THE SOUTH AFRICAN WHEAT FLOUR CARTEL: OVERCHARGES AT THE MILL

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Draft paper

ABSTRACT

This paper analyses the South African flour cartel, active from 1999 to 2007. The paper provides an overcharge estimation by applying a "during and after" approach as well as a constant-margin method. The empirical analysis is complemented by a descriptive overview of the history and structure of the South African flour industry. The flour cartel fixed the price of flour and allocated customers from 1999 to 2007. We find that the overcharges to independent bakeries range from 9 percent to 31 percent. We also show that the cartel profits were approximately two times higher during the cartel than the price war year 2002 or the post collusion year 2008.

Keywords: Competition policy, Cartels, Flour, Overcharges

JEL: L13; L40; L41; L66

1. Introduction

One important presumption of competition law, and the least controversial, is that cartels are bad for consumers because they increase prices and reduce the supply. The South African competition regime, like elsewhere around the world, prohibits cartels.[2] Yet, firms continue to find collusion to be very profitable. Perhaps one reason for the persistence of cartels is a desire to have a 'quite life' on the part of managers. Managerial slack may provide a motive of managers forming a cartel that may not show up in the form of profitability but x-inefficiencies. The illegality per se of cartel conduct has not been an efficient deterrent. For this reason, Competition authorities around the world, including in South Africa, have recently increased their effort to detect and deter cartels.

Complementing the work of competition authorities, academics such as Harrington (2004a), Harrington (2004b), Levenstein and Suslow (2004), Connor (2004) and Connor (2001) have improved our understanding of the pricing dynamics of cartels. On the empirical side, there exist a number of case studies focusing on the workings of specific cartels. These case studies investigate how the cartel operated, how effective it was in sustaining collusion and how large the generated welfare losses

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[2] Section 4(1) (b) of the Competition Act 1998, as amended, prohibits price fixing, market allocation and bid rigging.

actually were. Examples of these studies include Porter (1983), Ellison (1994), Porter and Zona (1999), Genesove and Mullin (2001), Röller and Steen (2006), Asker (2010) or de Vanssay and Erutku (2011).[3]

The legacy of apartheid in South Africa, largely due to extensive regulation and state support, resulted in an economy that was highly concentrated. Protectionist policies were aimed primarily at encouraging import substitution industrialisation. Post apartheid, the South African government took significant steps to liberalize many of the formerly price regulated markets. Industry restructuring led to the break up of regulated cartels, but what lagged behind was the strict enforcement of competition policy to ensure that competition was being preserved. Liberalization inadvertently, by increasing competition in regulated markets, increased the incentives for firms to participate in cartels. Hence, many formerly price regulated industries turned to collusion after liberalisation.

For example, the wheat value chain was extensively regulated by the state from 1937 to 1996. The Wheat Board was the main intermediary between the farm gate and the processing level of wheat products. Marketing of wheat was regulated through a single channel marketing system administered by the Wheat Board. The Wheat Board was sole buyer and seller of wheat at predetermined prices. The Wheat Board also controlled imports and exports of wheat and flour. With liberalisation, the expectation was that millers would compete. Competition it was hoped would result in low prices of flour and bread. But instead of competing, the millers simply replaced state regulation with private regulation.[4] The flour cartel was uncovered in 2007. The cartel was uncovered when, Premier Foods, one of firms involved in the cartel applied for and was granted corporate leniency in terms of the Competition Commission's ("Commission") corporate leniency policy. The cartel fixed the price of flour, bread and maize meal and allocated customers in flour and bread from 1996 to 2007.

To contribute to the literature on overcharges, we calculate the overcharges to independent bakeries. We use both private and publicly available price data to estimate the cartel price overcharge. In particular, we find that the overcharges to independent bakeries in flour range from 9 percent to about 31 percent. Before analysing the effect of the wheat flour cartel on prices, an understanding of both the wheat flour market and the cartel arrangement is an essential precondition. In sections 2 we outline the policy background and market dynamics of the flour industry. Section 3 describes the flour cartel. In Sections 4, we present the estimated results of the overcharge. Section 5 concludes.

[3] Connor and Lande (2006) and Levenstein and Suslow (2006) offer surveys of contributions to the empirical research on inter-industry studies of samples of cartels.

[4] Government regulation of the milk sector began as early as the 1930s through minimum price regulation for certain products. This was achieved through various milk and dairy control boards. The system of control boards was abolished in 1997 when the Marketing Act of 1968 was abolished. In March 2006, the Commission initiated a complaint against milk processors. The Commission alleged that during the period January 2002 to March 2006, milk processors had directly and indirectly fixed procurement prices for raw milk. See Tribunal Consent Order in the matter between the Commission and Lancewood Cheese. Tribunal Case No 103/CR/Dec06.

2. The industry

A. POLICY AND HISTORICALBACKGROUND

Wheat cultivation is one of the oldest agricultural activities in South Africa.[5] Wheat milling is one of the oldest industries. It all began with first European settlement in the Western Cape. The wheat industry grew rapidly, in the 19th century in line with the increased demand.[6] This growth was supported by the introduction of improved farming equipment and import duties on wheat and flour imposed in 1826.[7]

The import duty on wheat was suspended because of a local crop failure between February 1920 and June 1921. At the same time, world wheat prices declined after 1920. This period also witnessed a reduction in local freight charges. When selling their produce, local farmers were exposed to competition from imported wheat, which could be landed and transported inland at lower cost. So they began lobbying for higher protective duties. Due to their lobbying efforts, between 1921 and 1926, a dumping duty was imposed on Australian wheat. The dumping duty was superseded in 1926 by a tariff increase.

To support local farmers, prices of wheat were artificially maintained at a level which made wheat production in South Africa profitable. Due to a further reduction in world prices in 1930 and 1931, the import duty on wheat was increased while imports of flour and maize meal were placed under permit. Special customs duties on a sliding scale were also imposed to raise the minimum import price of wheat, flour and maize meal.

The control of imports and the high protective tariffs were instrumental in maintaining the local price level, but prices were constantly under pressure to fall because of over-supply in the market. In light of this, co-operative groups attempted to regulate supply and carry over surpluses for use in years of shortages.[8] Importantly the powerful lobbying efforts of co-operative groups led to the creation of the Wheat Board in 1935.[9] The Wheat Board was essentially empowered, to regulate the flow of wheat to the market by paying storage compensation in respect of wheat stored by co-operative groups and farmers.[10]

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[5] See Section 7 Committee Evaluating the Deregulation Process: the wheat to bread value chain report, 1999. National Agricultural Marketing Council.
[6] See Vink (2012)
[7] The increasing population of settlers coupled with the discovery of the diamond and gold fields, led to significant growth in wheat production in South Africa. In addition, the development of railways, in conjunction with reduced freight charges, resulted in wheat cultivation being restricted to areas where natural conditions were most suitable, while shortages were imported from overseas.
[8] The costs and risks attached to these efforts were borne by the co-operative producers.
[9] Under Section 19 of Act No 58 of 1935.
[10] During the first two years of its existence the Wheat Board had a difficult task as a bumper crop was reaped in 1935/36 and there was a surplus on hand in 1936/37. By utilising its levy revenue on wheat milled in the country and with the aid of

The Marketing Act of 1937 introduced the Wheat Control Scheme giving the Wheat Board the sole right to sell wheat. In addition, the Marketing Act empowered the Wheat Board, to fix prices from producer to consumer and to rationalise the milling and baking industries, subject to ministerial approval.[11] In September 1949, the Wheat Control Scheme became the Winter Cereal Scheme with control extended to include barley, oats and rye. With the outbreak of World War II, the Wheat Board introduced subsidies on grade A wheat to increase production. Subsidies to producers continued up until the 1957, after 1957 the subsidy was paid only on bread flour, and after May 1977 the subsidy was paid only on flour intended for the baking of standard bread. The subsidy was paid to the baker with the objective of keeping the price of bread to the consumer as low as possible. The Wheat Board ceased regulating the prices and marketing of products derived from the processing of winter cereals in 1991, although it continued regulation the production price of wheat. The bread subsidy was also abolished in 1991, while value added tax on white bread was introduced.

In summary, up until the 1990s the marketing of agricultural products in South Africa, including grain products, was extensively regulated by the state through the Marketing Act of 1937 (consolidated in the Marketing Act of 1968).[12] Institutions mandated to implement the legislation included the Land and Agricultural Bank as well as Control Boards. Specific to wheat, the Wheat Board was the main intermediary between the farm gate and the processing level of wheat products. Marketing of wheat was regulated through a single channel marketing system administered by the Wheat Board. The Wheat Board was sole buyer and seller of wheat at predetermined prices. The Wheat Board also controlled imports and exports of wheat and wheat flour. Millers were obliged to take up all locally produced wheat for milling. Fixed price schemes and the agricultural co-operatives were generally appointed as agents of the relevant boards.

The co-operatives functioned as regional monopolies. Under these schemes, farmers were paid a fixed price at delivery to the co-operative. This resulted in substantial cross-subsidisation from farmers proximate to the market to farmers situated further away from the market. The system was meant to reduce regional differences and ensure the stability of agricultural prices

The first democratic government initiated a complete transformation of the industry with the introduction of the Marketing of Agricultural Products Act, No. 47 of 1996. The new Act dramatically changed agricultural marketing. Changes included the closure of the Wheat Board, a conversion from quantitative trade restrictions to tariffs and gradual reductions in the tariffs themselves. The South African Futures Exchange ("SAFEX") for agricultural products was established in the free market

Government, the Wheat Board succeeded in preventing a price collapse, although a decline in prices did take place. Wheat growing was the most profitable branch of farming during the depression years.

[11] Co-operatives and other agents were engaged at a commission, to receive, grade and finance the wheat, and store and deliver it to millers on the instruction of the Wheat Board. The apartheid Government used to protectionist policies to support favoured firms. See also Groenewald. (1964).

[12] See Vink and Kirsten (2000).

environment as a hedging instrument. The futures prices formed through trading on SAFEX are used as price indicators in the trade. Post liberalisation the grain value chains generally consist of six key levels, that is, the input (e.g. fertiliser) for agricultural production, agricultural producers (farmers), storage and trading of grain, the milling, processing of grain for supply on a wholesale basis, retail of wheat products and end-consumption.

B. MARKET DYNAMICS

Wheat represents one of the most important field crops in South Africa.[13] The wheat industry is important because it contributes significantly towards the total gross value of agricultural production. In addition, milled wheat in the form of flour is a key input into one of the main staple foods for South Africans, that is, bread. The purpose of milling is to break up the grains of wheat into flour (which comes from the centre of the grain, or endosperm), bran (the skin of the wheat), and pollard (the dusty material created during the grinding process). The aim of the miller is to extract the maximum proportion of flour from the grain with the least possible contamination by bran and pollard, the first two because they discolour the flour, and the last because it reduces the keeping quality.

The wheat milling process consists of three stages, each with its specific type of machinery. In the break process, roller mills are used to gently crack the wheat kernel open to prepare the wheat for further processing, with the aim of removing as much of the bran (the skin of the wheat berry) from the endosperm (the grain kernel). In the scraping process, the endosperm is scraped from the bran and is refined by means of roller mills, sifting machines and purifying methods. In the reduction process, the endosperm is finally refined by means of smooth roller mills and graded by sifting machines. The flour made from the endosperm is mainly used for human consumption and comprises a mixture of fine granules of starch and protein.

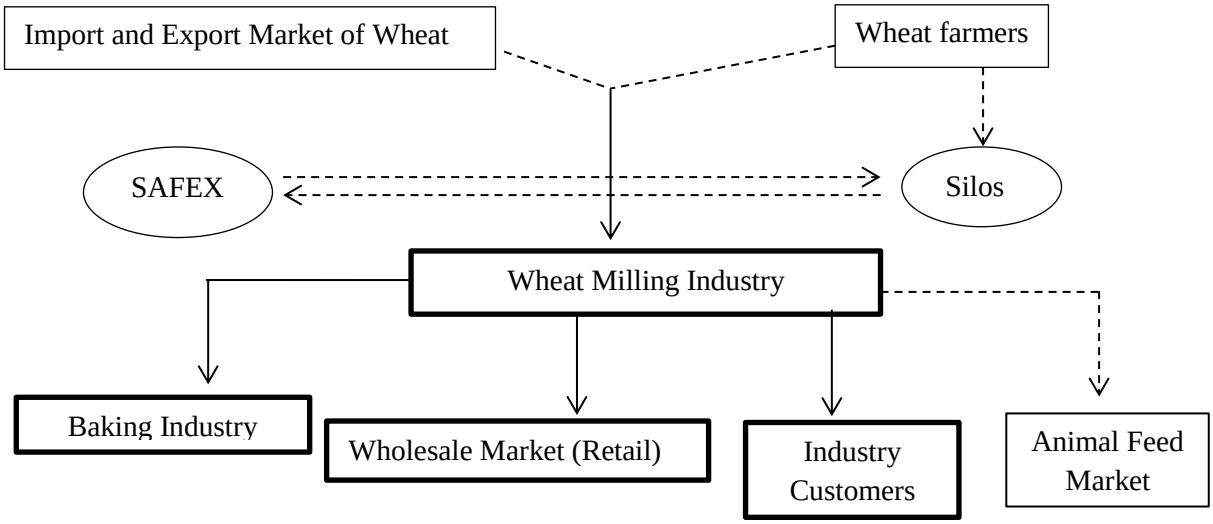
Wheat is generally classified as hard or soft. Hard wheat has higher protein content than softer wheat and is mainly used for bread. Soft wheat is more suitable for confectionary and biscuits purposes. The main products produced from the wheat milling process in South Africa include brown and white flour (used for baking bread, white bread flour accounts for about 40 percent of sales, while brown bread flour accounts for about 26 percent of sales), industrial flour (sold to only industrial users and is not available to end-customers, it accounts for about 1 percent of flour sales), wheat offal (used for cereals and/or sold to the animal feed manufacturing industry) and cake flour (use to bake cakes and accounts for about 30 percent of sales).

Figure 1 provides an overview of the wheat to flour value chain. South Africa has 4 major firms in the milling industry namely Pioneer Foods, Tiger Brands, Premier Foods and Foodcorp are all involved through their various divisions, in the wheat milling and baking industries. The 4 major firms were all

[13] See Meyer and Kirsten (2005).

involved the flour and bread cartels. The flour cartel also included a smaller firm, Godrich Flour Mills. The firms in the flour cartel accounted for more than 98 percent of all milled wheat sales.

Figure 1: The value chain



The flour industry is highly concentrated and is characterised by multi-market contact, homogenous products and a history of collusion, both at the level of milled wheat and in the main end consumer product, bread. The firms interact in more than one than one market at the same time. In particular, the firms have extensive presence in a number of geographic markets and are also in the baking of bread and milling of white maize. The firms are integrated in baking and production of other foodstuffs such as pasta. The wheat milling and bread baking industries were regulated prior to 1997.[14]

Flour is essentially an intermediate product either used internally by vertically integrated companies for their own bakery operations or it is sold to other firms to bake bread or manufacture other products such as cakes and biscuits. Although the end products of milled wheat, that is, bread and maize meal constitute staple foods and the main sources of energy for the majority of the South African population, it does not imply that flour and maize meal are substitutes. Various other factors such as consumer income, demand and supply, differences in nutritional value, seasonal output of raw product, regional consumption patterns, etc., also affect consumer decisions.

[14] Cartels in flour have also been discovered elsewhere around the world. In Europe, the Dutch, Belgian and German competition authorities have all recently prosecuted flour cartels. For example, on 22 December 2010, the Netherlands Competition Authority concluded that 15 flour milling firms agreed to share the market in order to limit competition and even went as far as to buy out and shut down rivals that would not join the cartel. Because the Dutch flour market had long ceased to grow and consumers had not increased their bread consumption and in order for each firm to remain assured of a certain market share, the flour producers shared the market between 2001 and 2007. This led to an agreement not to take over each other's customers, making it harder for those customers to negotiate better prices. In addition, a competitor that did not take part in the cartel agreements was bought by the cartelists and removed from the market. Another cartelist was compensated for revenue losses on condition that they would not destabilise the cartel.

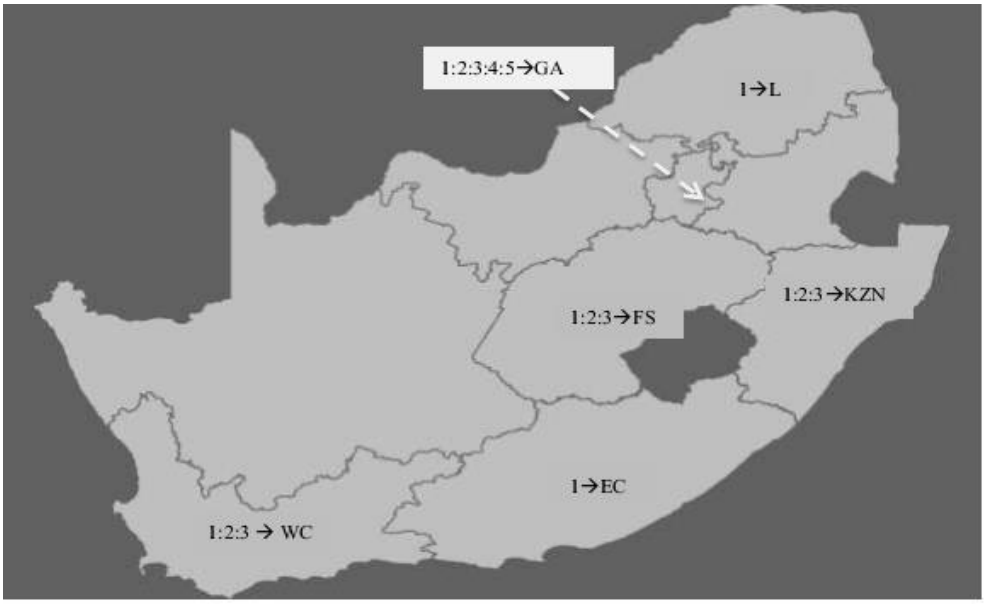
Flour and maize meal are not competing products and are in separate product markets. There is no supply side substitution between wheat milling and maize milling. The size differences between the wheat and the maize kernels mean that the settings and design of the milling equipment is different. Converting a maize milling plant into a wheat milling plant requires changing and replacing all the milling equipment which requires significant capital outlays. It is for this reason that the milling companies tend to design and configure their milling facilities in terms of the type of product. Competition takes place at both national and regional levels. The competitive dynamics are associated with sourcing of wheat, the supply and demand balances across regions within the country and the significant transport costs. The flour producers are able to compete with each other on a national level, through a network of storage depots and regional scattered mills across the country (see Figure 2).

Raw wheat is sourced through the SAFEX from traders and farmers, and can also be bought direct from farmers in what is referred to as the 'physical market'. If wheat is delivered through SAFEX, the seller of the wheat must ensure that the wheat is delivered according to the SAFEX rules of delivery and the location difference to factor in the transport costs will be reflected in the final price.[15] More than 80% of wheat in South Africa is produced in the Free State, Western Cape and Northern Cape provinces. South Africa is not a major producer of wheat in the world, wheat is imported to supplement domestic production. South Africa is a net importer of wheat. Wheat prices are generally lowest in the Western Cape, where there is generally a local surplus and prices are set against the inland (Randfontein) price, determined by import parity through Durban, less transport from the Western Cape.[16]

[15] The price of wheat on different markets is adjusted to take account of the differences in transport costs, exchange rates, etc., in order to make comparisons possible. Such an adjusted price is called a reference price; it is calculated with respect to a reference point. In the case of grains in South Africa the commonly used reference point is Randfontein. In order to adjust prices to this reference price, the international commodity price ('free on board' or FOB Gulf price) has to be adjusted to take account of all the costs incurred in bringing the wheat to Durban. This price, called the CIF price, is adjusted to local currency using the current exchange rate. Once this is done, all local Rand based costs (off-loading, losses, interest, local transport costs) can be added resulting in a final landed (local) price per tonne at the point of consumption, or the reference point.

[16] The Competition Tribunal ("The Tribunal") highlighted the above dynamics in the matter between CTH and Senwes, noting that "while trading (derivative) market may be national, in the sense that traders are located nationally and compete for supplying processors nationally, geography cannot thereafter be dispensed with." It further also recognised that in the market for the physical supply of grain there is a competitive advantage to having the best location for storage. Simply put, while millers can procure nationally through SAFEX trading, the regional dynamics will ultimately be reflected in the transactions. See the Competition Tribunal's decision in Case Number 110/CR/Dec06.

Figure 2: Location of wheat mills by the major milling companies



Notes: 1 = Pioneer Foods; 2 = Tiger Brands; 3 = Premier; 4 = Foodcorp; and 5= Godrich; and WC =Western Cape; EC = Eastern Cape; KZN = KwaZulu-Natal; GA = Gauteng; FS = Free State; L = Limpopo

3. The flour cartel

Recall that there are two main elements to successful collusion. The first element is reaching an agreement. There must be some understanding among the firms regarding what conduct is permitted under the terms of the collusive agreement, for example, the prices that the firms will charge. The second element is enforcing the agreement. Timely detection of deviations from a collusive agreement and a credible mechanism for the punishment of deviations are key conditions to enforcing the agreement. Specifically, detection and punishment must be sufficient to deter individual firms' incentive to cheat on the agreement, typically by cutting prices in the short-term, in order to achieve greater profits through a higher market share, at the expense of the other firms, before they can respond.[17]

A. ORIGIN AND GENERAL DESCRIPTION OF THE CARTEL

Private meetings and telephone contacts between the wheat milling firms began in 1999 and carried on until March 2007.[18] It appears that the cartel started subsequent to the de-regulation of the industry. Instead of competing, the flour millers replaced the regulated cartel with private agreements. Cheating on cartel agreement was part of the collusive equilibrium. Wheat millers have similar overhead costs and hence, it was very easy for the firms to lose market share and customers when they increased their prices especially following an increase in the price of raw material. Some firms would hold over on

[17] For recent extensive surveys of the evidence of collusive activity, see Levenstein and Suslow (2006).

[18] See Commission press release, 13December 2012 Competition Commission settles milling case with Foodcorp. Available at http://www.compcom.co.za/assets/Uploads/AttachedFiles/MyDocuments/Commission-settles-milling-case-with-Foodcorp-.pdf

the increase in price and manage to attract customers of those firms that had already increased their prices. These cheating episodes led to discussions between firms and co-ordination of price increases in an effort to "stabilise" the market. The firms understood that co-ordination was necessary for them to avoid losing customers and market share.

The cartel's internal enforcement mechanism was such that when deviations became visible, the cartelists first communicated before reverting to a price war. The cartelists only met when there was some instability in the market. That is, when the market was running smoothly with firms increasing their prices after the increase in raw material costs, there was no need to have any discussions. However, when some firms decided to cheat by for example, holding over on the increase, the discussions would then become necessary.

The cartel meetings were held at regional and national levels. Cartel meetings took place at different locations in the different provinces. For example, in some provinces, the meetings were better known as "church meetings". Indeed, the price fixing meetings were held in church halls and were, quite astonishingly, often preceded by a prayer. In other provinces, the firms organised themselves into regional forums and the meetings were not only structured in the sense that the meeting dates were agreed upon in advance, the meetings were chaired by different people. The illicit agreements were not based upon any precise formula, although a pattern can be discerned:[19]

i. A core group of firms, namely Tiger Brands, Pioneer Foods, Premier, Foodcorp and Godrich Flour Mills were involved in the cartel;

ii. The firms had multilateral and bilateral meetings every 4 to 6 weeks in which they discussed price increases, implementation dates and customer allocation by region before 2003. The cartelists were usually present at all meetings and those that were not, were brought or kept up to speed on developments and discussions by those present. During various periods when there were no meetings between the representatives of the milling firms, ad hoc contact was maintained by way of telephone calls;

iii. The firms had an agreement not to target one another's customers (bakeries and other big wholesalers and retailers). This so-called "gentlemen's agreement" in the industry amounts to customer allocation and was also used as a method of monitoring behaviour, pricing and market shares over time. If a customer of a competitor approached a milling company for a price, it was understood that they should be offered a high (uncompetitive) price. In certain cases where a competitor did indeed target and poach a customer by low pricing there would be telephone calls and sometimes meetings to discuss the situation and to ensure that all members adhered to this understanding at all times;

[19] See Competition Commission and Pioneer (Consent Order), Case number: 15/CR/Mar10. Available at: http://www.comptrib.co.za/assets/Uploads/1015CRMar10-Pioneer.pdf

iv. After 2004 there were regular telephone contacts and infrequent multilateral and bilateral meetings. It is not clear what changed after 2004, perhaps the cartelists were trying to elude detection by customers and the authorities.

v. Price lists were determined nationally, together with minimum prices to which regional marketing and sales managers could discount. These price lists were then sent to the regional managers. The regional managers had some discretion in deviating from these lists, although they had no mandate to adjust prices below the minimum national prices.

vi. In 2006, the core group of the cartelists met and discussed national prices and these were filtered down to the regions.

vii. The meetings initially occurred frequently but fizzled down later and occurred mostly when there was non-compliance with the "gentlemen's agreements" or when firms failed to raise their prices after an increase in the price of raw material or as agreed.

B. COMPETITION TRIBUNAL DECISIONS AND TIMELINES

Section 4 (1) (b) 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 involves directly or indirectly fixing a purchase or selling price or any other trading condition or dividing markets by allocating customers, suppliers, territories, or specific types of goods or services. The firms must be in a horizontal relationship.[20] Section 4 (1) (b) of the Competition Act is a *per se* provision. The mere occurrence of the conduct will attract liability. It is not open for justification but it must nevertheless be established that the prohibited conduct has taken place.[21]

Premier Foods, Tiger Brands, Pioneer Foods and Foodcorp have all admitted that their conduct contravened section 4 (1) (b) of the Competition Act. They admitted that during the period between 1999 and 2007, they were all part of a cartel that fixed selling prices as well as the implementation dates of such prices and allocated market for wheat flour.

When Premier Foods applied for corporate leniency in terms of Commission's corporate leniency policy in the bread cartel case, it also indicated that the cartel extended to the milling industry as well.[22] Because of Premier Foods' co-operation with the Commission's investigation and its confession to its role in both the bread cartel and the milling cartel, Premier Foods was granted conditional immunity from prosecution on 16 March 2007.

Tiger Brands corroborated Premier Foods' allegations and entered into a consent agreement with the Commission on 9 November 2007. In terms of the consent agreement, the Tribunal imposed a fine on

[20] Section 1(1) (xiii) of the Competition Act defines a horizontal relationship as one that exists between competitors.
[21] American Natural Soda Ash Corporation v Competition Commission 2005 6 SA 158 (SCA).
[22] On 14 March 2007, the Commission initiated a complaint against Tiger Brands, Pioneer Foods, Foodcorp and Godrich Milling in respect of alleged collusive activities in the wheat milling industry.

Tiger Brands for its role in the bread cartel. Tiger Brands confessed its role in the bread cartel and provided further evidence on the milling cartel. Tiger Brands co-operated with the Commission in its investigation and was granted conditional immunity from prosecution in terms of the corporate leniency policy.[23]

On 6 January 2009 the Tribunal confirmed a consent agreement between the Commission and Foodcorp regarding Foodcorp's involvement in the bread cartel and imposed a fine.[24] On 3 February 2010, after contested proceedings, the Tribunal found that Pioneer Foods had been involved in a conspiracy to fix the prices of bread as well as market allocation in the Western Cape province and nationally.[25]

The flour cartel complaint was referred to the Tribunal for determination on 15 March 2010. On 30 November 2010, the Tribunal confirmed a consent agreement between the Commission and Pioneer Foods regarding Pioneer Foods' involvement in the milling cartels.[26] On 12 December 2012, the Tribunal confirmed a consent agreement between the Commission and Foodcorp regarding Foodcorp's involvement in the milling cartels and imposed a fine.[27] Godrich Flour Mills is contesting the Commission's findings and the Tribunal is still to adjudicate.

C. THE CARTEL AND HARM TO INDEPENDENT BAKERIES

Suppose there is a vertically integrated cartel producing flour and bread. The vertically cartel sells flour to independent bakeries, who use the flour to bake bread and compete with the vertically integrated cartel in the bread market. Competition in the bread market can be characterised as involving a cartel with a competitive fringe. Figure 3 below shows the demand for bread and the demand for flour (the intermediate product), which is used in the production of product bread. Let w_0 denote the flour price in the absence of a cartel and p_0 be the corresponding price for bread. Suppose a

[23] The Tribunal imposed a fine of R98 million on Tiger Brands for its role in the bread cartel. This represented about 5.7 percent of its turnover from baking for the financial year 2006. See Commission press statement, 12 November 2007, Tiger Brands admits to participation in bread and milling cartels and settles with Competition Commission. Available at: http://www.compcom.co.za/2007-media-releases/

[24] The Tribunal imposed a fine of R45 million on Foodcorp. This represents 6.7 percent of its turnover for baking operations for the financial year 2006. See Commission press release, 5 January 2009, Competition Commission settles with Foodcorp. Available at: http://www.compcom.co.za/assets/Uploads/AttachedFiles/MyDocuments/5-Jan-09-CC-Settles-with-Foodcorp.pdf

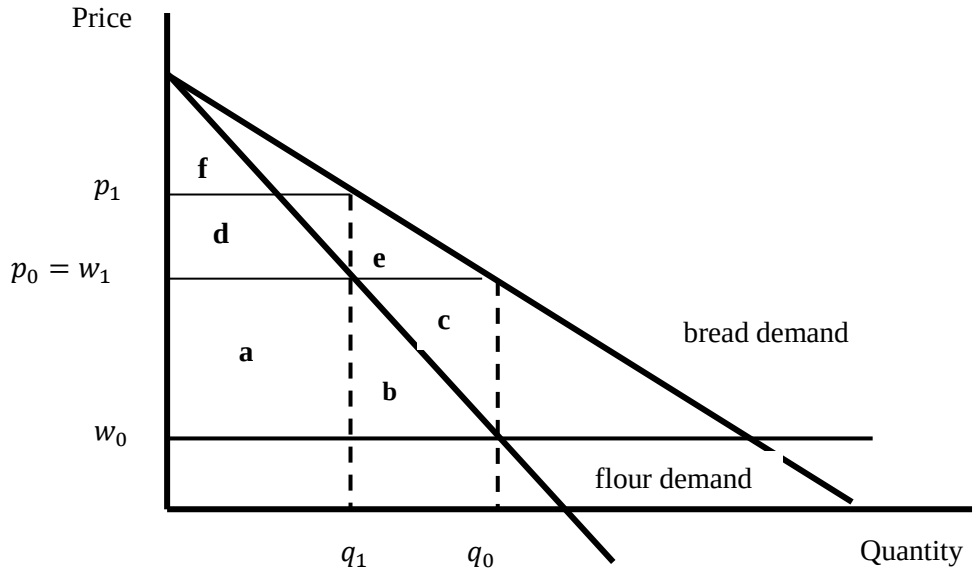
[25] The Tribunal ruled that Pioneer Foods had engaged in fixing the price of bread products in the Western Cape province and nationally and imposed a fine of R196 million. See Competition Commission v Pioneer Foods (Pty) Ltd (15/CR/Feb07, 50/CR/May08), Available at http://www.saflii.org/za/cases/ZACT/2010/9.html

[26] See also Bonakele and Mncube (2012) for details on the design and objectives of the Pioneer Foods settlement agreement. The remedies that were concluded with Pioneer Foods constitute a major measure of "success" in the enforcement of competition law in developing countries. They included, among others, an administrative fine, part of which by agreement was set aside for the creation of an Agro-processing Competitiveness Fund aimed at lowering the barriers to entry, as well as a commitment to reduce prices on the sale of flour and bread over an agreed period designed to stimulate rivalry while at the same time enabling smaller non-vertically integrated participants to compete in bread.

[27] The Tribunal imposed a fine of about R89 million which amounted to 10 percent of the affected turnover of its 2010 milling division. See Commission press release, 13December 2012 Competition Commission settles milling case with Foodcorp. Available at http://www.compcom.co.za/assets/Uploads/AttachedFiles/MyDocuments/Commission-settles-milling-case-with-Foodcorp-.pdf

cartel operating in the flour market succeeds in raising flour prices to w_1. The cartel has an indirect effect on the price of bread, which increases up to p_1.

Figure 1: Harm caused by the wheat flour cartel



The cartel in the market for flour harms the independent bakeries, who demand flour in order to produce bread and industrial flour purchasers (industrial flour is sold to industrial users in large packs and is not available to end-customers) as well as the indirect users of flour, who purchase bread for their consumption.

A firm found guilty in a cartel case and sued for damages may invoke the passing-on defence, that is, its (direct) buyer passed on to its own customers the higher price. The degree of pass-on depends on the structure of the market. If the buyer faces Bertrand competition downstream and its rivals were not affected by the cartel, the pass-on will be 0. If there is Bertrand competition downstream and all buyers were affected by the cartel, the pass-on will be 100%. If the buyer is a monopolist downstream, then the pass-on will be partial (under linear demand assumptions, it turns out to be 50%).[28] This also opens the issue of possible claim by indirect customers, who would have been hurt by the pass-on.

Assume, there is Bertrand competition in the bakery market and bakeries belonging to the flour cartelists are not affected by the flour cartel while independent bakeries are affected. Therefore, there is no pass on effect. Direct customers such as independent bakeries and industrial users are harmed because they are forced to pay $(w_1 - w_0)$ more for the q_1 units purchased from the cartel and because the volume they sell in the end product market falls from $q_0 \; to \; q_1$, which implies a loss of profits

[28] See Verboven and van Dijk (2009). There is also a huge empirical literature on the pass-on (also called pass-through), especially in macro and international trade.

equal to $p_0 - w_0 (q_0 - q_1)$. In the absence of the pass on effect, the harm caused by a cartel for direct customers is the sum of areas a, b, and c.

The harm caused by the cartel on direct customers is reduced if they can pass-on part of the flour price increase to their own customers by increasing the price charged for bread from p_0 to p_1. As shown in Figure 3, the harm caused by the flour cartel on the direct customers of flour is given by the sum of areas a, b and c minus area d. Area a measures the flour cartel overcharge. The combined area b and c measures the loss of profits associated with the reduction in volume caused by the cartel. Area d measures the pass-on effect.

Consumers of bread pay a price p_1 when they would have paid p_0 in the absence of the cartel. Consumer welfare in market for bread also falls as a result of the reduction in volume from q_0 to q_1. Observe that area a, now accrues to the cartel. Area a, is not therefore a loss for society. It used to belong to the direct customers, it now belongs to the cartel. Similarly, area d, is not a loss for society. It used to belong to the consumers (i.e. bread buyers), it now belongs to the 'direct customers'. So areas a and d are not part of the social loss created by the cartel. These two areas have simply changed hands. This is not the case, however, with areas b, c and e which represent the true harm created by this cartel on the South African economy.

When the flour and bread cartels were in operation, there is an open question as to how much of the collusive mark-up was realised in the flour mark-up and how much in the bread mark-up. In principle, collusion could have taken place exclusively in the flour market, that is, maximal surplus from bread consumers could have been extracted by flour millers raising the price of flour and then competing (with this artificially high cost of flour) in the bread market. Given the lack of substitute for flour in the baking of bread, such a collusive scheme could be effective. However, it is probably not difficult to find reasons for why cartel may not want to raise the price of flour too much and to instead collude both in the milling and baking market.

The analysis below assumes that there is no pass on effect in the independent bakery market. This assumption is reasonable because the independent bakeries were excluded from the bread cartel and the vertically integrated cartel is known to have engaged on predatory pricing strategy to keep independent bakeries out of the bread market.[29] In addition, Pioneer Foods admitted in November 2010 that this conduct impeded small independent bakeries from expanding within the market as part of the Pioneer Foods consent order concerning the milling cartel concluded by the Tribunal.

[29] Mncube (2013) provides direct evidence of predation through below-cost pricing in the cartelised South African bread industry by comparing prices to average variable costs.

4. Estimating wheat flour price overcharges to independent bakeries

The method for assessing the overcharges adopted in this section consists of comparing the actual situation during the period when the flour cartel produced anticompetitive effects with the situation on the same market after the cartel ceased. In principle, three different points of reference that can be used for the comparison over time:

i. An unaffected pre-carte period (comparison 'before and during' in the wheat flour cartel example: comparison of the prices paid for wheat flour in the same market before the cartel. A complication to this assessment in the flour industry in South Africa is that the industry has always been cartelised, establishing the before period is difficult. Recall that the industry was regulated from 1937 to 1996);
ii. An unaffected post-infringement period (comparison 'during and after' in the wheat flour cartel example: comparison of the prices affected by the cartel with prices paid in the same market after the cartel ended); and
iii. Both an unaffected pre- and post-infringement period (comparison 'before, during and after').

One advantage comparing, over time, data from the same geographic and product market is that market characteristics such as the degree of competition, market structure, costs and demand characteristics may be more comparable than in a comparison with different product or geographic markets.

A. THE REDUCED FORM MODEL

Defining the but-for situation is a necessary condition for isolating these effects and distinguishing them from the effects of factors unrelated to, and unaffected by, the collusive conduct. The reduced form model uses data on prices and the explanatory variables from both the cartel and non-cartel period (see for example, Nieberding (2006), Rubinfeld (2008), Van Dijk and Verboven (2009), and McCarry and Rubinfeld (2011)).[30] The model adopted describes the equilibrium price that results from the interaction of demand and supply (or cost) forces in the flour industry, with the output variable having been removed by substitution and given by:

$$p_{it} = \beta_0 + \beta_1 C_{it} + \beta_2 S_{it} + \beta_3 D_{it} + \varepsilon_t$$

[30] Some of the advantages of using a reduced form model for estimating dames include, (1) the fact that data requirements are limited to time series of the respected cartelized product; (2) the economic concept behind the approach is simple and straightforward; (3) the estimation of the over-charge itself is relatively easy to implement; and (4) it is not necessary to make any assumptions on industry conduct absent the cartel.

Where p_{it} represents the price of flour at time t in region, i , and C is a set of variables that affect per-unit costs (e.g., wheat prices). S is a group of variables affecting demand (e.g., the prices of substitute products). The cost and demand-shift variables included are assumed to be exogenous, since they are presumed to be determined independently of price and therefore unaffected by it (see Rubinfeld (2008)). Variables related to market demand appear in the model because the reduced form model tries to explain the equilibrium price.

Included within the explanatory variables is a dummy variable, D. The dummy variable assumes the value of one for observations during the cartel period and zero for observations outside the cartel period. The estimated coefficient of the dummy variable if found to be significant provides an estimate of the average overcharge due to the cartel. Put differently, the dummy variable represents a "shift" in the price line under study rather than causing a change in its shape (or slope).

However, as discussed by Finkelstein and Levenbach (1983), if prices are affected in more varying and complex ways, the use of one scale dummy variable for the entire cartel period (which assumes that the cartel added a fixed Rand or percentage amount to price during the conspiracy) may be too simple an approach (see also Nieberding (2006)).[31] When the duration of the cartel behaviour is long and the necessary data is available, the more appropriate way to evaluate the overcharges is use a forecasting approach. In this approach, one estimates a regression model that explains prices using only data for the control period in which competition was not restricted. Thereafter, the regression model is used to predict but for prices in the cartel period.

The error term reflects random shifts in demand, marginal cost, or conduct by the market participants. The error is assumed to be independent of, and therefore uncorrelated with, all of the right-hand variables. Further, we note that there are demand and cost shifters which are only observable to the firms. These unobservable characteristics will be captured by the error term in the empirical model.

B. DATA AND RESULTS

The dataset contains information on monthly wheat prices, flour prices to the independent bakery channel and other variables from September 2003 to December 2008 for Gauteng and Western Cape provinces. Table 1 presents some of the descriptive statistics and variable description.

[31] Another shortcoming of the reduced form model, is the fact that the omission of relevant variables can bias the results. Omitted variables that are correlated with the dependent variable reduce the probative value of the regression analysis. Furthermore, the results might not be robust to the choice of functional form.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Description
GA_WF_P	63	3542.7	1202.3	Represents the average monthly real price per tonne of white bread flour in Gauteng (in Rands)
GA_WF_WC	63	2511.3	1020.3	Represents the wheat real cost per tonne of white bread flour in Gauteng (in Rands)
GA_BF_P	63	3506.1	1119.8	Represents the average monthly real price per tonne of brown bread flour in Gauteng (in Rands)
GA_BF_WC	63	2318.6	937.7	Represents the wheat real cost per tonne of brown bread flour in Gauteng (in Rands)
GA_CF_P	63	3674.3	1155.6	Represents the average monthly real price per tonne of cake flour in Gauteng (in Rands)
GA_CF_WC	63	2653.1	1081.4	Represents the wheat real cost per tonne of cake flour in Gauteng (in Rands)
WC_WF_P	63	3288.9	1192.7	Represents the average monthly real price per tonne of white bread flour in Western Cape (in Rands)
WC_WF_WC	63	2106.2	1007.0	Represents the wheat real cost per tonne of white bread flour in Western Cape (in Rands)
WC_BF_P	63	3186	1097.3	Represents the average monthly price per tonne of brown bread flour in Western Cape (in Rands)
WC_BF_WC	63	2108.9	1008.3	Represents the wheat real cost per tonne of brown bread flour in Western Cape (in Rands)
WC_CF_P	63	3811.9	1138.6	Represents the average monthly real price per tonne of cake flour in Western Cape (in Rands)
WC_CF_WC	63	2979.5	1134.2	Represents the wheat real cost per tonne of cake flour in Western Cape (in Rands)
safexp	63	2075.2	843.9	Represents the average monthly real SAFEX Randfontein wheat price per tonne (in Rands)
Oats	63	9.8	1.1	Represents the real price of cereal per 500g (in Rands)
dcartel	63	0.6	0.5	1 if in cartel period and 0 otherwise

The dataset is constructed using a combination of both public and private data. The private data is from the National Chamber of Milling ("NCM") and the firms involved in the cartel themselves. The private dataset includes prices, costs and sales volumes. We include in the dataset monthly consumer price index data gathered from Statistics South Africa ("Stats SA"). This data captures monthly food prices and is provided by the South African Grain Information Service ("SAGIS") and is public. It contains nominal prices of substitutes such as Oats. Wheat flour can be substituted with oat flour in baking bread and other products.

The wheat cost is calculated using the average monthly SAFEX Randfontein wheat price per tonne (i.e. monthly average using daily SAFEX prices, lagged by 3 months to take into account of mills buying wheat on forward contracts) plus the SAFEX transport differential which is adjusted annually, less the average monthly chop (offal) price adjusted for the extraction rate (for example, for cake flour the extraction rate 70% per tonne of milled wheat).[32] The extraction rate is obtained from the NCM.

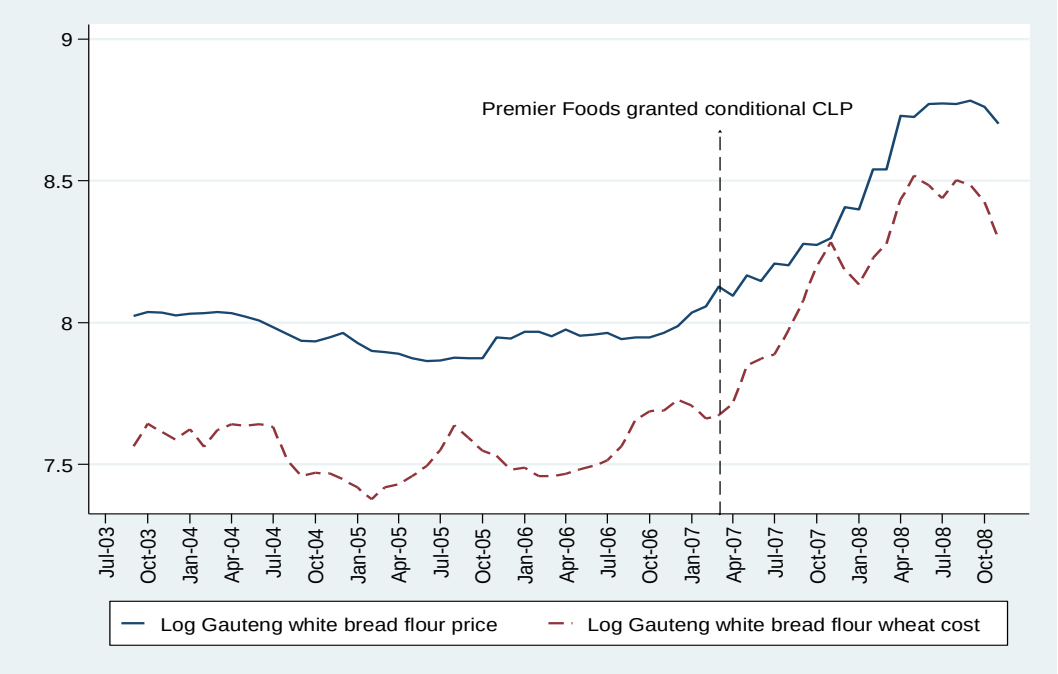
[32] All SAFEX prices are Randfontein-based, this means that if a producer can deliver or a miller can accept delivery at Randfontein, they will receive or pay the SAFEX price for the delivery month contract (the spot price). The delivery usually takes place at points across the various producing regions, all spot prices are SAFEX adjusted prices. For example if the

Other costs are obtained from the firms' annual submission to the NCM's costing survey data. These costs are averaged across the regions for all of the firms and include packaging, distribution, production and marketing costs per tonne of milled wheat.

The flour prices are obtained using the firms average monthly transaction price for a 12.5kg bag of flour sold to the independent customer channel, multiplied by 80 to convert them to a price per tonne, adjusted for an extraction rate of approximately 70% per tonne of milled wheat as obtained from the NCM. The price and cost data is deflated using the South African consumer price index for food ("CPIF"). The CPIF only includes the food items appearing in the consumer price index basket and is provided by Stats SA. The base year for the deflator of real prices is 2005.

The proved existence of the cartel suggests that independent bakeries paid a high price for flour and were therefore harmed by the cartel. Figures 4 to 7 show the development of flour prices and wheat costs per tonne of flour from September 2003 to December 2008 in Gauteng and Western Cape provinces.

Figure 4: Gauteng white bread flour price, September 2003 to December 2008



transport costs between Randfontein and the silo where a producer chooses to deliver is R100/tonne, the delivery price for the producer will be equal to the Randfontein price (the delivery month contract price) minus the R100/ton transport cost. The buyer will now collect the maize from the relevant silo at the SAFEX price minus the R80/ton. These transport cost differentials are calculated every year and are available from SAFEX.

Figure 5: Western Cape white bread flour price, September 2003 to December 2008

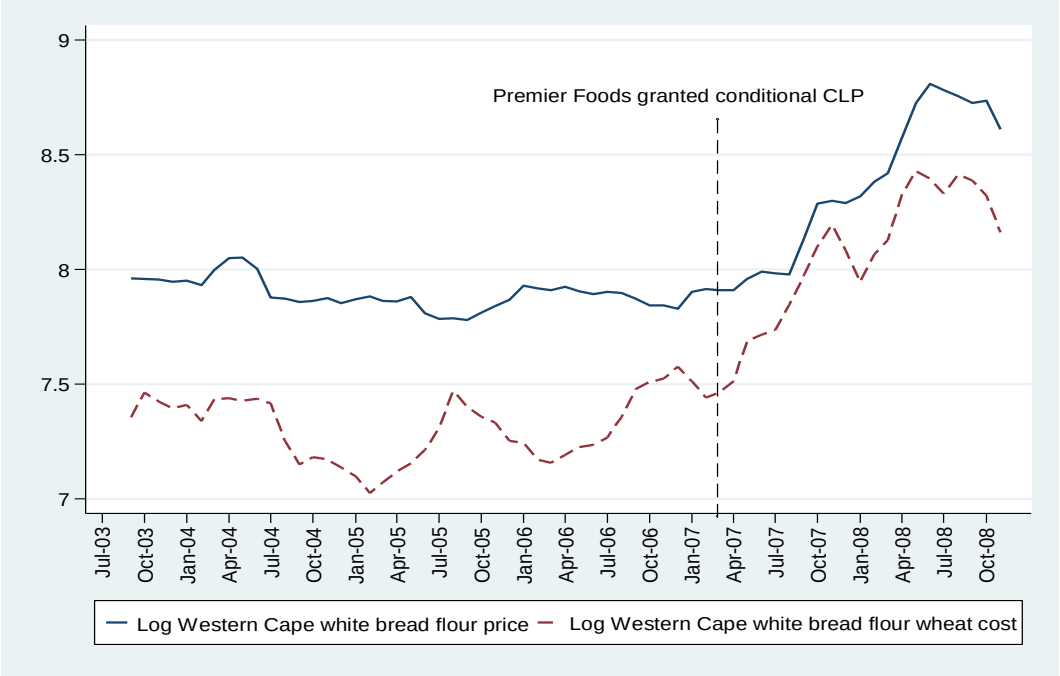


Figure 6: Gauteng cake flour price, September 2003 to December 2008

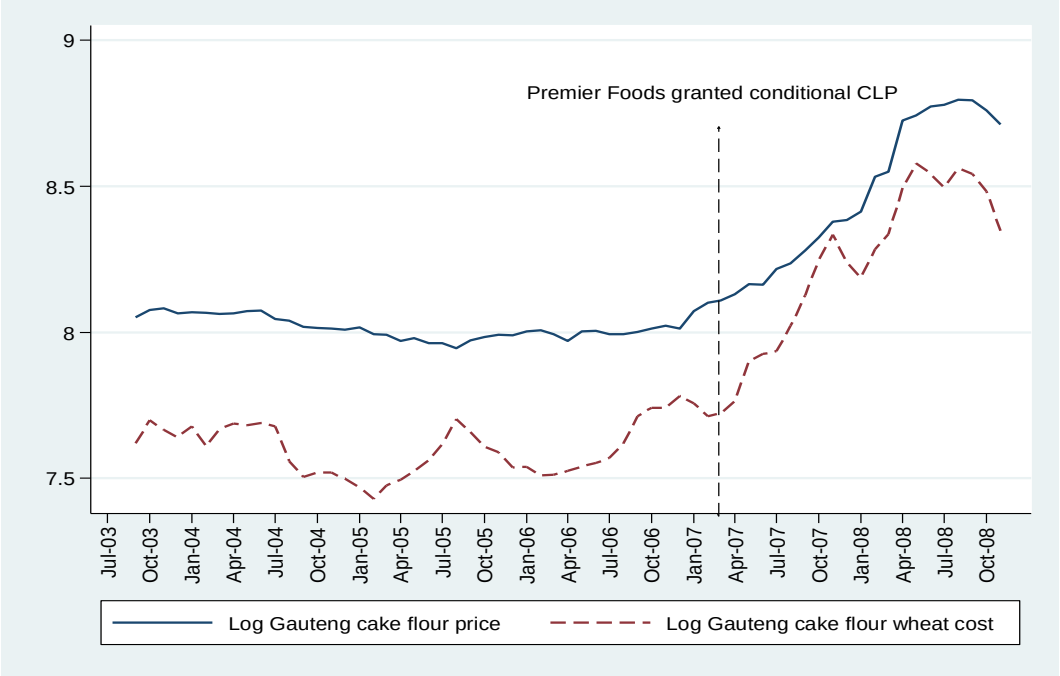
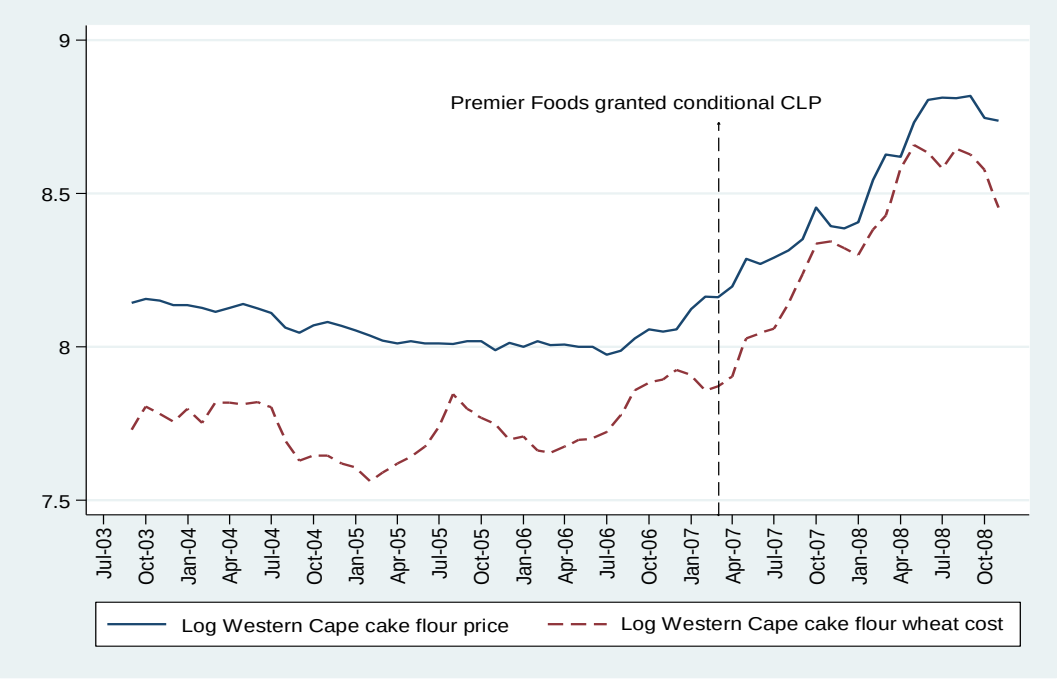


Figure 7: Western Cape cake flour price, September 2003 to December 2008



Figures 4 to 7 aim to provide a simple comparison of prices during the period of the alleged cartel with the prices in the period after, on the assumption that the latter provide a reasonable approximation of price levels in the absence of the cartel. While this approach is appealing because of its simplicity and visual transparency, it is subject to a number of potentially significant pitfalls. Observations of the likely impact of the cartel are difficult make from the figures. Post cartel, flour prices increased substantially up to May 2008, after which prices began to fall while the flour price remained stable.

There are several explanations for this observation. First, it could be a result of asymmetric price transmission of cost changes whereby price responds quicker to cost increases than to cost decreases. Some review of the literature reveals that rockets and feathers have been observed for many agricultural markets.[33] Second, tacit collusion is more likely after explicit collusion, because firms may have learned ways to organise themselves in manor in which tacit collusion is the outcome during the explicit cartel (see Connor (2004)). Connor's argument suggests that prices decline after the explicit cartel but just not to competitive levels, other things equal. If the cartel is not perfectly colluding and is not motivated by the desire to maximise joint profits but rather socialisation, it is possible that the tacit collusion outcome results in higher prices. Alternatively, Harrington (2004) shows that the likelihood of damage assessment based on post-cartel prices may in fact create an incentive for firms to price above the non-collusive price in the post-cartel period in order to

[33] See for example, Meyer and von Cramon-Taubadel (2004); Frey and Manera (2007) and Cutts and Kirsten (2006).

complicate calculations of damages. This strategic behaviour may lead to an underestimation of cartel damages if the assessment is based on post-cartel prices.[34]

The arguments above support the use of pre-cartel price information as the more appropriate benchmark. However, it is impossible to get pre-cartel price data for wheat flour given the history of regulation in the flour industry in South Africa. Ideally the benchmark period selected for identifying but for prices should capture long-run equilibrium prices. It is important that the conditions under which prices were set before, during and after the cartel be clearly understood. If prices are un-representative during the selected benchmark period then the but for prices generated by this approach may be misleading.[35]

We estimate a log-linear model. As discussed above, only the relevant cost and demand variables are included in the empirical analysis. Notice that we do not include the quantity variable itself as an independent variable but instrument quantity by using the price of substitutes. This is done to avoid the inter-dependence of price and demand. From an econometric perspective, ignoring the interdependence can cause serious consequences in the form of biased coefficients. The model is expressed in its implicit form as:

$$\ln(flour\ price) = \beta_0 + \beta_1 \ln(wheat\ cost) + \beta_2 \ln(Oats\ price) + \beta_3(cartel\ dummy) + \varepsilon$$

The explanatory variables included in the model aforementioned and their definitions are presented in Table 1.

Table 2 shows the results of the log-linear regression specification using OLS. The R-squared value of 0.909 (Column 1) indicates that 90.9 percent of the total variation in the price of brown bread flour explained by the explanatory variables in the model. The wheat price (cost shifter) is significant and positively related to the price of flour. This is accordance with priori expectations. The regression results show that a 1 percent increase in the price of wheat leads to a 0.487 percent increase in the price of brown bread flour in Western Cape. The results show that the price difference between the cartel period and the non-cartel period (that is, the price overcharge) is given by the exp (0.213) - 1 and is equal to 23.7 percent for brown bread flour (column 1). The Western Cape estimated results

[34] While private antitrust class actions have historically been weak in South Africa, the South African Constitutional Court recently ruled in favour of the companies looking to initiate a class action against various bread producers. Note that the firms involved in the bread cartel are the same firms involved in the flour cartel. Constitutional Court judgment overturned two previous rulings by the Western Cape High Court as well as the Supreme Court of Appeal that denied the distributors the ability to bring a class suit against Pioneer Foods, Tiger Brands and Premier Foods who were found guilty by the Competition Tribunal for price-fixing. Now, the bread distributors have another chance to sue the cartelists. The Constitutional Court referred the case to the Western Cape High Court to hear the argument again. See Children's Resource Centre Trust v Pioneer Food (50/2012) [2012] ZASCA 182 (29 November 2012) and Mukaddam v Pioneer Food(49/12) [2012] ZASCA 183 (29 November 2012). See also https://www.competitionpolicyinternational.com/south-africa-court-overturns-class-action-denial-for-bread-distributors/

[35] This approach assumes that the selected benchmark prices would have been constant during the period of the cartel which implicitly assumes that the key determinants of pricing conduct would have remained entirely unchanged during the period of the cartel as compared to the selected benchmark period. This is a strong assumption and may be difficult to justify where the cartel spans a significant time period during which demand and supply conditions are likely to have changed.

also reveal an overcharge of the value of exp (0.271) -1= 31.1 percent for white bread flour (column 2). Table 3 shows the estimated results of brown, white and cake flour in Gauteng, respectively. In line with priori expectations, all the cost shifters are positive and significant in Table 3. For example, a 1 percent increase in the price of wheat leads to a 0.519 percent increase in the price of Gauteng brown bread flour. However, all the cartel dummy variable coefficients are insignificant in Gauteng. The overcharge is of the value of exp (0.09)-1= 9.4 percent for white bread flour and the overcharge is of the value of exp (0.123)-1 = 13.1 percent for cake flour

Table 2: Western Cape flour markets regression analysis (log –linear model)

	(1)	(2)	(3)
VARIABLES	**lnWC_BF_P**	**lnWC_WF_P**	**lnWC_CF_P**
lnWC_BF_WC	0.487***		
	(0.0692)		
lnWC_WF_WC		0.473***	
		(0.0792)	
lnWC_CF_WC			0.555***
			(0.0703)
dcartel	**0.213*** **	**0.271*** **	0.0500
	(0.0591)	(0.0647)	(0.0306)
lnOats	1.545***	1.945***	0.861***
	(0.283)	(0.325)	(0.274)
Constant	0.673	-0.147	1.804***
	(0.647)	(0.676)	(0.402)
Observations	63	63	63
F(3, 59)	138.95***	172.46***	290.18***
R-squared	0.908	0.899	0.937

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Gauteng flour markets regression analysis (log –linear model)

	(1)	(2)	(3)
VARIABLES	**lnGA_BF_P**	**lnGA_WF_P**	**lnGA_CF_P**
lnGA_BF_WC	0.519***		
	(0.108)		
lnGA_WF_WC		0.592***	
		(0.0776)	
lnGA_CF_WC			0.573***
			(0.0675)
dcartel	0.0370	**0.0904***	**0.123*** **
	(0.0530)	(0.0535)	(0.0422)
lnOats	0.940**	1.080***	1.078***
	(0.435)	(0.311)	(0.256)
Constant	1.962***	1.009*	1.150**
	(0.617)	(0.564)	(0.464)
Observations	63	63	63
F(3, 59)	126.72***	316.75***	350.70***
R-squared	0.844	0.944	0.949

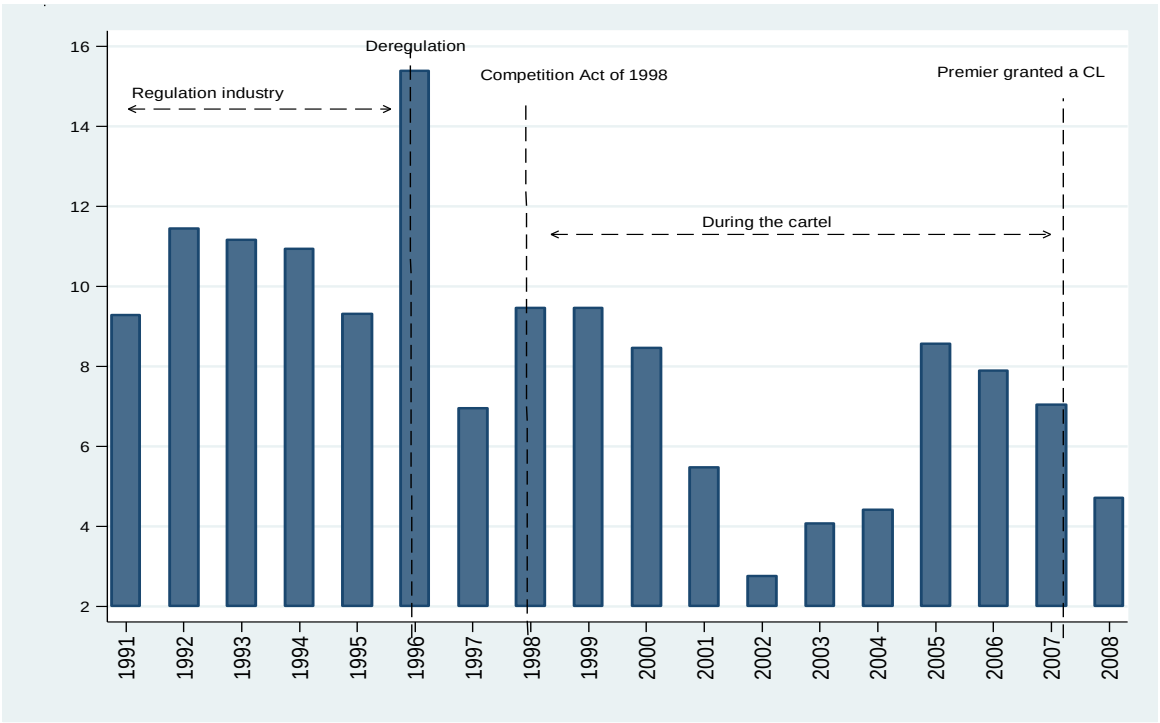
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Connor (2007) suggests a constant-margin approach as a variation on the before-and-after and cost-based methods. Figure 8 below shows the average percentage industry profits before, during and after the cartel. The average percentage profits on turnover are before tax and interest. Notice that there is a drop in profits by more than half following deregulation in 1996. This may have been one motivation why the industry fearing liberalisation decided to continue with regulation, albeit private regulation, in order to restore industry profits.

A price war in 2002 could explain the drastic drop in average industry profits. As an alternative to the before and after regression results, the cartel profits in Figure 8 are approximately two times higher during the cartel than the price war year 2002 or the post collusion year 2008. Figure 8 also suggests that the cartel may have experienced 2 episodes and that the first episode (1996-2001) was somewhat more effective in generating cartel profits than the second episode.[36]

Figure 8: Percentage industry profits on turnover before tax and interest



How do our estimates compare with findings elsewhere? Most of the empirical studies indicate that the majority of cartels that have been studied have a positive overcharge. For example, several studies derive overcharge estimates for various past cartels in various industries and countries. Connor and Lande (2006) provide a survey of cartel overcharge estimates by examining more than 500 referred journal articles, working papers, monographs and books. They find an average in the range of 31

[36] While in the first episode the cartel held regular meetings, in the second episode the cartel held regular telephone contacts perhaps because of probability of detection concerns.

percent to 49 percent and a median overcharge in the range of 22 percent and 25 percent of affected commerce. Connor and Lande then conclude that the presumption that cartels overcharge by 10 percent is much too lenient and the current levels of cartel penalties should be increased significantly. Combe et al (2008) analysed 64 cartels prosecuted by the European Commission and argue that fines imposed against cartels by the European Commission are overall sub optimal.

Levenstein and Suslow (2006), based on their review of 16 cartel case studies, calculate an average mean overcharge of 43 percent. They find that in all cartel cases surveyed, the cartel was able to raise prices immediately following cartel formation. Levenstein and Suslow are more cautious and their review suggests that there is a lot of variation in estimated cartel price over charges. A 2002 OECD study based on a survey of cartel cases conducted by its members between 1996 and 2000, finds that the median overcharge was between 13 percent and 16 percent of the cartel price (with a variation from 3 percent to 40 percent. Werden (2003) reviews 13 other studies, and finds 21 percent mean overcharge. One important key limitation of all these studies is publication bias, that is, a lot of cartels are unsuccessful in raising prices but because of publication bias are not reported upon.

5. Conclusion

The quantification of the overcharge suffered by independent bakeries in South Africa as a result of collusive behaviour requires a comparison with the position in which this group of customers would have been but for the cartel. Put differently, in calculating overcharges, we ask the question, what would have happened without the collusive behaviour? This hypothetical question cannot be observed. To answer, the hypothetical question we need to estimate the but for world with which then compare with actual world. To be specific, because the flour cartel raised prices to independent bakeries, the but for price is estimated as a reference point for comparing with the price actually paid by these customers.

However, it is impossible to know with certainty how the flour market would have exactly evolved in the absence of the collusive behaviour. Prices, sales volumes and profit margins depend on a range of factors and complex interactions between market participants that are not easily estimated. The estimation of the hypothetical non-cartel scenario relies on a number of assumptions. Hence, the calculation of overcharges is subject to considerable limits as to the degree of certainty and precision. There is no a single ‘true’ value of the overcharge suffered that can be determined, but only best estimates relying on assumptions and approximations.

In this paper, we have used a several techniques in order to estimate the overcharges in the flour industry. While admittedly, empirical estimations of overcharges are subject to assumptions. That the models are imperfect is however not a reason to discard them. Best practice suggests that whenever used, one should assess the empirical results in light of its limitation and perform sensitivity analysis to assess the robustness of the results. In addition, contrast the results with the other evidence collected in the course of the investigation.

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