beyond business failures. The monetary policy department from the South African regulatory departments can apply the results within their policies to potentially stabilise the economy through informed cause and affect changes in the macro environment. Understanding why and how businesses fail and what impacts these failures, and in turn how these impact the economy, can generate policies that can mitigate risk, especially business failure risk. Response measures can also be found.

Growth in unemployment rates is directly related to the rate of business failures. As a result, a receding GDP means less output, and as a circular effect, employment rates fall short of what is needed for economic stability. In South Africa, confidence levels at the household/consumer level have been declining; a key concern has been persistently high levels of unemployment faced within the economy with a subdued income growth in developing countries. For businesses, sluggish demand and highly competitive operating conditions continue to influence perception of resilience and confidence. It is appropriate for a country like South Africa to put in place policies that bolster or spur economic growth to boost the aggregate GDP, leading to more business start-ups creating a large employment base. This can be implemented by using both the supply side and demand side policies.

There are some socioeconomic concerns that need addressed, which would impact businesses and the GDP alike, even if such an effect would be seen rather gradually. In South Africa, there are many individuals who have inadequate education and financial training on monetary policies. This means that there is insufficient business knowledge among entrepreneurs, increasing the likelihood of business failure. There is lack of economic information that can aid entrepreneurs to be speculative to determine risk levels for their business and to develop adequate preventative mechanisms. It is important to prepare for business upturn cycles and have a good response time to ensure there is no serious business lag during the cycle period. This observation resonates with Dubrovski (2009) who maintained that in the event of a crisis within the business, a quick response is often necessary. It is suggested that the inclusion

of entrepreneurship into the school curriculum will nurture and equip learners with key skills relevant to running a business.

Another major implication is that South Africa's growth path is highly resource intensive and thus, unsustainable, which leads to a low business confidence index. This results from the international market price changes for commodities such as gold and oil, which creates a major business cycle, upturns if not correctly predicted. It is highly recommended that risk prediction model is used to determine the connection between the macroeconomic fluctuations and business failure since this business failure will impact the economy of South Africa. There should be corrective measure to ensure that other avenues for growth are identified and developed. This will create new companies and eliminate reliance on multinationals that are aligned to natural resources.

For any business to thrive and sustain growth, proper infrastructural provision should be made available, and for South Africa this has not been achieved. When this is viewed as a determinant of economic growth there are inadequacies that are binding constraints. The provision of necessary infrastructure by government to allow for businesses to grow also plays a key role in determining whether a business succeeds or fails.

The business failures in South Africa have a significant relationship with the macroeconomic variables; therefore, it is important for the country to come up with policies that will significantly reduce the fluctuations and spur economic growth in the country. A good understanding of the causes of business failures in a country is the first step towards improving its economy. The cliché that a problem understood is a problem half-solved applies here in that, by understanding the microeconomic factors that cause business failures, the State and other players in the economy can concentrate their efforts on spurring growth and attracting investors.

6.4 Suggestions for further research

This study only limits itself to the understanding of the impact macroeconomic cycles have on failure of businesses in South Africa. Several opportunities for further research arose during the process of conducting the study. One of them is coming up with a solution to streamline the macroeconomic factors that lead to failure of business as a way of allowing for economic growth and development. The study was limited to a few macro-economic factors so there is a need to expand on this research taking note of all other factors that were not considered in this study. That is why the research question can be tested with the same model by using different macroeconomic factors.

6.4.1 *On a governmental level*

Another area that this study leaves open for further exploration is the impact of political and social inclusion factors of South Africa that may lead to failed businesses. Cultural values such as hard work and concentration in certain industries are factors that impact the success or failure of businesses in an economy. Therefore, it is important to examine these factors to understand their role in the business world.

Policies set by governments are important to the success of business or the failure of an economy. Detracting governmental decisions such as increase in cost of licensing, government control, and political instabilities may also affect the levels of success for businesses. The provision of necessary infrastructure to allow for businesses to grow also plays a key role in determining whether a business succeeds or fails.

6.4.2 *On a macro level*

It is also important to test the analysed variables further about their relationship with each other, as it was found during the study's analysis that some may have a relationship or impact with/on the other. For example, the composite index of lagging indicators is best used in conjunction with the composite index of

leading indicators to assess their impact on business failure as they tend to be complimentary in nature. After understanding the macroeconomic fluctuations' relationship to business failures, the next step would be to address them. This presents another research opportunity where the different fluctuations can be examined and solutions sought. With finding solutions to fluctuations that are not harmful to the businesses in the economy, there is bound to be an improvement in the levels of business success and the improved economy.

There is need to research the impact of other macro-economic problems like currency fluctuations, interest rates, and unemployment on the economy at the various cycle phases. It is important to broaden the area of study as the study was done on a single economy, which is influenced by other international economies. Many developing economies are affected by economic changes experienced in world leading economies such as the UK and the USA. This was found by (Liu, 2009).

6.4.3 *On the business level*

Business failure itself has been defined with an arbitrary approach. In the majority of definitions, failure is linked to bankruptcy (Charitou, Neophytou, & Charalambous, 2004; Daubie & Meskens, 2002; Dirickx & Van Landeghem, 1994; Ward & Foster, 1997). In addition to the difficulty of defining of failure, business failure is largely based on a juridical definition. The downside of this definition is that it does not always include the financial presentation of the company. Companies can liquidate the assets to avoid paying debt just by starting a new company. Modelling business failure in predictions analysis can also be skewed. Failure does not happen overnight and in general panel data stipulates the date on which the company was officially liquidated but do not take in consideration the process of company failure (Hubert Ooghe & De Prijcker, 2008; Theodossiou, 1993)

When searching for literature regarding business failure there were limited studies done on the subjects compared to prediction models on business failure (Pretorius, 2009). Evidently, the process of identifying events of business failure

are easier to obtain after businesses have failed, than to understand when and in what stage of a business failure will possibly occur (Probst & Raisch, 2005).

Understanding and defining business literature has presented a theoretical challenge. Studies in the past have attempted to define literature according to their methodological approach, especially in prediction models where bankruptcy and liquidations were general. Future studies can be conducted on previous literature to attempt to build theory on classifying business failure by combining financial, legal and regulatory regulations in general use. The benefit of the unified business failure term is that it can aid business failure prediction models to be more specific and comparative

Studies in the past have used model-driven architecture models and have assumed a dichotomous business failure variable which is classified as failed and not failed. Positioning of the failed versus non-failed business into populations by itself can cause arbitrary prediction models. In the majority of studies, a juridical definition of failure has been used of which most systems classify as bankruptcy. More attempts to identify different classifications of business failures have produced a variety of results as with Keasey and Watson (1991) who used financial distress, Laitinen (1991) who used future events such as cash insolvency and default, and Ward and Foster (1997) who used loan defaults. The criterion is chosen arbitrarily by researchers, whether it is judiciary or based on financial distress. Additionally, choosing the failure rate can be arbitrarily viewed in failing and non-failing businesses when modelled in percentage, as the increase in births of new businesses can skew the dichotomous percentage number. As the failure definition is always applied to a certain arbitrary time period, the separation of firms into failing and no failing populations is artificial. The two populations are only mutually exclusive within the chosen time (Altman & Eisenbeis, 1978; H Ooghe & Joos, 1990; H Ooghe & Verbaere, 1985). Further research can be conducted into defining a unified methodology when testing for business failure.

According to Bhattacharjee et al. (2009), business failures tend to be cyclical in nature, where bankruptcies are associated with economic downturn and

acquisitions with recoveries. Business failures tend to decline with as businesses age, and that can contribute to the experience of the firm through cycles. Additional research can be conducted by introducing the business age, potentially using the age as a moderating variable.

Additionally, further studies can be made by segmenting the different business sizes. Everett and Watson (1998) study suggests that economic factors appear to be associated with 30% to 50% of small business failures, depending on the definition of failure used.

Balcaen and Ooghe (2006) have argued that although failure should depend on more than one annual account in financial health, past information about business performances has been ignored (Pompe & Bilderbeek, 2005; Shumway, 2001). Further studies can be conducted on company level data of failed businesses to assess the profitability through business cycles and how exogenous macro variables influence the business profitability.

However, when panel data is considered, it is usually an indication of a moment in time, and depending on the definition of business failure, such data can also be considered. This would lean towards the classic failure prediction models and would not take into consideration the process of business failure. Detailed studies can be conducted taking into account the business failure process as indicated by Ambler et al. (2004) mentioned in the literature review. Moreover, according to Pretorius (2009), based on literature it is evident that we can learn from the decline in business, the reasons why businesses fail, and how business entrepreneurs can make a turnaround to derive more value. Based on the numerous studies conducted on business failure and the exogenous and endogenous factors contributing towards business decline and failure, the study suggests focusing on businesses that were in decline but were eventually able to turn the businesses into successful entities. Future studies can identify, using Pretorius (2009) process of business failures, in what stage of the process the business was in when the turnaround happened. The potential outcomes of the study can enlighten entrepreneurs and business owners to act proactively

based on the findings and to potentially identify a percentage tipping point where the businesses lost control making failure inevitable.

In conjunction with the above suggestion of understanding the process of business failure, the classical business failure prediction models do not differentiate in the possibility that there are different paths for business failure and assume a uniform process (Laitinen, 1991). Further studies can be conducted not only in the process of the business failure but can also include the different paths that lead to failure.

6.4.4 *At an industry level*

He and Kamath (2006) have indicated that data is generally collected across industries as a whole and that when the researcher develops a model it is most likely to ignore the heterogeneity of the observations and therefore introduce bias. Future studies in research can potentially segment businesses in specific industries and test how the macroeconomic variables affect the specific sectors individually.

Future studies can include the industry as different elements, whether they are internal or external factors, can affect the decline and failure rates of businesses differently. As an example, companies that specialise only on imports versus only export companies will be influenced by different macro variables i.e. the Rand/Dollar exchange rate. This suggestion echoes that of Platt et al. (1994) who recommended that using industry rations can be used instead of financial rations when developing an analysis model.

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