Cartel detection in the South African bread market: A review of the studies by the Competition Commission and National Agricultural Marketing Council

by

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DEDICATIONS

I dedicate this dissertation to Lord God Almighty who gave me the strength and determination to complete this study. I would also like to dedicate this dissertation to my loving family and friends for their love and encouragement throughout my years of studies.

Signature: _____

Date: _____

DECLARATION

I hereby declare that I have submitted this dissertation to the University of Pretoria for my M Inst Agrar (Agricultural Economics) degree, and it has not been previously submitted for a degree at any other University. The dissertation is written in the author's personal capacity and the views expressed here are not necessarily those of the Competition Commission or the National Agricultural Marketing Council.

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ABSTRACT

CARTEL DETECTION IN THE SOUTH AFRICAN BREAD MARKET: A REVIEW OF THE STUDIES BY THE COMPETITION COMMISSION AND NATIONAL AGRICULTURAL MARKETING COUNCIL

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The South African Competition Commission has analysed most levels of the food supply chain by investigation of alleged anti-competitive behaviour by producers, input suppliers, storage companies, processors and retailers. The numbers of these cases include cartels and, to a lesser extent, restrictive vertical constraints and abuse of dominance position. Sexton (2012) states that the recent development in the agricultural market, where large companies are vertically integrating, renders the perfect competition model inappropriate. This brings doubt that the law based on perfect competition will work in oligopolistic markets. Despite the identified number of detected cartels in the grain industry, it might be possible that some cartels in other food chains are still undetected.

Through the application of the market screening approach, the aim of this study is to establish whether the National Agricultural Marketing Council ("NAMC") and the Competition Commission could have detected the bread cartel using secondary data in the absence of the information from the whistle-blower. As the first step, the study carried out a structural assessment of the bread industry. This assessment indicated that the bread market has a number of factors that may facilitate collusive behaviour. The study found that the history of information sharing played a crucial role for bakeries to coordinate their conduct. The second step was to conduct an in-depth behavioural assessment that focused on bread prices to see

whether there has been a structural break in the period under investigation. The idea was to estimate the price equation of brown bread as a function of the SAFEX wheat price, petrol price (cost shifters), and 1 kg of maize meal (demand shifters). The study used the OLS to estimate three regressions using the data for the whole period and two sub-breaks (before the break point, and after the break point) to perform a Chow test. The question that the Chow test asked is: was there a structural break in March 2007, after the Competition Commission received the information from the whistle-blower? In other words, had the price of bread increased or decreased at a certain period without any changes in the demand or cost variable. The Null hypothesis states that there was no structural break, while the alternative hypothesis states that there was a structural break in March 2007.

The Chow test result shows that at a 5 per cent significant level, the F-critical value is $F_{5, 90}$ = 2.68 and the F test statistics is 20.59 with a p value of 0.00. This indicates that we cannot reject the null hypothesis and conclude that a structural break did not occur in March 2007. The screening approached failed to prove the existence of cartel in the bread industry.

Therefore, the study concludes that in the absence of the whistle-blower, it would not have been easy for the Competition Commission and the NAMC (2009) to detect a cartel by just using secondary data. This proves that screening alone cannot prove the existence of cartel without prior knowledge of the conduct and of the industry as a whole. Nevertheless, a market screening approach is important as it can be used as a warning mechanism to detect an emerging cartel, since it can flag potentially suspicious behaviour. Nevertheless, this calls for the policy makers to combine the scoping study by the Competition Commission and the monitoring of food prices by the NAMC, as this will provide the best enforcement tool in detecting cartel behaviour in the food industry.

Key words: Cartel, collusion, market screening approach, structural approach, behavioural approach

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CHAPTER 1

BACKGROUND AND PROBLEM STATEMENT

1.1   INTRODUCTION

Cartels are the extreme form of anti-competitive behaviour and carry the highest penalties in South Africa (Competition Commission, 2010/2011). While they remain undetected, they harm consumers, generate forms of market inefficiency, and reap the benefits of high profit margins.

While there are concerns about the concentrated structure in the food industry and its consequences in the market, it seems almost impossible to detect cartel activities in this industry. Hüschelrath and Veith (2011) state that from a firm perspective this suggests that customers of undetected cartels are faced with elevated costs when sourcing the input products. However, they mention that the availability of detailed transaction data, together with experts' knowledge of the industry, may help the customers of the cartelised industries to proactively detect the conspiracies inherent in cartels.

The studies by the National Agricultural Marketing Council (2009) (NAMC) and the Competition Commission (2002) have shown how difficult it is to detect cartels in the absence of information about, or suspicions of, conspiracies. For example, investigations by the Competition Commission (2002) and NAMC (2003; 2009) attempted to understand the reasons for the high price of food. Although they raised some general concerns, most explained the price movements as result of the market forces. For example, the NAMC (2009) study analysed the price change in the grain supply chain, by comparing prices of the wheat-to-bread supply chain overtime, and suggested that other economic factors, rather than anticompetitive behaviour, influenced the price hikes.

Several investigations by the Competition Commission have proved that the existence of a limited number of players with market power in the industry may give rise to collusive behaviour. The question may have been asked how these two reputable institutions' investigations did not find the evidence of cartel activities in the food chain. This resulted in

critics arguing that the Competition Commission was reactive rather than pro-active in performing its mandate. Similarly, the NAMC (2009) was also criticised for not being able to detect the evidence of collusion, even though they had prior knowledge that the Competition Commission had received information of anti-competitive behaviour from a bread distributor. Although the bread manufacturers have paid a huge administrative penalty, this does not bring back all the money that poor consumers have spent on their loaves of bread.

Against this background, this study argues that the bread cartel and other cartels could have been detected had the Competition Commission used a market screening approach. Therefore, the study discusses the methods that were used by both the Competition Commission and the NAMC to perform their independent mandates. The study then highlights the method that the Competition Commission and the NAMC could have used to flag potentially collusive behaviour in the absence of information from a customer or whistle-blower. Lastly, the study highlights factors as to why scoping and market inquiries by the Competition Commission, together with monitoring of food prices by the NAMC, can be an ideal enforcement tool to complement the existing tools for cartel detection.

1.2   RESEARCH OBJECTIVES

The study will be guided by the following research objectives:

- To assess the market structure, concentration and to unpack structural factors that have facilitated collusion in the bread industry.
- To describe the methods the Competition Commission uses to uncover uncompetitive behaviour.
- To illustrate how the Competition Commission and the NAMC can detect cartels using secondary data by applying the market screening approach.

1.3   HYPOTHESIS

The NAMC (2009) study and the Competition Commission could have detected the bread cartel by using secondary data in the absence of information from the whistle-blower.

1.4   IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

It is difficult to detect cartels because they can take different forms and they utilise highly profitable forms. The courts have made it clear that the Competition Commission is not entitled to undertake "fishing expeditions" to launch an investigation without sufficient evidence or reasonable suspicion to justify the investigation. The Competition Commission must be in possession of information and such information must give rise to a reasonable suspicion of questionable conduct.   However, this does not mean that the Competition Commission must not be more pro-active in detecting anticompetitive behaviour.

This study endeavours to illustrate how cartels may be detected using secondary data in oligopolistic markets. The aim is to investigate how to strengthen the role of the Competition Commission in the modern agricultural and food market. Hence, it is sought to identify some of the potential structural challenges that may harm effective competition in the bread industry, and for this reason, factors, such as actors, structure, market concentration and barriers to entry, are discussed.

This study also provides an overview of the market monitoring activities of the NAMC and the focus of the study will specifically be limited to the NAMC 2009 report on the wheat-to-bread value chain. This study will highlight the shortcomings of analysis done by the NAMC, mainly arguing that it used the principle of perfect competition and ethical business practices as the point of departure. The study will also identify the methods that the Competition Commission uses to uncover cartels in the food industry.

This study aims to define and explain an alternative method, which may help the Competition Commission to complement the existing, more passive tools (getting information from immunity applications, whistle-blowers, and customers) with more proactive methods of cartel detection. Therefore, the study hopes to illustrate how the market screening approach can be used as a proactive method to flag anti-competitive behaviour in the absence of information from whistle-blowers or customers. Ultimately, the study will recommend how a combination of a scoping study by the Competition Commission and the monitoring of food prices along the food chain by the NAMC could be the most important enforcement tool in detecting anti-competitive behaviour in the food industry.

1.5   METHODOLOGY

The methodology applied in this study is the classical test for structural breaks, known as the Chow Test, which is used to identify a firm's collusive behaviour. This study examines (a) whether the Competition Commission or the NAMC could have found a structural break using secondary data, and (b) whether this structural break relates to the existence of a cartel in the bread industry.

Firstly, as suggested by Mncube (2013a), the study estimates a reduced form price regression as a function of exogenous demand, cost shifters, and includes a test for a structural break using an Ordinary Least Square model (OLS). To do so, the study estimated a linear equation for the price of bread in the first difference of the logarithms of all variables. The test asks whether the price has increased or decreased at a certain period for reasons other than demand or cost variables.

Secondly, the assumptions are that there was a structural break in March 2007 after the Competition Commission received information from a whistle-blower. Accordingly, the study estimated two separate models. Model 1 applies before the break period, from 2000 to February 2007, and then model 2 applies after the break period, from March 2007 to August 2008. The study applied a Chow test to test whether or not parameters are unchanged from one set of data to another.

1.6   OUTLINE OF THE STUDY

This study is organised into six (6) chapters. Chapter 2 outlines the theoretical and empirical literature on testing for anti-competitive behaviour in the industry, i.e. the discussion is from a structural approach to a behavioural screening approach. Chapter 3 discusses the role of the South African Competition Commission and lists some of the cartel cases in the food chain. The criticisms against the Competition Commission are also discussed. The chapter also discusses the role of the NAMC's Section 7 committee and their terms of reference, and the finding of the NAMC (2009) wheat-to-bread report. The NAMC's shortcomings in the 2009 wheat-to-bread value chain report are also discussed. Chapter 4 outlines the structure of the bread industry and factors that have been identified to facilitate collusion in this market.

Chapter 5 concentrates on the methodology and results of the market screening approach. Chapter 6 focuses on the recommendation of how both the NAMC and the Competition Commission can combine their agricultural economic knowledge and understanding of competition law in order to detect cartels.

CHAPTER 2

ECONOMIC METHODS APPLIED TO DETECT CARTELS IN FOOD MARKETS

2.1   INTRODUCTION

The Competition Commission's fight against cartels has increased over the last ten years. However, despite the identified number of detected cartels in the grain industry, some of the existing cartels might still be undetected. Previous investigations by the Competition Commission (2002) and NAMC (2009) have proved how difficult it is to detect cartel activities in the absence of information or suspicions of conspiracies.

This chapter identifies and reviews some of the economic methods used from the 1950s to the 1990s to detect cartel behaviour. The next section of this chapter focuses on the foundation of economic analysis into anti-competitive behaviour, as well as highlights the flaws, which might have been experienced with regard to identifying the cartel behaviour within the wheat-bread value chain. Lastly, the chapter reviews the theory and empirical literature on market screening approach. The aim is to show how one can use the market screening approach as method to detect cartel activities.

2.2   FOUNDATIONS OF THE ECONOMIC ANALYSIS INTO ANTI-COMPETITIVE BEHAVIOUR

Bain pioneered the extensive literature concerning a firm's behaviour and market structure in 1951 and known as the Structural Conduct Performance Approach (SCP) (Armah, 2007; Al-Obaidan, 2008; Lee, 2007). The underlying assumption of the market SCP hypothesis is that there is an inverse relationship between the degree of market concentration and degree of competition. The SCP approach has been criticised for not having any econometric foundation (Armah, 2007). The SCP approach and the legal rules were carried out in parallel, both sought to develop and broaden the legal rules to be applied to all industries, and they were framed around measures of market concentration. The legal rules were unsuccessful because it was the rules that were adopted served to deter efficient and pro-competitive behaviour, and the

reliance on structural measures to detect market power became problematic (Baker & Bresnahan, 2006).

The Chicago School of thought followed the SCP paradigm in the early 1970s. The Chicago School criticised the implications of a one-way relationship, stating that it is does not demonstrate the simplicity of tacit or overt collusion in more concentrated markets. Demsetz, one of the Chicago School students, argued that concentration was a consequence of economies of scale and growth of firms that are efficient. Without detailed analyses of price, it is a challenge to distinguish the possibility that high concentration led to higher prices and profitability, from the possibility that high profits from the results of economies of scale, which were associated with lower costs, larger firms, and more concentrated industries. If concentrated markets led to higher industry profits, this is consistent with competitive behaviour, indicating that these profits are the consequences, not the cause, of the efficiency of large firms (Rubinfeld, 2008).

However, there were few differences between the SCP approach and the Chicago School of thoughts, especially with the cartel analysis. The Chicago School gave great weight to regulations as an explanation for the formation of cartels (Connor, 2008). From the late 1970s to the 1980s, the development of game theory models has been applied to the analysis of oligopolistic strategic behaviour. Vives (1999) mentions that the traditional microeconomic model of oligopolistic competition has two types, i.e. the Cournot model or the Bertrand model, all building on the game theory dimensions.

The Cournot model postulates that firms, which compete independently, can decide on their production levels, and bring their output to a level where a price emerges from the interaction of supply and demand. The Nash Equilibrium is reached when each firm chooses an output level that maximises profits, given their rivals' output. At the equilibrium, price is above the marginal cost of production. Unlike the Cournot model, the Bertrand model assumes that the obvious choice for oligopolists is to collude in price, not in quantities. The Bertrand model postulates that in the market were products are homogenous the relevant strategy for a firm is price not quantities. Harrington (2006) states that the Nash equilibrium for the static game is the point where each firm chooses its strategy, normally a price, a bid or a quantity, by looking at the strategies of other players. However, the Nash equilibrium has also not been

without criticism: Sexton (2000) argues that many games have multiple Nash equilibria, raising the question of how to choose among them. Nash equilibria define necessary, but not sufficient, conditions for an "obvious way to play the game" (Kreps, 1990a, 1990b).

In 1970, the empirical measurement of market behaviour, collectively known as New Empirical Industrial Organisation (NEIO), emerged. This method uses microeconomic tools and game theoretic tools. According to Lee (2007:12), contrary to the SCP which was primarily based on cross-section studies, the NEIO focuses on econometric testing with the objective of detecting market power or changes in the collusive-competition behaviour of firms in single industries.

However, according to Sexton (2000), most NEIO applications in agriculture have causally defined the market. He also does not understand the erroneous inferences of how competition on one side of the market affects the market power on the other side of the market. He states that although the SCP approach lacks a microeconomics foundation, it may help to uncover important structural factors across industries. Digal and Ahmadi-Esfahani (2001) also argue that the NEIO approach is complex to implement.

Over the last two decades, other studies have focused on asymmetric price transmission in the agricultural market. This approach is mostly used in the retail food industry and it looks at the movement of price in a vertically integrated market. These models are relatively easy to implement because of fewer data requirements. However, most applications lack theory and they cannot separate collusion from a perfectly competitive markets. Hence, their results are only indicative of market power (Digal & Ahmadi-Esfahani, 2001).

2.3   THE DISADVANTAGE OF USING A HIGH PRICE-COST MARGIN TO SCREEN COLLUSION

According to Harrington (2005), there are several reasons why we should not use a high price-cost margin (defined as $\frac{price - marginal\ cost}{price}$) when screening collusion. The problem with the high price-cost approach is that margins differ across industries. Harrington mentions that there are many industries with high price-cost margins with no evidence or even suspicion of

collusion. A high price-cost margin does not imply collusion, although if properly measured it is may indicate the evidence of market power.

Harrington (2005) argues that there are many industries with high price-cost margins, but only a few are cartelised. Werden (2004) and Connor (2008) agree that the inference that collusion might lead to an increase in price would be wrong, since prices can increase for many reasons unrelated to collusion, i.e. rises in input prices. Collusion may have the impact of raising the price-cost margin to a level commensurate with Cournot quantity competition, in an industry that is subjected to Bertrand price competition, so that the non-collusive price-cost margin is around zero (Harrington, 2005). According Connor (2008), modern oligopoly theory teaches that collusive behaviour will result in price significantly lower than the level of pure monopoly prices.

The Pioneer employee told the Tribunal that bread operates at very low margin at a net profit of between 2-4 %. Harrington (2005) states that an economist who is unaware of the appropriate competitive benchmark, may infer from the observed low margins that there is no cartel. This may be the reason why the NAMC investigation could not detect or find grounds for suspecting collusion in the bread industry because the margins were not high enough to conclude that there were any conspiracies. However, they could only suspect the probability of market power. Similarly, in the flour cartel, the conduct parameter estimated was not very high, however it may have been sufficiently high to drastically raise prices. In that case, it is unlikely that an estimate of the conduct parameter could provide proof of the existence of a cartel (Mncube, 2013a).

Harrington (2005) postulates that a high price-cost margin does not necessarily imply collusive conduct, although a sharp increase in the price-cost margin may raise some concerns. While high price-cost margins can be rationalised without resorting to the presence of a cartel, it is not easy to rationalise the substantial changes in the price-cost margin without the presence of a cartel. Harrington states that the approach of Porter (1983) tries to find the evidence of collusion by determining whether the price generating process is subject to regime change, which cannot be explained by cost and demand shifters. He also suggests that the Porter approach is a more refined and informative implication of the collusive theory,

since it can detect the presence of a cartel even if price-cost margins are not high. Against this background, this study will not apply the high-cost margin approach to detect the cartel.

According to Mncube (2013a), a simpler approach that may be more useful is that which focuses on prices and enquires whether there has been a structural break. The idea is to estimate a reduced form price regression as a function of exogenous demand, cost shifters, and includes a test for a structural break. The test asks whether price has increased or decreased at a certain period for reasons other than demand or cost variables. This is discussed in detail in the next section.

2.4   MARKET SCREENING APPROACH FOR ANTI-COMPETITIVE BEHAVIOUR

Recent studies use a market screening approach as a way to detect collusion in the market. Abrantes-Metz and Sokol (2012:11) define screening as "the art of flagging unlawful behaviour through economic and statistical analysis". Harrington (2005) states that behavioural screening approaches seek to establish which behaviour of participants is likely to be associated with cartels, and that this can be detected from the pattern of firms' prices or quantities or some other aspect of market behaviour. For example, a parallel movement in prices or an inexplicable increase in prices may prompt buyers to be more suspicious. Abrantes-Metz and Sokol (2012:11) state that screening uses data, such as prices, market share, bids, transaction quotes, spreads, volumes and other data, to identify patterns that are anomalous or highly improbable.

2.4.1   Requirements of Screening

Abrantes-Metz and Bajari (2009:66), in concordance with Harrington (2005), argue that a good screening method should possess the following properties: (a) it should minimise the number of false positives and negatives; (b) it should be easy to implement – with minimal human input; (c) it should be should be costly for firms to circumvent; and (d) the screen should have empirical support.

Abrantes-Metz and Sokol (2012:11-12) point out six requirements to appropriately develop and implement an effective antitrust screen for collusive behaviour. These requirements are:

(i)   An understanding of the industry, including its key drivers, the nature of competition, and the potential incentives for the firm to cheat – both internally and externally;

(ii)   A theory on the nature of cheating;

(iii)   A theory on how such cheating will affect market outcomes;

(iv)   The design of a statistic capable of capturing the key factors of the theory of collusion, fraud, and the relevant type of cheating;

(v)   Empirical or theoretical support for the screen; and

(vi)   The identification of an appropriate, non-tainted benchmark against which the evidence of collusion or relevant cheating can be compared.

2.5   THEORETICAL SCREENING METHODS

This section reviews some theoretical models of cartels and collusive behaviour used to construct screening. Hüschelrath (2010) states that competition authorities can implement market screening in their cartel investigation. He further states that the market screening method can be subdivided into three steps. The first step is to undertake a structural assessment of all industries in an economy. This is followed by an in-depth behavioural study of the industries identified to be suspicious by the initial structural assessment. Thirdly, if competition authority find sufficient behavioural evidence, the may offer a leniency programme or may execute dawn raids with the aim of collecting written proof for the existence of cartels.

Dick (1995) uses the transaction cost theory to identify industry structures that might encourage and ultimately sustain cartel activities. He finds that price-fixing cartels were more likely to export non-durable, capital-intensive goods to large markets with many small buyers. Price-fixing cartels sold non-durable goods more than twice as frequently. Increased standard deviation increased the probability of forming a price-fixing cartel by 84.4 %. Raising average buyer size by one standard deviation raised the probability by 29.8 %. He states that each of these characteristics raised a price-fixing cartel's ability to exercise market power. Stigler

(1994), referenced in Dick (1995), stated that collusion is more likely to be sustained against smaller buyers because secret price-cuts will be easily detected by large-scale buyers.

The study of Green and Porter (1984), cited in in Motta (2004), states that collusion would be more difficult to sustain if actual prices (or price discounts) are not observable, but it could still arise at equilibrium. For instance, in an industry where sellers cannot observe the prices charged by rivals or the levels of market, it will be a challenge for a seller to know if a lower than expected number of customers served is attributable to a negative shock in demand or to a price cut by a rival.

According to Green and Porter (1984), if the discount factor is high enough, the collusive strategies that represent equilibrium exist. For example, as long as another firm faces a higher level of demand, each firm sets a price at collusive price level. A low (or zero) demand triggers a reaction and each firm set the one-time equilibrium for a set period, after which all firms revert to the collusive price. Observing the low prices at some periods, we cannot sufficiently assume that the industry is at a collusive equilibrium.

A study by Hanazono and Yang (2007) considered an infinity Bertrand game in which a demand shock occurs in each period, where each firm receives a private signal about the demand shock at the beginning of each period. They considered the optimal symmetric perfect public equilibrium (SPPE) for patient firms. They found that in an optimal sorting SPPE for patient firms, prices tend to higher in high demand states than in low demand states, while high demand states triggers future price wars. Their model also suggests that the relationship between price rigidity and concentration is not monotonic: monopolistic and competitive industries have more flexible prices than oligopolistic industries and in oligopolistic industries, prices tend to be more rigid as the number of firms increases. They state that their findings are in contrast with previous literature on new price war implications.

2.6   EMPIRICAL SCREENING METHODS

The empirical literature on collusive screens may be categorised into the following categories: (1) screening based on a search for pockets of high and low price variances; (2) screening based on structural modelling; and (3) screening based on price and cost information.

2.6.1   Screening based on price variance

According to Abrantes-Metz and Bajari (2009), a well-designed variance screen would flag the high variance of price in the competitive regime. However, some competition authorities worldwide used a low variance to flag potential anticompetitive behaviour. Their motivation for the screening came from the observation of price and cost behaviour during and after the fall of a frozen perch bid-rigging scheme between 1987 and 1989. The conspiracy indicated that collusive prices are less volatile and less responsive to cost shocks than competitive prices. They argue that this empirical finding is consistent with many theoretical models of collusion.

These authors state that a cartel can be thought of as a "filter" that weakens cost shocks before passing them to price, and reduces price variance. Abrantes-Metz and Bajari (2009) results revealed four patterns that were consistent with theoretical models of cartels:

(i)   there was a structural break when the cartel collapsed, marked by a sudden drop in prices;

(ii)   the average price was higher during collusion than during competition;

(iii)   prices were more stable under collusion than under competition, and

(iv)   prices followed costs movements more closely under competition than under collusion.

Abrantes-Metz, Froeb, Geweke and Taylor (2006) examined the price movements in the retail gasoline industry in Louisville over time around the breakdown of a bid-rigging cartel. They estimated price variance at the 279 gasoline stations in Louisville, from 1996 to 2002, that accepted fleet credit cards, and that sales people used and workers whose jobs required driving. They applied screening based on the coefficient of variation to retail gasoline stations and found that while the mean decreased by 16 %, the standard deviation increased by over 200 %. Their results suggest that price variance was lower during the cartel period, compared to the post cartel period.

Bolotova, Connor and Miller (2005) examined the difference in the behaviour of the first two moments of the price distribution during collusion and the absence of it in citric and lysine cartels, using an extension of traditional ARCH and GARCH models. Their results suggest,

relative to pre- and post-cartel periods, that the citric acid conspiracy increased prices by 9 cents per pound, while the lysine cartel increased prices by 25 cents per pound. The price variance for lysine cartel was lower during the cartel period than the variance of prices during the pre- and post-cartel period, as they expected. However, the variance of prices during the citric acid cartel was higher relative to periods that were more competitive. However, the citric acid cartel price variance was higher during the cartel relative to periods when there was no cartel. Because the citric acid cartel continued longer than the lysine cartel did. This makes it more difficult for the cartel member to supervise the cartel and enforce cartel discipline. In addition, the variability in citric acid prices could have been caused by possible opportunistic behaviour.

A study by Jiménez and Perdiguero (2012) established that a monopolistic market showed lower coefficients of variation than the rest of the fuel retail market in question, which according to them confirmed the positive relationship between the existence of cartel and lower price variability. Furthermore, the comparison of results, with respect to both the monopoly in gasoline stations and to the independent firms, suggested a closer to collusion than competitive outcome.

Heijnen, Haan and Soetevent (2012) have developed a method to screen for local cartels. They test whether there is statistical evidence of clustering of outlets that score high on some characteristic that is consistent with collusive behaviour. They followed literature on variance screens initiated by Abrantes-Metz *et al.* (2006) and applied their method to the Dutch gasoline market. They used daily price data on virtually all gasoline stations in the Netherlands and they classified as suspicious those stations with a particularly low variation coefficient. They found clustering in an area close to Rotterdam, for the period 2005-2007. This can never be construed as evidence for collusion but it does suggest that an antitrust authority should have a closer look at the stations active in that area.

2.6.2   Screening Based on Price and Cost Information

In concordance with Harrington (2005; 2006), Abrantes-Metz and Bajari (2009:66) state that identical prices by firms may indicate a price-fixing arrangement, especially when prices are strongly positively correlated. They also mention that a high degree of uniformity across firms

in product price and other dimensions, including the prices for ancillary services, may also indicate a price-fixing arrangement. Price-fixing arrangement may exit in a situation where price increases are not explained by increasing costs.

2.6.3   Screening using the structural break model

Von Blanckenburg, Hanfeld and Kholodilin (2013) have developed a market screening model to detect inconstancies in price changes. They employed a nonparametric (distribution-free) test comparing two distributions, namely Kolmogorov-Smirnov test. They illustrated their approach with a short market simulation in a common energy market setup including merit-order effects. Finally, they adapted the model to German electricity markets. Their task was to employ the timing of the unknown structural break. Their results proved that between 2001 and 2011 energy suppliers were probably successful in controlling the market price for several phases. They detected five structural break periods in which they observed that the distribution of price changes differed with high significance.

A study by Hüschelrath, Müller and Veith (2011) developed a market screening approach that could be applied by customers of potentially cartelised industries to analyse procurement based on the cartel members' invoice information. Firstly, they applied a structural break analysis to detect anomalies in the data. To examine whether structural break could be related to the existence of a cartel, they used a multivariate pooled and static panel estimation approach. They applied a unique data set of about 34 000 market transactions from 36 smaller and larger customers of German cement producers to test the accuracy and effectiveness of the proposed screening tool and illustrate how screening approaches would have allowed the large upstream customers to detect a cartel before the competition authority. Their results showed that the competition authorities should view customers of the potential cartelised industry as they fight cartels.

Frank and Schliffke (2013) used the same data and methodology as Hüschelrath, *et al.* (2011) in the study of a German cement cartel that lasted from the beginning of the 1990s until the end of 2001. They also found the presence structural break in the period under investigation, although the main purpose of these two studies was to analyse cartel overcharging.

2.7   SHORTCOMINGS OF THE MARKET SCREENING APPROACH

Haider and Hunter (2010) state that economic screenings have limits to what they can uncover. Doane, Froeb, Sibley and Pinto (2013) use the metaphor of statistical inference by specifying the competing hypotheses, i.e. competition (H0) vs. collusion (HI), and a variable X to differentiate between them. The study found the under-appreciated reasons for failure of screening are that the null hypothesis is not indicative of competition or the alternative is not indicative of collusion. Haider and Hunter (2010) state that in developing screens to detect collusion when there is no information provided by the informant or an immunity application one will face the following challenges:

- The screening for collusion depends on the available data. A screening cannot prove or establish that collusion has actually occurred, however, it may be able to flag the likelihood of cartel. It is unlikely that market price, sales and output analysis will be able to distinguish explicit from tacit collusion. Thus in the absence of an explicit agreement, a screening based on economic data will only be used to identify a situation that requires further study and not as stand-alone proof of illegal behaviour. They argue that it is challenging to apply or develop a price-fixing screen when there is no with suspicious or prior knowledge of a price-fixing claim.

- A screen that can detect collusion throughout an industry requires a systematic approach that does not rely on information about known or suspected periods of price-fixing. While the variance test has a strong theoretical foundation, a screen based on such a test is difficult to develop. For example, the variance screen assumes that prices are more stable under collusion. However, there are economic models that suggest that prices may be more variable during the collusive phase. They note that firms may find ways to pass through the total of cost increases during a competitive phase rather than a collusive phase. They also note that economic models that incorporate the possibility that a cartel may have a punishing mechanism in place suggest that there could be a very high variance in prices during the alleged cartel period, e.g. the citric acid cartels in early 1990s (refer to Bolotova *et al*., 2005).

- A screening based on changes in cost and demand shocks may be possible, although the data requirements may be onerous. Screening can be used to develop an informative competitive benchmark. However, prior information about the alleged price fixing or bid rigging and the timing of the alleged conduct is required.

Practitioners must make sure that they make screening assumptions that "fit" the industry to which the screening is being applied (Doane *et al*., 2013). The screening assumptions must be able to distinguish collusive from competitive behaviour to account for market conditions and cost that explain the observed behaviour. Haider and Hunter (2010) also note that while screens may be useful in identifying collusion, data on prices and sales alone can never distinguish tacit from explicit agreement among competitors.

2.8   SUMMARY

Cartels constitute the most serious form of anti-competitive behaviour, which carries the highest penalties in many countries. However, despite the identified number of detected cartels in the South African grain industry, a number of existing cartels may still remain undetected. This chapter has provided a literature review of some of the economic methods used from the 1950 to the 1990s, in which the analysis was narrowed down to the modern use of a market screening approach adopted by some competition authorities. From the structural approach pioneered by Bain to the behavioural approach, there has been a significant improvement in detecting cartels and collusive behaviour by different Competition Authority.

The market screening approach is useful in detecting a cartel. Nevertheless, there is no doubt that the approach cannot alone prove the existence of cartel without prior knowledge of price-fixing claims. However, the screening can flag potentially suspicious behaviour (Haider & Hunter, 2010). The next chapter discusses the role of the Competition Commission and the NAMC. The chapter also highlights some criticism of both institutions and recommends how these two reputable intuitions can combine their expertise in order to improve the analysis of competition in the food industry.

CHAPTER 3

THE COMPETITION COMMISSION AND THE NATIONAL AGRICULTURAL MARKETING COUNCIL

3.1   INTRODUCTION

The purpose of this chapter is to discuss the role of the Competition Commission and the NAMC in the bread cartel saga. This chapter also highlights some criticisms of both institutions and recommends how these two reputable institutions might combine their expertise in order to improve the analysis of competition in the food industry.

The first part of the chapter outlines the role of the Competition Commission's investigation into cartels and other anti-competitive behaviour. The chapter will also highlight some of the criticisms of the Competition Commission. The second part of this chapter outlines the role of NAMC, briefly discuss their approach to investigation in the bread-to-wheat supply chain , their findings and shortcomings in this investigation. Lastly, this chapter will discuss how these two reputable institutions could work together to strengthen the role of, and adherence to, Competition Law in the food sector.

3.2   THE ROLE OF THE COMPETITION COMMISSION

The responsibility of the Competition Commission is to investigate, control and evaluate horizontal practices and vertical practices, abuse of dominance, pricing behaviour and mergers (Competition Act no 89 of 1998). Neuhoff, Govender, Versfeld, Dingley (2006:14-15) state that are three ways of initiating a complaint: firstly, a natural or legal person (complainant) may ask the Competition Commission to investigate an agreement or a practice by another firm if they believe that the other party may have contravened the Act. Secondly, the Competition Commissioner may initiate a complaint against the parties that may have contravened the Competition Act. Thirdly, a firm or party to an agreement may notify the Competition Commission of their behaviour with other parties through a corporate leniency application. Lastly, a party or a firm may take a complaint straight to the Tribunal.

3.2.1   The Competition Commission's approach to investigations

Cartels constitute the most serious form of anti-competitive behaviour and carry the highest penalties, of up to 10 % of the firm's annual turnover in the preceding financial year, both in South Africa and from its exports from South Africa (Competition Commission, 2010). Any member of the public may lodge a claim for damages incurred and the high number of investigations involving cartels has prompted the Competition Commission to form a specialised unit to investigate cartel allegations.

The corporate leniency policy is used as an effective tool in identifying and investigating cartel cases (Competition Commission, 2011:25). A firm or whistle-blower (this may be a disgruntled employee) can come forward and disclose their involvement in cartel activity. The Competition Commission grants conditional immunity ("CLP") immunity to a firm that meet the qualifying criteria, including truthful disclosure and cooperation with it. When firm qualifies for a conditional immunity for a particular behaviour, it will not pay a penalty in terms of the settlement process. In addition to the CLP, the Competition Act also makes provision for settlements and consent orders, which allow the Competition Commission and the respondents to agree on the terms of an appropriate order with Competition Tribunal (Competition Act No.89 of 1998:73).

However, in an instance where the Competition Commission receives information from a whistle blower, the Competition Commission can issue either a summons or an information request to gather the evidence. Surprise inspections conducted at an alleged firm's place of business have also constituted a crucial instrument that the Competition Commission has used to gather evidence, e.g. in the cement cartel, cable wire cartels and constructions cartels. Customers or competitors of alleged cartels have also proved to be helpful in providing evidence of collusive behaviour to the Competition Commission. Effective from the 1st April 2013, the Competition Commission has the formal power to conduct market inquiries as a tool to promote competition in the economy.

3.2.2   Food as a Competition Commission priority sector

The strategic plan for 2006 to 2009 introduces Competition Commission's work through sector prioritisation. The Competition Commission prioritise four sectors: (i) food agro-processing and forestry; (ii) banking and financial services; (iii) intermediate industrial products; and (iv) construction and infrastructure. Agro-processing, as one of the priority sectors, covers economic activity from production of agricultural products to processing for final consumers and includes production of food products, as well as forestry and timber. These industries are important because of the essential products produced, value adding activities, employment involved and the likely existence of anti-competitive behaviour in the agricultural market attributable to high concentration (Competition Commission, 2010/2011).

3.2.3   Cases of anticompetitive behaviour in the food sector

The South African Competition Commission has analysed most levels of the food supply chain by investigating alleged anti-competitive behaviour by producers, input suppliers, storage companies, processors and retailers. The numbers of these cases include cartels, and to a lesser extent, restrictive vertical constraints. With respect to the grain industry, the Competition Commission has investigated activity involving fertiliser, storage, bread, milled wheat and white maize meal, retailers on exclusive lease, milk processors, fats and oil, fish, animal feeds, sugar poultry and eggs. Table 3.1 in the next shows some of the cases of anti-competitive behaviour in the food market which the Competition Commission has investigated.

Table 3.1: Selected cases of anticompetitive behaviour in the food industry investigated by the Competition Commission

Industry	Parties	Description Of The Behaviour	Who Initiated a Complaint	Recourse
Fertilisers	Sasol/Omnia and Yara	*Cartel and abuse of dominance*. Charging discriminatory prices and refusal to supply.	'Profert' Pty) Ltd-Customer	Administrative penalty
Storage	(i) Senwes	Abuse of dominance through a margin squeeze.	CTH - Competitor	Found guilty of Margin Squeeze. No administrative penalty-but Senwes had to change their behaviour
	(ii) AFGRI, Senwes and others.	Fixing the price of daily storage rate.	Competition Commissioner	Settlement
Bread	Premier, Pioneer, FoodCorp and Tiger Brands	An alleged price fixing and customer allocation cartel.	Bread Distributor in the Western Cape and CLP applications	Administrative Penalty
Millers (Wheat)	Pioneer Foodcorp Goldrich Milling, Premier, Tiger Brands and others	Fixing the price of wheat.	CLP application from Premier and Tiger.	Administrative Penalty
Millers (White Maize)	Pioneer, Foodcorp, Goldrich Milling, Premier Foods, Tiger Brands and others	Information received from CLP Application proved that the parties were involved in fixing the price of wheat.	CLP application from Premier and Tiger.	Administrative Penalty
Milk	Clover, Parmalat Ladismith Cheese, Woodlands Dairy, Nestle SA and Milkwood Dairy	Processors fixed prices paid for raw and processed milk, information exchanged and market allocation.	Producer	Other cartel members paid their fines. Woodlands and Milkwood referral was withdrawn
Poultry	Astral and Elite	Restricting competition and the fixing of trading conditions on the supply of parent breeding stock.	County Bird, and Supreme Chicken-Competitors	Settlement

3.2.4 Criticisms levelled against the Competition Commission's Approach

There are some criticisms that have been levelled against the Competition Commission, especially in the food sectors. The methodologies used , the accuracy of the information collected, and the types of analysis undertaken by the Competition Commission to uncover cartels. One may argue that the actions of the Competition Commission have by definition, been excessive and have as such killed all future investments in the food industry, thereby entrenching the existing concentration.

There are also perceptions that the actions of the Competition Commission were only witch-hunts and that they did, in fact, possess real evidence before starting investigations. For example, in the Woodland and Milkwood case others argue that the Competition Commission missed the plot and went into the case without understanding the milk market since they thought that selling milk to your competitor is anti-competitive.

However, that was not the case. The SCA made it clear that the Competition Commission is not entitled to undertake "fishing expeditions"; that is, to launch an investigation without sufficient evidence or reasonable suspicion to justify an investigation. Therefore, the important criticism levelled against the Competition Commission by the Supreme Court of Appeal (SCA), was that the Competition Commissioner had initiated a complaint against the whole industry, even though he did not have evidence to prove that the anti-competitive behaviour occurred throughout the industry as a whole. According to this judgement, the Competition Commissioner is supposed to properly identify the respondents and the conduct before initiating a complaint. This led to the initiation statement being deemed to be flawed.

Table 3.1 shows that the initial evidence which prompted Competition Commission's investigations came from information received from producers, customers or competitors, with the Competition Commission initiating only a few of the cases. As a result, critics have argued that this is the evidence that the Competition Commission was reactive, rather that proactive, in performing its mandate. The Competition Commission's 2000 internal report also failed to detect anti-competitive conduct in the food industry. The content of the report are confidential. That is way the writer did not discuss them.

3.3   THE NAMC AND ITS ROLE

The NAMC was established in terms of the Marketing of Agricultural Products Act ("MAP ACT") No. 47 of 1996, as amended by Act No 59 of 1997 and Act No. 52 of 2001. The NAMC provides strategic advice to the Minister of Agriculture, Forestry and Fisheries on the marketing of agricultural products.

3.3.1   Section 7 Committees

Section 7 of the MAP Act makes provision for the NAMC to establish a Section 7 Committee whenever it deems it necessary to investigate industry issues. The Section 7 Committee structure consists of industry representatives and associations, members of the NAMC Council, and Non-Government Organisation (NGO) representatives including workers unions, trade unions. The NAMC Council has the power to approve the formation of the Section 7 Committee.

3.3.2   Terms of reference for NAMC Report 2009

The Minister of Agriculture and Land Affairs mandated the NAMC in 2009 to investigate the misuse of market power by firms along the wheat-to-bread value chain. The NAMC's investigation only focused on providing the fundamental economic factors that drive the price of bread. Their focus was on these main objectives:
- To analyse the economic factors driving bread prices,
- To investigate the pricing in the wheat-to-bread value chain,
- To investigate the cost structure in the wheat-to-bread value chain, and
- To make recommendations for making bread more affordable.

3.3.3   The approach followed by the NAMC in their investigation

To compile the wheat-to-bread value chain report, the NAMC used a combination of a literature review and written submissions from key role players. The submissions came from the National Chamber of Milling and Baking, Grain South Africa and Yebo. The Members of the Chamber of Milling and Baking were required to submit information on a monthly basis

for compilation into industry statistics. A draft report was compiled and used as a basis for further consultation with SAFEX, SAGIS, Wheat Forum and the Chamber of Milling at a formal workshop. The Council used five different prices in the value chain, namely the average producer price that the farmer receives, as reported by SAFEX; the mill door price based on the SAFEX price, including transport, handling and storage costs; the bakers' wholesale price; and the retail price for bread. Data from the AC Nielsen database shows that the industrial large-scale millers and bakers still have the largest portion of the market share in the production and sales of bread.

The NAMC also looked at the cost structure at different levels in the chain, namely the used average costs of different wheat production regions of the primary sector, and indicative figures for net profit using Grain South Africa information. The NAMC received details of costs and profits before tax and interest for major millers and bakers from the National Chamber of Milling and Baking.

3.3.4   The NAMC's findings

The most significant finding of the NAMC (2009) from the wheat-to-bread investigation was that the price of bread had been following international market trends and was subject to economic factors governing the market. The NAMC stated that the factors behind the increase in the price of bread are beyond the control of local policy makers. The NAMC highlighted the fact that South Africa is a net importer of wheat and the local price of wheat is subject to import parity pricing. The NAMC looked at the different trends of the nominal national average price of white and brown bread between January 2000 and December 2008. Their logical thinking was that, since brown bread is zero-rated for value-added tax and is more expensive to process than white bread, it could be expected that the difference between these white and brown bread would be 14% (the rate of value-added tax) at any given time. However, the result of their analysis showed a progressively decreasing differential, from 17% in January 2000, to 11% in December 2008.

The brown bread price increased 13 % faster than that of white bread in the same period. According to the NAMC, retailers were the ones who had to account for such an increase in the price of brown bread. The share of different nodes in the retail price of bread shows that

the share of wheat producers was 30% in the early 1990s. In the late 1990s, this figure dropped below 20% and in 2007, it picked up to 25%. This was the result of changes in the wheat price over time. Additional observations were as follows:

- The share of the millers decreased during the period under consideration.
- The bakers' share was the highest in the retail price of bread and the NAMC suggested that this was attributable to the level of value adding that bakers contribute. The producers' share had been gaining in momentum, putting the bakers' share under pressure.
- The retailers' and government's shares did not show any significant growth or decline during the period examined, because brown bread had been VAT zero-rated since 1990.
- The costs of logistics had declined during the period under consideration.

The NAMC made the following observations regarding the cost structure and profits along the chain in the wheat-to-bread value chain.

At the primary level:
- The wheat producer costs had been on the rise since 2000, owing to the rise in input costs.
- Average net profits were under pressure and producers made considerable losses in the same period.
- Increases in input costs in 2008 may have put pressure on the net profits of producers, hence their ability to produce. (Profitability had recovered owing to higher global wheat prices.)

At secondary level:
- Milling and baking costs had increased since 2000, due to rising distribution costs attributable to rising fuel and transport costs.
- Bakers' profits before tax and interest had increased and were higher than that of the millers.
- Millers' profits before tax and interest were under pressure.

The NAMC found that, despite the rising costs along the value chain, the South African bread price had remained the lowest among many developed countries and some African countries. Lastly, the NAMC raised the concern about high concentration in the secondary level of the value chain. The NAMC mentioned that this put pressure on smaller firms, and militated against healthy competition and the opportunity for buying more affordable bread. The NAMC alleged that smaller bakeries argued that the vertically integrated millers tended to negotiate higher flour prices with smaller bakeries, forcing them to operate at lower margins or to exit the business. Allegedly, this restricted smaller bakeries in the market.

3.3.5   The NAMC's shortcomings

Harrington (2005) highlights the point that the use of industry experts to provide ancillary information is good and potentially fruitful, even though there may be some concerns. Industry experts might be quite good at predicting median mark-ups, but less effective at predicting extreme mark-ups, owing to the fewer observations being made. There is also a concern that experts' beliefs are based on what they infer about cost and the model they are using. Therefore, we first need to ask these questions: "did they presume competition? or, did they suspect collusion? If they presumed that firms are competing, then is this approach not biased in favour of the competitive model?"

Accordingly, one may argue that the NAMC analysis maintains a perfect competition assumption on one side, while investigating oligopoly market. As a result, they miss the appropriate uncompetitive benchmark. Thus, they infer from the observed margin that the market is competitive because the price-cost margins were consistent with a model of competition. Accordingly, their approach is biased in favour of the competitive model. As a result, their analysis is inconsistent with a firm's collusive behaviour. This has led to NAMC drawing some wrong conclusions, and it has claimed that retailers were the ones who were to account for the increases in the price of bread. According to Motta (2004), it is important to note that descriptive analysis does not change the fact that we have to make the right assumptions about the market. This teaches that the point of departure before we carry out descriptive analysis is to make right assumptions about the market. Even if good and reliable data exist, econometric techniques might provide ambiguous answers as to the existence of anti-competitive behaviour in a given industry. The descriptive analysis approach is more

likely to give complementary evidence, rather than conclusive proof, of anticipative behaviour in the market.

On the other hand, there is a perception that the NAMC's close relationship with the role players in the value chain has compromised their assessment and therefore their assessment is biased. Even though they knew that the Competition Commission had received information from the bread distributor, which alleged that the bakeries were involved in cartel conduct, the NAMC ignored this information, and the only plausible explanation the NAMC could find for the increases in the price of bread was the market forces.

However, there is also a perception that the relationship between the NAMC and the industry participants is based on trust and respect, and therefore it is not biased. Owing to asymmetric information in the agricultural market, this relationship helps the NAMC to get information from industry participants.

3.4   SUMMARY

This chapter shows how the Competition Commission has played an important role in the food sector to ensure fair and efficient competition in the food industry to benefit the consumers. The NAMC also plays an important role in reviewing and monitoring the food market and in investigating whether the agricultural market is functioning well. This calls for an allocation of competencies between the NAMC and the Competition Commission for strengthening the role of the Competition Commission in the modern agricultural market. The NAMC is in a better position to provide guidance to the Competition Commission, since their investigations give them a better understanding of the industry, and this should also allow the NAMC to gain a better understanding of competition law and so ensure that the Competition Commission does not undermine their work. Although the NAMC and the Competition Commission have received some criticism, these institutions are still striving towards the effective implementation of their mandate. Chapter 6 will discuss in detail how the Competition Commission and the NAMC could work together to deter the anti-competitive conduct. The next chapter provides the overview of the market structure and concentration in the bread industry, which is followed by the characterisation of the so-called bread cartel.

CHAPTER 4

OVERVIEW OF MARKET STRUCTURE, CONCENTRATION AND ANTI-COMPETITIVE BEHAVIOUR IN THE BREAD INDUSTRY

4.1   INTRODUCTION

The previous chapter discussed the roles of the Competition Commission and the NAMC and some of the criticisms levelled against both institutions when conducting their investigations. In Chapter 2, we noted that the market screening approach can divided into three steps, namely the structural approach, the behavioural approach and leniency applications.

The aim of this chapter is to demonstrate how a structural approach could be used to detect cartels. A structural assessment approach is based on identifying markets with traits thought to be conducive to cartel formation, i.e. homogenous products, fewer firms, inelastic demand and more. In contrast, a behavioural approach focuses on signs in actual market behaviour, which may signal the existence of cartel agreement (Hüschelrath, 2010). Economic theories, and the structure of the industries where cartels were previously found, have identified a number of additional factors, which have the potential to facilitate the formation of cartels and collusive behaviour. Accordingly, this chapter discusses the structural factors that may facilitate collusion in the bread industry; issues such as the history and the structure of the bread market are discussed. This is followed by a characterisation of the bread cartel.

4.2   THE HISTORY OF THE BREAD INDUSTRY

Bread is the staple food for most South Africans. Thus, the price sensitivity of market demand for bread is low. The price of bread can vary without significantly affecting the quantity demanded because of the low price sensitivity of the demand for bread. This has provided bread manufacturers with an opportunity to coordinate their conduct (NAMC, 2009). On 1 March 1991 the payment of subsidies on standard bread was abolished. The aim of various control measures had been to keep bread affordable. In 1980 the authorities had been pressurised into granting additional bakery licences. Then in 1991, the process of deregulating the wheat, milling and baking industries started. This was followed by the abolishment of

single marketing in 1997, leading to an era of a free market system. Before 1997, regulations and government controls heavily influenced supply chain management. After 1997 interaction increased communication in the up and downstream market in the supply chain (NAMC, 1999). Table 4.1 depicts the key indicators in the baking industry.

Table 4.1: Key indicators in the baking industry

Regulated	Deregulated
Control of wholesale and retail price until 1991	No control on bread price
Bread prices were subsidised by government up to 1991	No subsidies on bread prices
Prior to 1991, no VAT on white bread	VAT on white bread
	Retail margins on brown bread higher because of VAT exemption.
Market share of plant bakeries was 92 % of the total bread market	Drop in market share to approximately 60 % of the total bread market.
Number of plant bakeries decreased after 1991 to 147 in 1997	Number of plant bakeries dropped further to 106 in 1999
Restrictive registration of standard bread bakers until 1991	Amalgamation of four major plant bakery groups

Source: NAMC, 1999

According to Motta (2004), history might play a crucial role in prompting cartel members to coordinate. From 1947 the prices of a standard loaf of white and brown bread had been subsidised. Looking at the history of the bread market in South Africa, we can observe the industry whose culture and business practices appear to facilitate or encourage collusion. For instance, before market liberalisation and deregulation, many food markets had been protected from foreign competition, which resulted in a highly concentrated agricultural industry. In the Competition Commission case against Pioneer , the Competition Tribunal state that although the bread industry was no longer regulated after 1991, a history of co-operation and sharing of industry information became entrenched over many decades among the industry participants. Members used to exchange information in the days of the Marketing Boards. As a result, the history of coordination and information sharing provided bakeries with a focal point on which to coordinate their conduct.

4.3   THE STRUCTURE OF THE BREAD MARKET

The baking industry is the major client of the milling industry. Four primary bakeries enjoy a market share between them of between 50 – 60 % of the domestic bread market in South Africa. These companies are Premier Foods (whose brand is Blue Ribbon), Tiger Brands (whose brand is Albany), Foodcorp (whose brand is Sunbake) and Pioneer Foods (whose brands are Sasko and Duens). All these companies are vertically integrated.

After deregulation, the number of baking units was estimated to be 7 900; 85 of which were wholesalers, 600 were in-store corporate bakeries, 3 700 were independent bakeries, and 3 500 were franchise bakers. The informal bakeries were estimated to number 53 200[1].

The major four bakeries were former members of the trade association, i.e. the Chamber of Milling and Chamber of Baking. After the deregulation of the agricultural market, members of the associations continued to use the trade associations to share market information.

The bread making industry is characterised by low barriers to entry. While this might be the case, Grimbeek and Lekezwa (2013) state that the existence of the cartel in flour industry has limited the ability of independent bakers to enter and expand within the industry. According to a source (2008), cited in NAMC (2009), bakeries all use the same equipment and ingredients and are therefore faced with similar input costs, e.g. wheat flour (41 % of their cost), fuel, and labour, and these costs are subject to the same fluctuations. Although branding is important, bread is usually seen as a homogenous product.

However, given this collection of factors that might facilitate collusion, Hüschelrath (2010) notes that such an analysis is by no means sufficient with respect to the detection of cartels. The presence of one or more structural factors in a market renders the industry more susceptible to cartel. Yet, there is no guarantee that you will not find a cartel in an industry with different structural characteristics.

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[1] Accessed at http://www.nda.agric.za/docs/fpmc/Vol4_Chap3.pdf on 20 November 2013

4.4   THE COST DRIVERS OF BREAD

The NAMC's main finding is that the movement in bread prices follow the prices in the international wheat market suggesting that international market forces play an important role in the level and trend of the price of bread in South Africa. This is confirmed by Figure 4.1 and Figure 4.2 showing how the bread price tracks the trend in the wheat market, which is closely linked to wheat import parity prices, as mentioned by NAMC (2009). Since South Africa is a net importer of wheat, the domestic wheat prices are determined by international prices of wheat. This results in the domestic price of wheat being close to the import parity price and closely follows trends in international prices.
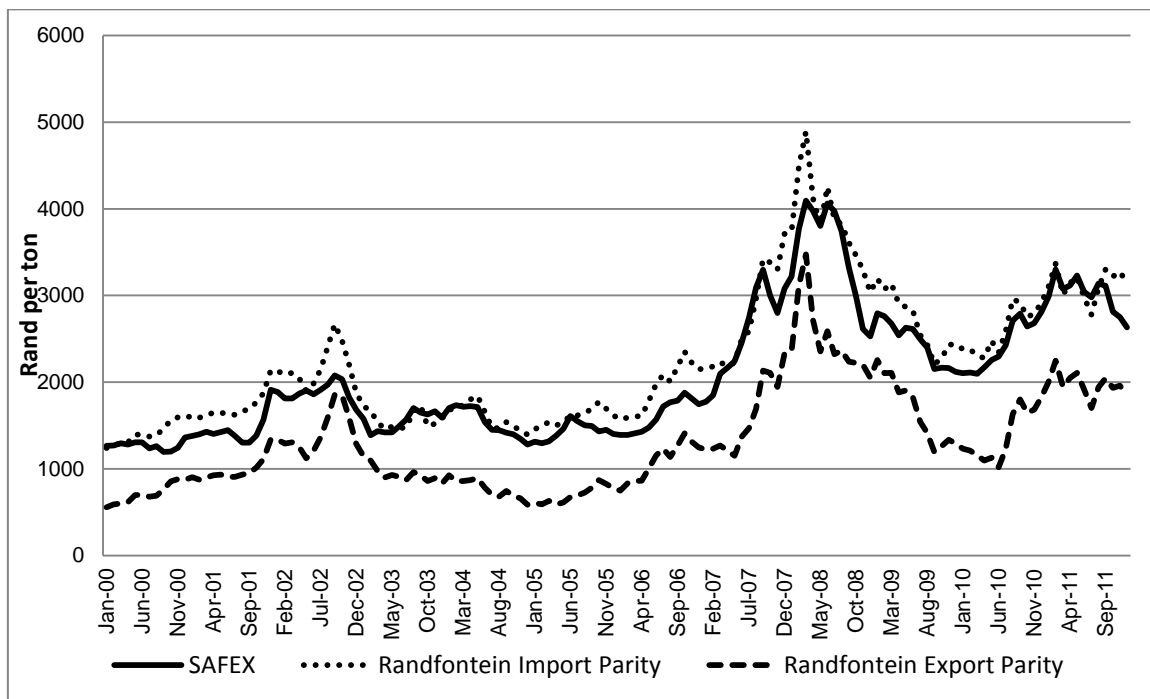
Figure 4.1: The SAFEX wheat price as determine by the international wheat price from 2000 to 2013

Source: Sagis, SAFEX
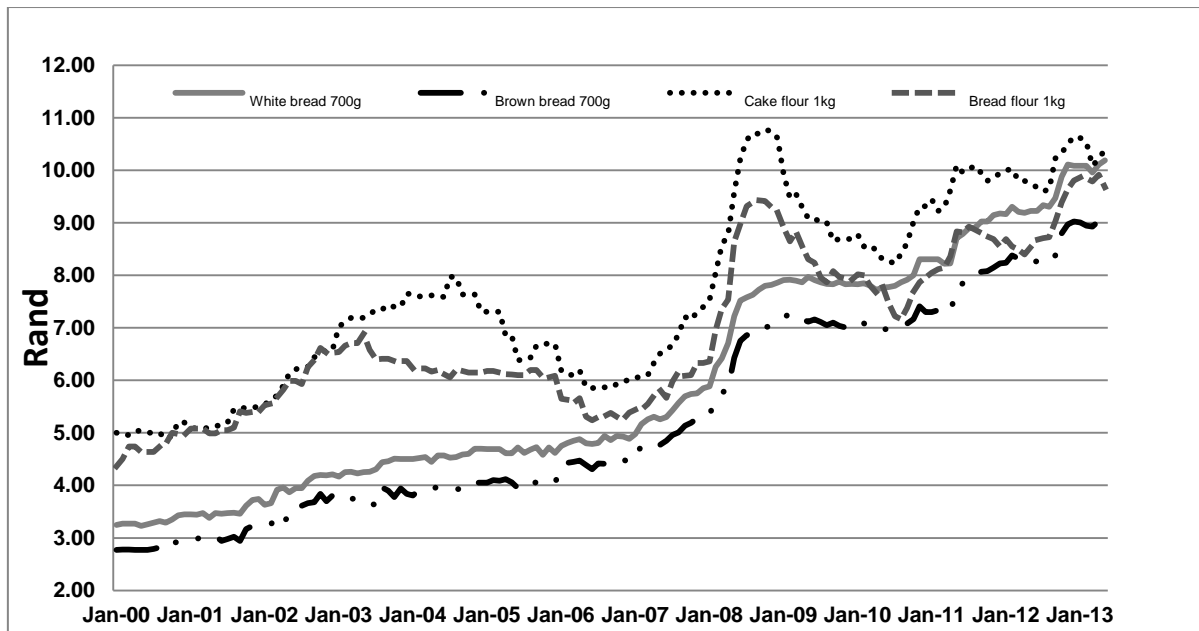
Figure 4.2: Nominal Price of bread and bread and cake flour

Source: Stats SA; Grain SA; Sagis

4.5   THE BREAD CARTEL

In 2006, the Competition Commission received information from bread distributors in the Western Cape about an alleged cartel. This led to the Competition Commission's investigation into bread and milling companies. The complainant alleged that major bread manufacturers, namely Premier Foods (whose brand is Blue Ribbon), Tiger Brands (whose brand is Albany), Foodcorp (whose brand is Sunbake) and Pioneer Foods (whose brand is Sasko and Duens) were fixing the price of bread. This complaint was called the Western Cape complaint.

During the investigation into the Western Cape complaint, Premier Foods applied for leniency and undertook to cooperate with the Competition Commission in terms of its role in the bread cartel. Premier Foods disclosed that it, together with Tiger Brands ('Tiger' or 'Albany') and Pioneer Foods ('Pioneer' or 'Sasko'), had been colluding in the operation of a bread cartel in Western Cape to fix the selling prices and other trading conditions. In addition to the Western Cape cartel, Premier Foods also revealed that the cartel members also operated in the inland regions of the country. This complaint was called the national complaint.

To describe the relevant geographic market, the Competition Commission used the term "national" or "inland", rather than "Western Cape", simply because the cartel was not necessarily equally stable in all parts of the country (in all regions) or the same time. In regions such as the Western Cape, members did not agree or were hostile towards each other for longer periods than in other regions.

4.5.1   The modus operandi of the cartel

After deregulation, the cartel members continued to use the Chamber of Baking as a legitimate forum for sharing industry information, e.g. on wheat deliveries, wheat quality, unscrupulous bakers and security concerns. Through the admissions of Premier Foods and Tiger Brands, and those who entered into consent orders with the Competition Commission, it was revealed that parties had also continued to engage in cooperative interactions through the Chamber of Baking and other less formal forums. It is argued that the cartel members were colluding because a culture of co-operation and sharing information on prices had become entrenched in the industry over many decades. The cartel members held frequent meetings when price increases were required, for example when costs were increasing, or when one cartel member deviated from the arrangement by providing increased discounts. The cartel members also discussed how to prevent large customers from playing the respondents against each other. Chabane, Rakhudu and Roberts (2012) mention that in the wheat and white maize meal cartels, meetings were sometimes referred to as 'church meetings' to avoid specifying the true purpose the meetings. The members of the bread cartel were also active in the wheat and maize cartel

Periods where "cheating" (that is, on competitive discounting) occurred led to meetings being called. In some regions the co-ordination involved allocating customers, in others price fixing, and both in some regions. The price fixing arrangements (although they were often not honoured) did not stop cartel members from competing. List prices were transparent, and were increased but never reduced, although there were periods when members competed by offering discounts. The cartel members stated that there was an incentive for each individual firm to seek to increase its market share, thereby attracting customers from their rivals. These resulted in the cartel members cheating and charging at prices lower than those they had agreed upon. It can be argued that, although cartel members had a culture of coordination, the

price fixing arrangement was not that successful, since members were able to cheat and drop prices lower than their competitors.

Bread operates at a low margin of between 2 % to 4 %, and as a result another central purpose of the bread cartel was to "stabilise" the market through allocating customers and allocating territories in order to prevent new competitors from entering the market. Predatory pricing was used as a strategy to discourage market entry in order to maintain their ability to coordinate. For example, Mncube's study (2013b) on the strategic entry deterrence of Pioneer Foods and the bread cartel established direct evidence of predatory pricing in the South African bread industry. Mncube (2013b) mentions that meetings were held concerning the formal terms under which an entrant could become a cartel member. The new entrants were threatened with predatory pricing. Mncube (2013b) that these threats were part of a deliberate strategy to force the new entrants out of the market. The cartel members would declare a price war if the entrants did not abide with the arrangements. He found evidence of price wars in several towns in the Western Cape Province that suggested predation. For example, in both Worcester and Mossel Bay, entrants were driven out of the market by predatory prices, and after they exited, the prices of the cartel members would substantially increase.

4.5.2   The relevant legislation

Section 4(1)(b)(i) of the Competition Act provides that an agreement between, or concerted practice by, firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship. If it involves any of the following restrictive horizontal practices; (i) directly or indirectly fixing a purchase or selling price or any other trading condition; (ii) dividing markets by allocating customers, suppliers, territories, or specific types of goods or services. Pioneer agreed that it had fixed the price and date of increases in the price of toaster bread and a value added loaf, and it agreed that the competitors should cap the discount to agents at 90c per loaf, and to market sharing arrangements. However, it denied fixing the price of a standard loaf of bread, or at least that Pioneer was party to that conspiracy.

Accordingly, the Tribunal found that Premier Foods, Pioneer Foods, and Tiger Brands had contravened section 4(1)(b)(i) and (ii) of the Competition Act in the Western Cape. In

December 2006, Premier Foods, Pioneer Foods (through its Sasko Division) and Tiger Brands agreed:

- that all three firms would increase the discounted price of toaster bread;
- to increase the price of the standard loaf of bread;
- on the dates by which the bread price increases were to be implemented;
- that discounts/competition commissions given by all three firms to agents in the Paarl area would be capped at 90c and 75c for agents in the Cape Peninsula;
- that none of the firms would supply new distributors and each other's former employees;
- lastly, that none of the firms would make bread deliveries on 25 and 26 December 2006.

With regard to the national or inland complaint, the Tribunal found Pioneer and its competitor to be in contravention of the Act, by agreeing to a division of markets during the period 1999-2001. This agreement extended to at least the Southern Gauteng, Free State, North West and Mpumalanga/Limpopo regions. As for the price increases in 2004, Pioneer's documents showed a clear intention to increase its bread prices in 2004 in co-ordination with its competitors.

The Competition Tribunal found that there was an overall agreement or understanding between Pioneer, Tiger, Premier and Foodcorp in relation to the bread industry in the inland region, which led to agreements on price increases, territorial divisions, customer allocations and other trading conditions. Accordingly, Pioneer and its competitors were found to have contravened sections 4(1)(b)(i) and (ii) in the inland region, or in that part of the country excluding the Western Cape, over a period of time from as far back as 1999, to 2007. Accordingly, Pioneer paid an administrative penalty, while Tiger Brands and Foodcorp entered into a consent order agreement with the Competition Commission.

4.5.3   Timelines in the bread cartel

Figure 4.3 illustrates the bread and flour prices as reported by Statistics South Africa and the SAFEX wheat price between January 2005 to August 2011. This includes the timeline after which Premier Foods applied for conditional immunity, being the periods when developments

took place as part of the Competition Commission's enforcement activities. The bread cartel ended in March 2007, following Premier and Tiger Brand's CLP Applications. Tiger Brands and Foodcorp were fined R99 million and R45 million, respectively. Pioneer received the largest fine, R196 million, after admitting to participating in the bread cartels.
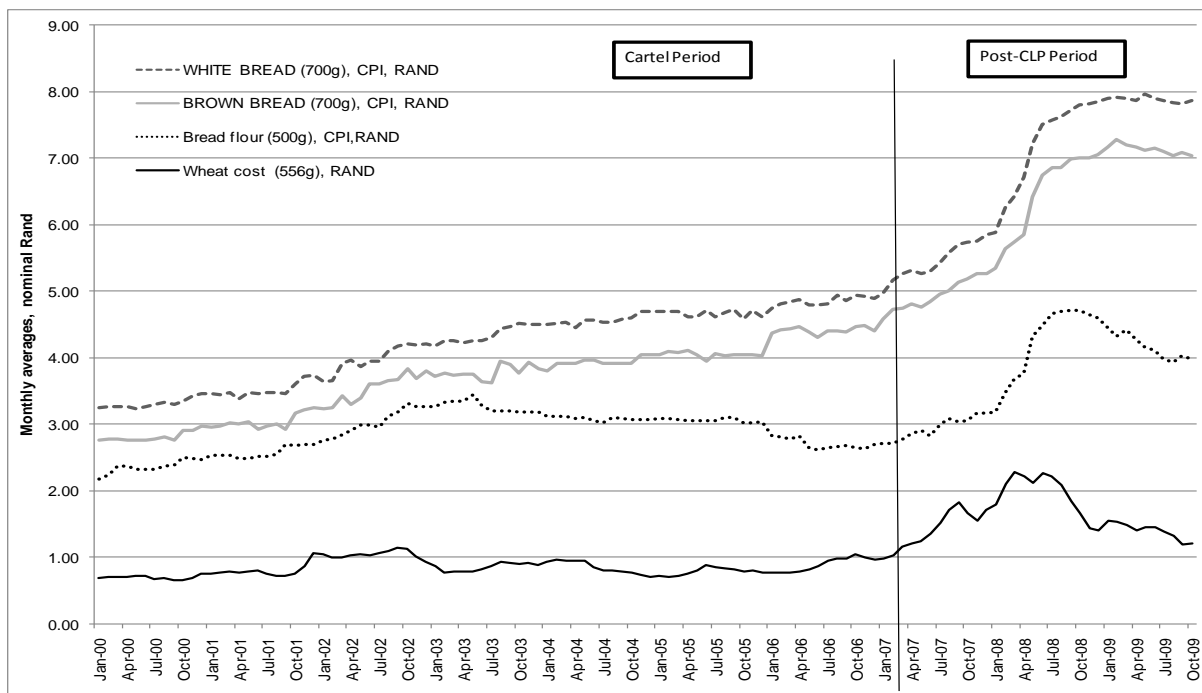
Figure 4.3: Nominal monthly average price of wheat, flour and bread price (R)

Source: SAGIS, Stats SA, Ngwenya and Sikakane (2011).

However, the Competition Commission still observed continued increases in bread prices, even after it had imposed fines on the members of the bread cartel. The punishment imposed on the cartel members did not bring the desired competitive outcomes, although the earlier price fixing arrangements had ceased in March 2007, and the market was still not competitive. In November and December 2009 the Competition Commission initiated a complaint against current and former members of the National Chamber of Milling and South African Chamber of Baking.

The Competition Commission found that firms in the industry were submitting commercially sensitive information to both these associations. In turn, the firms would then receive detailed disaggregated information from the industry associations. This information enabled members to sustain collusion without the necessity for meetings and telephone calls. A similar case was initiated in the maize industry after the Commission found that competition outcomes were

not observable, despite the breaking of the cartel. This complaint was initiated against the Chamber of Milling and its current and former members. The Commission has settled the case with other industry participants (Ngwenya and Sikakane, 2011).

4.6   SUMMARY

The economic literature teaches that the character of a market alone may render firms more susceptible to collusion. The assessment in the previous sections shows that the bread market has a number of factors that have the potential to facilitate collusive behaviour. There are two forms of allocation schemes observed throughout the bread cartel: (i) price fixing and (ii) exclusive territories. These have been implemented to the detriment of the customer. Although the bread industry had been regulated until 1991, their history of sharing information provided bakeries with a focal point on which to coordinate their conduct.

Notwithstanding the fact that the Competition Tribunal had imposed a fine on a cartel member, a culture of information sharing had become entrenched in the industry over many decades. The Competition Commission found that these firms were still sharing commercially sensitive information on wheat and maize to the National Chamber of Milling and South African Chamber of Baking. In turn, the firm would then receive detailed disaggregated information from the industry associations. This information enabled members to sustain collusion without the necessity for meetings and telephone calls.

CHAPTER 5

RESEARCH METHODOLOGY AND RESULTS

5.1   INTRODUCTION

The bread cartel and the wheat and flour cartels have attracted significant research from various perspectives. Mncube's study (2013b) on strategic entry deterrence and Pioneer Foods and the bread cartel investigated Pioneer Food's price scheme in relation to standard bread in Worcester and Mossel Bay. The author found evidence that the cartel members had used an entry deterrence strategy to hinder newcomers from entry into the market. This study seeks to demonstrate how market screening approach could have been used as a tool to detect the bread cartel.

The structural assessment presented in Chapter 4 proves that the bread industry exhibits a number of factors that influence collusive behaviour. The objective of this chapter is to present an empirical model of a market screening approach, as discussed in Chapter 2. The model is designed to provide statistical evidence of structural changes in data over time. The next section will briefly describe the underlying data employed in this study, which is followed by a discussion and the execution of a market screening approach involving a structural break analysis.

5.2   DATA

This study used "secondary" public data. The data sources include South African Grain Information Services ("SAGIS") and Statistics South Africa ("Stats SA"). The time series used are the monthly food prices and the data set is restricted to the period from 2000 to 2008. The dataset in this study includes the South African Futures Exchange ("SAFEX") wheat price. The SAFEX wheat price is lagged by 4 months in order to avoid endogeneity problem. The monthly handling and storage cost to the farmers. The monthly inland diesel price, measured in cents per litre, is taken from Department of Energy and the monthly prices of 1kg of maize, in rand, is taken from SAGIS and Stats SA. The prices are deflated using the South African consumer price index for all items. The base year is 2000.

The study would have wished to compare the private data and public data of the wholesale and retail bread price. However, owing to the lack of available private data, the study used the monthly retail price of bread. The reason being that to prove a Section 4 contravention, the Competition Commission only needs to prove that parties entered into a mutual agreement to fix the price, allocate the market, or conduct collusive tendering. The study restricts the analysis to the 700 gm loaf of brown bread for the period under consideration. The advantage of this screen is that it meets standards as set by Abrantes-Metz *et al.* (2006), in that (a) it has theoretical and empirical support; (b) no cost data is required; (c) secondary data can be used; and (d) it would be costly to disguise the cartel behaviour if the costs change.

5.3   METHODOLOGY: BEHAVIOURAL SCREENING

The study employs screening using the retail price index to find a structural break and to find whether the structural break could have been related to the existence of a cartel/ behaviour inconsistent with competition. However, this method is a general screening method in that it does not provide evidence of collusion, but rather evidence that proves lack of competition (Harrington, 2005). For purposes of this study, the author assumes that this method could have alerted the Competition Commission to the anti-competitive behaviour in the industry. Before we can conduct the market screening approach, the study will investigate the relationship between the dependent and independent variables by using correlation and regression analysis.

Step 1: Correlation and Regression Analysis

The basic idea of a regression/correlation analysis is to measure and interpret the strength of a linear relationship between the dependent and explanatory variable. The Pearson and Spearman correlation coefficients can take the value between -1 (negatively correlated) and 1 (positively correlated) (Verbeek, 2004). A negative coefficient means that as one variable increases, the other one will decrease. While a positive coefficient means that as one variable increases, the other one will increase too. This enables one to predict the relationship between the two variables. Between the values of 0.7 to 0.99, we say that there is a strong relationship between the dependent and the independent variables. Unlike a regression equation, correlation analysis is symmetric since the relationship between X and Y can go both ways

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(Tompkins, 1992). We expect to see a positive relationship between the SAFEX wheat price, diesel price, handling and storage cost. We also expect to see a negative relationship between bread and maize price.

Step 2: Structural Break Analysis

Harrington (2005) states that the general approach to identify collusion is to look for a structural break in the firm's behaviour. This could be associated with the formation of, and breakdown of, a cartel. Both cases need a discrete change in a firm's pricing function. This method requires data from outside the time of suspected collusion. Although the method can be implemented without prior information of what patterns are consistent with collusion, its power would be enhanced by theory and past evidence on cartels which could suggest what properties should be focused upon and what we ought to observe, if indeed a cartel has been formed.

The methodology applied in this study is the classical test for structural break, known as the Chow Test, to identify a firm's collusive behaviour. The study looked at (a) whether the Competition Commission or the NAMC could have found a structural break using secondary data and, (b) whether this structural break relates to the existence of a cartel in the bread industry. As suggested by Mncube (2013a), the study estimated a reduced form price regression as a function of exogenous demand, cost shifters, and included a test for a structural break using an Ordinary Least Square model (OLS). To do so, the study estimated a linear equation for the price of bread in the first difference of the logarithms of all variables. The test asks whether price had increased or decreased at a certain period for reasons other than demand (price is used a proxy for quantity demanded and quantity supply) or cost variables.

We are not expecting a significant change in price because of the information exchange that had continued after the cartel broke down in 2007. Because bread operates at a low margin, homogenisation between firms may have not necessarily led to high average prices.

However, Harrington (2005) mentions that the econometric evidence of structural change are not conclusive, as one has not distinguished it from other sources of a break. Structural break

is a screening method, which needs to be followed by verification methods. Hüschelrath and Veith (2011) mention that structural break analysis provides statistical evidence for changes in data structure over time

5.4   CHOW TEST MODEL

Based on the discussion above, the study uses the Ordinary Least Squares (OLS) method to estimate the price parameters for the 700 grams loaf brown bread by linear regression. The question that the Chow test asks is: did the regression coefficients $\alpha_{1=} \alpha_2$ or $\beta_{1=} \beta_2$, stay the same for 2000 to 2008 period. The Competition Commission received a conditional immunity application from Premier Foods in March 2007. After the Competition Commission received this application, did the consumers experience a change in price during the collapse of the cartel? In the absence of information from a whistle-blower, could the Competition Commission and the NAMC have found the evidence of cartel? To answer this question, the sample data was divided into two sub-periods, January 2000 to February 2007, and March 2007 to August 2008.

The null hypothesis to be tested is

$H_{0:} \beta_{1=} \beta_2 = \beta$

where β_1 is estimated first in the first model (1) and β_2 in the second part of the model.

Step 1: This estimated the linear regression using the data for the whole period, i.e. before and after the structural break, and collected the sum of squares residual (RSS).

A single regression line fits the data points, and it is depicted as:

$$y_t = \alpha_0 + \alpha_1 x_t + u_t$$

Step 2: Where we assume that there is a structural break, we have two separate models, depicted as:

$$period\ 2000 - 2007.02 \qquad y_{i=} \alpha_1 + \beta_1 x_1 + \gamma_1 z_{1+} \delta_1 t_1\ u_1$$
$$period\ 2007.03 - 2008 \qquad y_{i=} \alpha_2 + \beta_2 x_2 + \gamma_2 z_{2+}\ u_2 + \delta_1 t_1$$

Chow test assumptions are that the researcher knows the point(s) of the structural break. The error terms u_1 and u_2 in the sub-period regressions are normally and independently distributed (Econometrics 723 class notes). The assumption that error terms are independently distributed means that the two regressions are independent. In step 2 we estimate the two separate regressions on the data before and post the break point, and collected RSS for model 1 and 2. Hence, when we add equation or the first and the second model to obtain the unrestricted residual sum of squares (URSS), which will have $(n_{i+} n_2 - 2k) df$, where n_{i+} and n_2 are the number of observation in the first and second sub-periods, and k is the number estimated parameters in the model (Lewis-Beck, Bryman & Liao, 2004).

The restrictive residual sum of squares RRSS is obtained from the regression with the pooled data (Madalla, 1992). Since RSS, S1 was obtained under the assumption of the stability of the coefficient, one will expect that the regression coefficients to be the same period, then the S1 period is called the restricted sum of squares. The RSS will have *(n-k) df* where $n = n_{i+} n_2$. The URSS and RRSS should not be significantly different from each other. If we find that $RSS_r = RSS_{ur}$ then there is parameter stability. Both RSS will differ if there is no parameter stability (Lewis-Beck *et al*., 2004).The Chow test suggests that we test that

$$F = \frac{(RSS_r - RSS_{ur}|k)}{RSS_{ur}/(n_{i+} n_2 - 2k)} \sim F[k, (n_{i+} n_2 - 2k)]$$

Under the assumed conditions, we compare the calculated F value with the F distribution table. If the computed F value exceeds the critical value, we reject the null hypothesis that states that there is no structural break.

5.5   DIAGNOSTIC TEST

In this section we conduct a diagnostic test to assess whether the model is correctly specified and whether it properly accounts for relationship between the dependent and explanatory variables. In other words, the study will investigate the relationship between the set of explanatory variables to find whether the regression model is 'mis-specified'. To diagnose any problems with the estimated model, i.e. model misspecification, the study applied a Ramsey Regression Specification Error Test ("Reset"). This is discussed in detail in the next section.

5.5.1 Ramsey Reset Test

The study applied a Ramsey Regression Specification Error Test ("Reset") to diagnose any problems with the estimated model. According Ramsey (1969) the objective of Reset test verifies the presence of the specification errors by considering the significance of regressors that are proxies of omitted variables. The model is developed by comparing the distribution of residuals with the null hypothesis is that we have a stable regression alternative hypothesis is that we have misspecification. This procedure is presented clearly in Madalla (1992), Ramsey, 1969)

Suppose that the standard linear regression model is

$y_t = \beta x_1 + u_t$

The Reset test tests whether the model is misspecified by the omission of a variable z_1, to estimate this equation

$y_t = \beta x_1 + \gamma z_t + u_t$

and test the null hypothesis that $\gamma = 0$; using the F test

$$F = \frac{(RSS_r - RSS_{ur}|M)}{RSR_{ur}/(n_2 - k)} \sim F[m, (n_i - 2 -)]$$

Where M denotes the number of restrictions;

N denotes number of observations;

K denotes the number of parameters estimated in the unrestricted equation.

If, say at a 5 per cent significance level, the calculated value is greater than the F critical value, we reject the null hypothesis that states that the true specification is linear. If we cannot reject the null hypothesis this means that the model was specified correctly and it has passed the Ramsey Reset test.

Ramsey suggests these variables:

$Z = \hat{y}^2_t \quad \hat{y}^3_t \quad and \ \hat{y}^4_t$ to test the hypothesis that the coefficients of the power of $\hat{y}_t = 0$

where $\hat{y}_t = x_t \beta^\wedge$

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and $\beta\hat{}$ is the OLS estimated parameter.

5.6   EMPIRICAL RESULTS

Before we can conduct the market screening approach, the study will investigate the relationship between the dependent and independent variables by using correlation and regression analysis. From the correlation coefficient, it is evident that there is a strong linear positive relationship between the price of bread and that of fuel and oats.

Correlations and Multi-regression Analysis results

Table 5.1 presents the results of the correlation analysis between the dependent and independent variables.

Table 5.1: Covariance Analysis: Ordinary

Covariance Analysis: Ordinary
Date: 01/09/15   Time: 10:18
Sample (adjusted): 2000M05 2008M08
Included observations: 100 after adjustments
Balanced sample (listwise missing value deletion)

Covariance Correlation	BBREAD	RDIESELP	RMAIZE	RSAFEX	RSTRCOST
BBREAD	0.092341				
	1.000000				
RDIESELP	0.228031	1.263425			
	0.667611	1.000000			
RMAIZE	0.030815	0.037603	0.108724		
	0.307544	0.101458	1.000000		
RSAFEX	35.70630	48.34431	50.63278	56540.01	
	0.494164	0.180881	0.645791	1.000000	
RSTRCOST	0.575765	1.436839	0.284909	168.1346	7.005759
	0.715849	0.482954	0.326450	0.267148	1.000000

Table 5.1 provides the results of a correlation analysis. A correlation of 0.5 per cent suggests that there is a moderate, positive, linear relationship between bread price and SAFEX wheat price. At first glance, we also expected to see a strong relationship between the bread price and SAFEX wheat price, since according to the NAMC report (2009), the price of bread follows the SAFEX wheat price. However, upon closer examination Cutts and Kirsten (2006) established that a 10 per cent increase in the SAFEX wheat price would increase the price of a loaf of bread by R0.53, which decreases to R0.14 per loaf after one month. It takes 20 months for the remaining increase to be worked out of the system. This may be the reason why we do not have a strong correlation between price of brown bread and SAFEX wheat price.

A correlation coefficient of 0.66 prove that that there is a strong linear positive relationship between the price of bread and diesel price, which implies that as the diesel price increases, the price of bread also increases. We also expected a positive relationship between the price of bread and the price of maize. The low price of maize will reduce consumer demand for bread. The results show that there is only a partial correlation between the price of bread and the price maize. One may consider the partial relationship between the maize and bread prices seems somewhat illogical. However, upon a closer examination, one may note that the demand for most of agricultural commodities is relatively inelastic.

This means that, even if the price of maize meal or bread increases, consumers will still demand more or less the same quantities of bread and maize meal. Since the consumer's taste and preferences of staple food do not easily change. In South Africa, maize and rice are better substitute bread. We also expected a linear positive relationship between the price of brown bread and the handling and storage cost, which implies that as the cost handling and storage to the farmer's increases, the price of bread also increases. A correlation of 0.71 between price of brown bread and handling and storage cost is high and shows that there is strong positive linear relationship between the two variables.

This section presents the results of a multiple regression analysis. The model estimated is:

$$lnP_{b=} \beta_1 + B_2 \, lnSafex + \beta_3 \, lndiesel + \beta_4 \, lnstrcost + \beta_4 \, lnmaize + \varepsilon$$

The prices in the equation are P_b, price of 700 grams brown bread, SAFEX wheat price, diesel price per litre , handling and storage cost (cost to the farmers) in rand and1 kg of maize meal price. The study estimated three regressions using the data for the whole period and two sub-breaks (before the break point, and after the break point) to perform a chow test. Table 5.2 below present the OLS results obtained when estimating the parameters of the 700 gm loaf brown bread linear regression. The adjusted R-squared value indicates that the model explains almost 78 per cent of the variation in the price of 700 gm brown bread, which is a good fit. The F-statistic is also a statistically significant indication that the explanatory variables SAFEX wheat price, diesel price, handling and storage cost and maize price are jointly significant in explaining the dependent variable 'bread'.

Table 5.2: The results of 700 gm brown bread equations

Coefficients	2000-2008 Full period	2000.01-2007.02 Before the breakpoint	2000.03-2008.08 Breakpoint onwards
Constant	(-1.050497)	(-0.090173)	-1.050497
LnSafex (Wheat Price)	(0.171470)	(0.038300)	(0.171470)
Ln diesel price (per/l)	(0.153479)	(0.1520180	(0.1534790
Ln handling and storage cost (R)	(0.290455)	(0.263836)	(0.290455)
lnMaize (1kg)	(-0.059638)	(0.001601)	(-0.059638)
S E of regression	0.043551	0.028036	0.043551
R-Squared	77%	76%	83%
No of observations	100	82	18

Source: Own calculation based on data from SAGIS & Stats SA.

We expected a positive relationship between the bread price and SAFEX wheat price. The positive coefficient is in line with economic theory. The *p*-value shows that the SAFEX wheat price is slightly significant from zero. This implies that the bread retail prices react within four month to changes in the SAFEX wheat price. *Ceteris paribus*, a 1 per cent increase in the SAFEX wheat price will, on average, increase the price of bread by 0.17 per cent, and a 1 per cent increase in the price of petrol will increase the price of bread by 0.15 per cent.

The results show that, *ceteris paribus*, a 1 percent decrease in the maize price will, on average, decrease the demand for bread by 0.12 per cent. Lastly, there is a positive relationship between the price of brown bread and the price of handling and storage cost: if the cost of wheat handling and storage increases, the price of bread will increase by 0.05 %. The results are in line with theoretical expectations.

Chow test breakpoint results

Before we present the chow test breakpoint result. We use a graph of brown bread to analyse to show the date at which we are expecting to observe a structural break, in the brown bread function. Figure 5.1 present these results.
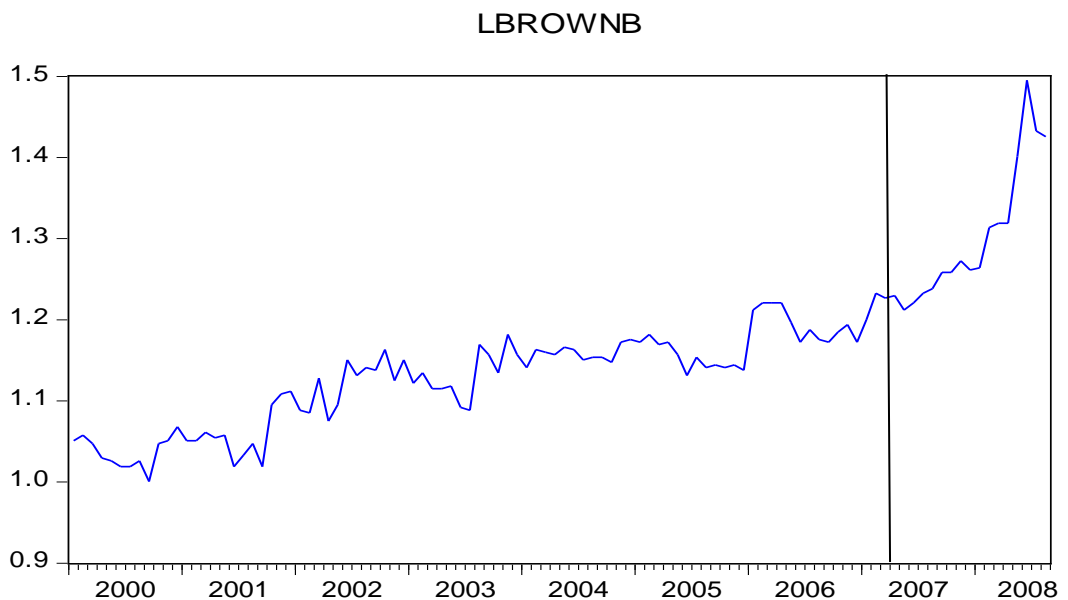
Figure 5.1: Real price of brown bread

Source: SAGIS, Stats SA, Own calculations

Figure 5.1 shows the real price of brown bread. Looking at this graphical representation of the price of bread, there appears to have been no structural break in March 2007. It appears that consumers did not experience a change in price of bread during the collapse of the cartel. As mentioned , earlier the bread price follows the price of wheat, which in turn a linked to wheat import parity pricing. In late 2007, the trend increased significantly, because the world price of wheat doubles towards the end of that year. The value of rand depreciation, petrol

price, and the increase in the Eskom tariffs are other factors that rapidly increased the price of bread (NAMC, 2009).

Table 5.3 below illustrates the results of the Chow breakpoint test. The null hypothesis states that there was no structural break in March 2007, while the alternative hypothesis states that there was a structural break in March 2007.

Table 5.3 Chow breakpoint test

Chow Breakpoint Test: 2007M03
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000M05 2008M08

F-statistic	20.59772	Prob. F(5,90)	0.0000
Log likelihood ratio	76.28214	Prob. Chi-Square(5)	0.0000
Wald Statistic	102.9886	Prob. Chi-Square(5)	0.0000

The OLS results show that the F statistics test is 20.59 with a *p* value of 0.00 at a 5 per cent significance, the table F-critical value is $F_{5,90} = 2.68$, which indicates that we cannot reject the null hypothesis that states that there was no structural break. We can, therefore, conclude that a structural break did not occur in March 2007.

The Predictive Chow Test: Equal variance

The study tested the null hypothesis state that the error terms in the sub-period regressions are normally distributed and have the same variance. The F test statistic is 2.41 and the F critical value is 2.68. Considering the fact that the F test statistic is less than the F critical value, we therefore do not reject the null hypothesis that the error terms in the sub-period regression have the same variance.

5.7 DIAGNOSTIC TEST RESULTS

The study used the Reset test to infer that the parameters we have estimated are stable. At a 5 per cent level of significance, the OLS results show that Likelihood Probability $X^2(2) = 6.52$.

Therefore, since LR (likelihood ratio) =1.04 < 6.52 and since the p-value is = 0.61>0.05, we therefore do not reject the null hypothesis and conclude that there is no misspecification and that our model is stable.

5.8   SUMMARY

The conclusion at this point would be that the breakdown of the bread cartel did not change the price of bread. The OLS results shows that the F statistics test is 20.59 with a *p* value of 0.00 at a 5 percent significance the table F-critical value is $F_{5,90} = 2.68$ indicates that we cannot reject the null hypothesis that states that there was no structural break. We can, therefore, conclude that a structural break did not occur in March 2007. This means that in the absence of whistle-blower, it would have not been easy for the NAMC and the Competition Commission to detect the cartel by just using secondary data. The study can conclude that consumers did not experience a change in price during the collapse of the cartel. Moreover, we can conclude that in the absence of information from the whistle-blower, the Competition Commission and the NAMC would not have found the evidence of the bread cartel (or at least, any sooner).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1   CONCLUSION

The truth is cartels are harmful to consumers and it is a very complex task to detect such conduct, especially because they take different forms and are highly profitable. From the structural approach pioneered by Bain to the behavioural approach, there has been a significant improvement in detecting cartels and collusive behaviour by the Competition Authority. This study provided a literature review of some of the economic methods used from the 1950 to the 1990s, and the analysis was narrowed down to the modern use of a market screening approach used the Competition Authorities. Despite the identified number of detected cartels in the grain industry, some of the existing cartels might have remained undetected.

The tools of investigation that the Competition Commission is using, together with the previous studies conducted by the Competition Commission in 2000 and the National Agricultural Marketing Council (NAMC) in its 2009 investigations, failed to detect the cartel in the food industry. The study used a market screening approach to illustrate how to detect cartels by using a market screening approach. In Chapter 2, we noted that the market screening approach was divided into two stages, namely the structural approach and the behavioural approach. The structural assessment approach identified several traits that were considered to be conducive to cartel formation of the bread cartel. The study found that the history of sharing information among the cartel members played an important role in this cartel.

In contrast, a behavioural approach focused on signs in actual market behaviour, which may signal the existence of cartel agreement this include looking for a structural break in the firm's pricing behaviour. The study used "secondary" public data to perform a Chow test breakpoint test, to look for the structural break. The data include South African Futures Exchange ("SAFEX") wheat price lagged by 4 months, the monthly petrol price, the monthly

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prices of 1kg of oats and 1kg of maize, in rands. The prices are deflated using the South African consumer price index for all items. The base year is 2000.

The question that the Chow test examined was whether there was a structural break in March 2007, after the Competition Commission had received certain information from a whistle-blower. In other words, did the price of bread increase or decrease at a certain period, other than from demand or cost variables. The OLS results illustrated that the F statistics test is 20.59 with a p value of 0.00 at a 5 percent significant the table F-critical value is $F_{5, 90} = 2.68$, which indicates that we cannot reject the null hypothesis that states that there was no structural break.

The study, therefore, concluded that a structural break did not occur in March 2007.This means that consumers did not experience a price change when the cartel collapsed. The study screening method filed to detect the cartel conduct in the bread cartel. The study also concludes that, in the absence of a whistle-blower, it would not have been easy for the Competition Commission and the NAMC to detect the cartel just by using secondary data. The results of the Reset test shows that the model was correctly specified, we therefore conclude that the model was stable and had no misspecification.

6.2   RECOMMENDATIONS

In the wake of the successful prosecutions of cartels for more than ten years by the Competition Commission, there is a need for the Competition Commission to use more tools that are balanced to detect cartels, including conducting scoping study and market inquiry together with the NAMC. Recent developments in the agricultural market, which include the expanding vertical coordination of markets by large input-providing, processing and retailing firms through vertical integration, render the perfect competition model inappropriate (Saitone & Sexton, 2012; Sexton, 2012). This brings doubt that a law based on perfect competition will work in oligopolistic markets.

In the previous chapters, the study examined how a market screening approach might be an effective tool that could be used to complement the existing, more passive tools (getting information from immunity applications, whistle-blowers, and customers) with the more pro-

active methods of cartel detection. The study has also noted that while screens may be useful, they can never be used alone to detect the hard-core cartels. In light of this, one may ask whether the combination of agricultural economic knowledge and competition law would enhance chances of detecting cartels in the food industry. This section makes recommendations as to how the combination of agricultural economics and competition law can strengthen the role of the Competition Commission in this oligopolic food market.

To increase inclusive growth, enhance equity, fair competition, price stability and sustainable food security, this study argues that the scoping studies conducted by the Competition Commission and the monitoring of food prices carried out by the NAMC could constitute the best enforcement tool in detecting cartel behaviour. For example, Friederiszick and Maier-Rigaud (2007:13) state that "complex economic analysis binds resources and requires a large case team both with economic and industry know-how. A methodology that requires permanent market monitoring and in-depth industry knowledge may simply overstretch a competition authority's capacities". Accordingly, this study recommends that both institutions should work together to ensure that the Competition Commission can efficiently use its scare resources.

For instance, the monitoring of food prices along the food chain is carried out quarterly in South Africa. Most of the NAMC studies have focused on price formation and price transmission analysis along the different levels of the supply chain. Similarly to South Africa, European Union food and monitoring institutions have reported that price hikes were related to other factors, not linked to anti-competitive behaviour (European Competition Network Food Subgroup, 2012). Guidance on the application of the Competition Act in the food industry will strengthen the role of the Competition Commission in agricultural markets. The OECD (2009) states "in some cases the "border" between agricultural policy and competition policy may be ambiguous and where competition policy has been enforced in the agro-food sector, particularly with respect to price fixing and merger activity, the implications for industry structure, conduct and performance are unclear".

For example, in South Africa most of food cartel conducts uncovered by the Competition Commission occurred under the auspices of industry associations. This has led some members of the associations to withdraw their membership from the associations, citing fears

of contravening the Competition Act. They argue that the border between information that is shared within the association, and the information that the Competition Commission deems to be sensitive, is ambiguous. What is more confusing is that the Competition Commission fails to clearly articulate to industry participants what kind of information the industry can legitimately share.

It is without doubt, that the industry associations play a very important and positive role in the food market, because of their well-known efficiency. The industry needs this association so they can grow and have access to market information. Therefore, this raises the need for both the NAMC and the Competition Commission to implement guidelines that will help industry associations to process data that delivers efficiencies, but is less useful for facilitating collusion.

Furthermore, because of data that is now not available, it has become a challenge for economic experts to make recommendations to the Minister of Agriculture forestry and Fisheries on how to keep South African market competitive. This may threaten the country's food security. Therefore, if the Competition Commission can work together with the NAMC, this will allow the NAMC to better understand the Competition Law and ensure that the Competition Commission does not undermine their work. The NAMC is also in a better position to provide guidance to the Competition Commission, since their investigations have allowed them to understand the agro-food industry.

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7   APPENDIX A
EQUATIONS

Equation 1: Full Regression

Dependent Variable: LRBRWNBREAD

Method: Least Squares

Date: 01/09/15   Time: 10:39

Sample (adjusted): 2000M05 2008M08

Included observations: 100 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRSAFEX	0.171470	0.034622	4.952558	0.0000
LREDIESELP	0.153479	0.019004	8.075961	0.0000
LRSTRCOST	0.290455	0.034133	8.509459	0.0000
LRMAIZE	-0.059638	0.055362	-1.077229	0.2841
C	-1.050497	0.227521	-4.617139	0.0000

R-squared	0.778067	Mean dependent var		1.159176
Adjusted R-squared	0.768722	S.D. dependent var		0.090560
S.E. of regression	0.043551	Akaike info criterion		-3.381048
Sum squared resid	0.180188	Schwarz criterion		-3.250790
Log likelihood	174.0524	Hannan-Quinn criter.		-3.328330
F-statistic	83.26423	Durbin-Watson stat		0.545738
Prob(F-statistic)	0.000000			

Equation 2: Regression before structural break

Dependent Variable: LRBRWNBREAD

Method: Least Squares

Date: 01/09/15   Time: 14:54

Sample (adjusted): 2000M05 2007M02

Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRSAFEX	0.038300	0.031437	1.218328	0.2268
LREDIESELP	0.152018	0.027208	5.587238	0.0000
LRSTRCOST	0.263836	0.022749	11.59791	0.0000
LRMAIZE	0.001601	0.043458	0.036837	0.9707
C	-0.090173	0.235426	-0.383022	0.7028

R-squared	0.767830	Mean dependent var		1.128490
Adjusted R-squared	0.755769	S.D. dependent var		0.056730
S.E. of regression	0.028036	Akaike info criterion		-4.251642
Sum squared resid	0.060522	Schwarz criterion		-4.104891
Log likelihood	179.3173	Hannan-Quinn criter.		-4.192724
F-statistic	63.66325	Durbin-Watson stat		1.048506
Prob(F-statistic)	0.000000			

Equation 3: Structural break period onwards

Dependent Variable: LRBRWNBREAD

Method: Least Squares

Date: 01/09/15   Time: 14:59

Sample (adjusted): 2000M05 2008M08

Included observations: 100 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRSAFEX	0.171470	0.034622	4.952558	0.0000
LREDIESELP	0.153479	0.019004	8.075961	0.0000
LRSTRCOST	0.290455	0.034133	8.509459	0.0000
LRMAIZE	-0.059638	0.055362	-1.077229	0.2841
C	-1.050497	0.227521	-4.617139	0.0000

R-squared	0.778067	Mean dependent var		1.159176
Adjusted R-squared	0.768722	S.D. dependent var		0.090560
S.E. of regression	0.043551	Akaike info criterion		-3.381048
Sum squared resid	0.180188	Schwarz criterion		-3.250790
Log likelihood	174.0524	Hannan-Quinn criter.		-3.328330
F-statistic	83.26423	Durbin-Watson stat		0.545738
Prob(F-statistic)	0.000000			

APPENDIX B: DIAGNOSTIC TEST

Equation 1: Ramsey RESET Test Level 2

Equation: UNTITLED

Specification: LRBRWNBREAD LRSAFEX LREDIESELP LRSTRCOST
   LRMAIZE C

Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	0.490369	(2, 93)	0.6140
Likelihood ratio	1.049036	2	0.5918

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.001880	2	0.000940
Restricted SSR	0.180188	95	0.001897
Unrestricted SSR	0.178308	93	0.001917
Unrestricted SSR	0.178308	93	0.001917

LR test summary:

	Value	df
Restricted LogL	174.0524	95
Unrestricted LogL	174.5769	93

Unrestricted Test Equation:

Dependent Variable: LRBRWNBREAD

Method: Least Squares

Date: 01/09/15   Time: 15:18

Sample: 2000M05 2008M08

Included observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRSAFEX	-3.675374	5.331911	-0.689316	0.4923
LREDIESELP	-3.292012	4.774900	-0.689441	0.4923
LRSTRCOST	-6.240719	8.998166	-0.693554	0.4897
LRMAIZE	1.288633	1.854989	0.694685	0.4890
C	31.21813	44.97220	0.694165	0.4893
FITTED^2	19.24760	25.91974	0.742585	0.4596
FITTED^3	-5.472008	7.185350	-0.761551	0.4483

R-squared	0.780383	Mean dependent var	1.159176

Adjusted R-squared	0.766214	S.D. dependent var	0.090560
S.E. of regression	0.043787	Akaike info criterion	-3.351538
Sum squared resid	0.178308	Schwarz criterion	-3.169177
Log likelihood	174.5769	Hannan-Quinn criter.	-3.277733
F-statistic	55.07737	Durbin-Watson stat	0.540828
Prob(F-statistic)	0.000000		

Equation 2: Ramsey RESET Test Level3

Equation: UNTITLED

Specification: LRBRWNBREAD LRSAFEX LREDIESELP LRSTRCOST

    LRMAIZE C

Omitted Variables: Powers of fitted values from 2 to 4

	Value	df	Probability
F-statistic	9.501906	(3, 92)	0.0000
Likelihood ratio	26.99086	3	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.042624	3	0.014208
Restricted SSR	0.180188	95	0.001897
Unrestricted SSR	0.137564	92	0.001495
Unrestricted SSR	0.137564	92	0.001495

LR test summary:

	Value	df	
Restricted LogL	174.0524	95	
Unrestricted LogL	187.5478	92	

Unrestricted Test Equation:

Dependent Variable: LRBRWNBREAD

Method: Least Squares

Date: 01/09/15   Time: 15:19

Sample: 2000M05 2008M08

Included observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRSAFEX	542.4217	104.7206	5.179705	0.0000
LREDIESELP	485.4688	93.72578	5.179672	0.0000
LRSTRCOST	918.8575	177.3972	5.179662	0.0000
LRMAIZE	-188.7663	36.44525	-5.179447	0.0000
C	-4257.319	822.5054	-5.176038	0.0000
FITTED^2	-4002.072	770.6957	-5.192804	0.0000
FITTED^3	2244.153	431.0026	5.206820	0.0000
FITTED^4	-470.4403	90.12125	-5.220081	0.0000

R-squared	0.830565	Mean dependent var	1.159176
Adjusted R-squared	0.817674	S.D. dependent var	0.090560
S.E. of regression	0.038669	Akaike info criterion	-3.590957
Sum squared resid	0.137564	Schwarz criterion	-3.382543
Log likelihood	187.5478	Hannan-Quinn criter.	-3.506608
F-statistic	64.42602	Durbin-Watson stat	0.720688
Prob(F-statistic)	0.000000		

Equation 3: **Serial correlation**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	49.33950	Prob. F(2,93)	0.0000
Obs*R-squared	51.48138	Prob. Chi-Square(2)	0.0000