

Working Paper 6/2018

## PIONEER PANNAR MERGER IMPACT ASSESSMENT<sup>1</sup>

Anthea Paelo, Genna Robb and Thando Vilakazi<sup>2</sup>

[antheap@uj.ac.za](mailto:antheap@uj.ac.za); [genna@acaciaeconomics.co.za](mailto:genna@acaciaeconomics.co.za); [thandov@uj.ac.za](mailto:thandov@uj.ac.za)

### Abstract

This paper sets out the findings of an ex-post economic assessment of the conditionally approved merger between Pioneer Hi-Bred International (Pioneer) and Pannar Seed Limited (Pannar). We critically assess the economic effects of the transaction in the South African market for hybrid maize seed breeding and the manner in which economic evidence and theory were considered by the competition authorities in evaluating the matter. The merger was prohibited by the Competition Tribunal, but this decision was overturned by the Competition Appeal Court which approved the three-to-two merger subject to behavioural conditions on pricing, among others. The paper assesses important issues regarding the effectiveness of pricing conditions to constrain upward pricing pressure post-merger, closeness of competition in differentiated product markets, the economic analysis of the counterfactual and efficiencies in merger proceedings, and the impact of mergers (in concentrated markets) on the incentives of firms to invest and innovate post-merger. Through analysing publicly available information, as well as information from detailed interviews with market participants, we find, firstly, that the pricing of Pannar-branded cultivars was constrained by the pricing condition imposed by the CAC for the duration of the conditions period. In addition, we find evidence of introduction of new varieties, and improvements in yield performance by Pannar-branded cultivars, but there are indications that this trend predated the merger to some extent, so it is unclear if the merger itself has led to the claimed efficiencies in terms of innovation. We also point out that the incentive to invest and innovate has most likely been dampened for firms in the industry, although our ability to assess this and other issues relating to prices and sales effects further has been limited by the data which is available. We set out recommendations regarding the importance of focusing on innovation competition and more complete economic assessment of efficiencies, and the weighting of anticompetitive effects in merger proceedings.

**JEL Classification:** L1, L41, O31

**Key words:** Seeds, Merger, Pioneer Pannar

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<sup>1</sup> This study was supported by the Competition Commission of South Africa. The findings presented in this working paper represent the views of the authors and not attributed to CCRED, the University of Johannesburg or the Competition Commission of South Africa.

<sup>2</sup> Anthea Paelo is a researcher and Thando Vilakazi, a senior researcher at the Centre for Competition, Regulation and Economic Development (CCRED) at the University of Johannesburg. Genna Robb is a Director at Acacia Economics and a senior associate at CCRED.

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## 1. Introduction

This report sets out the findings of an ex-post economic assessment of the conditionally approved merger between Pioneer Hi-Bred International (Pioneer) and Pannar Seed Limited (Pannar). We critically assess the economic effects of the transaction in the South African seed industry and the manner in which economic evidence and theory were considered by the competition authorities in evaluating the matter.

The transaction, an intermediate merger, was initially filed in 2010 wherein Pioneer, a US-based, vertically-integrated commercial seed company, proposed to increase its stake in Pannar, a South African seed company, from a 20% non-voting preference share interest previously acquired in 2009 to an 80% equity share (Competition Tribunal, 2011). In December 2010, the Competition Commission (“Commission”) prohibited the transaction. The merging parties filed a request for reconsideration with the Competition Tribunal (“Tribunal”) in December 2010, and the matter was heard before the Tribunal in September 2011. Following hearings during which extensive economic evidence was led, the Tribunal decided to uphold the Commission’s decision to prohibit the transaction in October 2011, the reasons for which were published in December 2011. The merging parties subsequently filed an appeal with the Competition Appeal Court (CAC), which approved the merger subject to conditions in May 2012.<sup>3</sup>

On the face of it, the merger seemed highly problematic from a competition perspective, as it combined two of only three firms active in the hybrid maize seed breeding market in South Africa, and resulted in Pannar, a local firm with very strong historical position in the South African market and valuable locally adapted seed genetics, being acquired by multinational biotechnology firm Pioneer. The merging parties argued, however, that increasingly Pannar’s position in the market and ability to compete was being undermined by its lack of access to the advanced breeding technologies used by the other two firms in the industry, Pioneer and Monsanto. This, it was argued, would lead to Pannar’s ultimate decline and exit from the industry if the merger did not take place. On the other hand, a merger with Pioneer would bring efficiency gains from the combination of Pioneer’s resources and Pannar’s seed genetics, which would ultimately benefit farmers. The Commission and Tribunal were concerned with the potential anti-competitive effects of the merger and accordingly prohibited, but the CAC was more convinced by the merging parties’ arguments.

This transaction is a useful subject for an ex-post review for a number of reasons. First, the Commission and the Tribunal took a very different approach to analysing the transaction to the CAC, resulting in opposing outcomes. It is therefore interesting to consider how the market has developed since the transaction in order to try to get a sense of where these analyses were able to accurately predict the merger effects and where they may have been flawed. The seed industry, and particularly the maize seed industry is key to food security and the prices of maize seeds have important implications for the downstream agricultural sector. In addition, there have been increasing concerns internationally about rising levels of concentration in biotechnology markets and seed markets in particular, and the effect that this might have on competition and market outcomes. It is therefore timely to look into the impact of this merger.

We find some evidence that the pricing of Pannar-branded cultivars has been constrained by the pricing condition imposed by the CAC, which may indicate that the merger did lead to upward pressure on pricing. Those interviewed raised a general concern about the rate at which prices have increased in the market, but did not indicate that this had worsened as a

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<sup>3</sup> The Competition Commission’s application to the Supreme Court of Appeal (SCA) for leave to appeal the CAC’s decision was dismissed by the SCA in its order of 12 September 2012.

result of the merger. However, the fact that above-inflation price increases are common, regardless of market conditions, may be an indication of market power.

We find evidence of improvements in yield performance by Pannar-branded cultivars, but there are indications that this trend pre-dated the merger to some extent, so it is unclear if the merger itself has led to the claimed efficiencies in terms of innovation. The improved performance of Pannar-branded cultivars particularly in cultivars relevant to the Western region has not been reflected in increases in market share so far, but this could be due to the slow adoption of farmers of new cultivars. There is a perception among farmers that Pioneer- and Pannar-branded cultivars have improved over the past five years, but again, it is possible that this could have occurred even absent the merger. There is some evidence that the performance of Pioneer-branded hybrids has worsened and that it is showing less interest in offering variety in niche areas where Pannar-branded cultivars are also competitive. These factors may reflect the reduced incentive for the two remaining firms to invest in innovation in order to provide greater quality and choice to farmers, particularly in areas where Pannar and Pioneer were competing head-to-head before the merger.

Ultimately, it is difficult to conclude with a high degree of certainty about the impact of the merger on prices and innovation due to data constraints. However, economic theory suggests that even if there have been some short-term gains in terms of research performance, the two remaining companies' incentives to innovate may be negatively affected by reduced competition in the longer term. Similarly, we would expect the impact on prices to be more apparent going forward, now that the condition period is at an end.

The report is structured as follows: The following section sets out our methodology and Section 3 provides a background of the characteristics of the industry in South Africa, the relevant competition markets considered, as well as barriers to entry and market power in the industry. Section 4 provides a detailed review of literature and recent merger cases from different jurisdictions which have considered issues to do with competition and concentration in innovation markets, and the assessment of effects in this context. The section also sets out the key questions which arise from the literature to be considered in the ex-post assessment of the Pioneer Pannar merger. Section 5 assesses the post-merger effects on prices, while Section 6 assesses the effects in terms of efficiencies and innovation using the available information. Section 7 provides a discussion and conclusion of the main results and implications, and section 8 sets out recommendations.

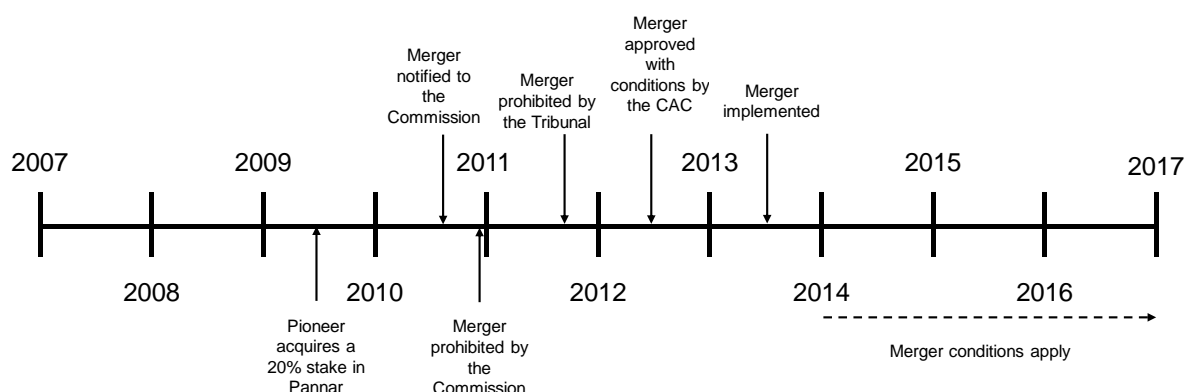
## **2. Methodology**

The assessment and hearing of the case before the Tribunal and CAC largely centred on the breeding and commercialisation of *hybrid maize seed*, which is also the approach adopted in this assessment. Our assessment focuses on the effects during the period from 2012/13 to the 2016/17 season, including the possible effect of conditions set by the CAC. This period is believed to be sufficient for assessing some of the effects of the transaction in the market based on the evidence led in the hearings regarding the period over which short term price effects were expected to arise, as well as the stated period for medium- to long-term dynamic efficiencies to arise. That being said, we also consider as part of the analysis, data and information relating to the period before the merger was approved in 2012 where it is available, in order to try to discern any changes in the long-term trends of prices and innovation, that may have arisen following the approval of the transaction. It should be borne in mind that the parties had been planning the merger since at least July 2009, when Pioneer acquired the initial 20% stake in Pannar, so data from that point onwards may reflect some level of joint strategy and decision-making.

The CAC attached a pricing condition to its approval of the merger which was to apply for three years from the first sales season following the implementation of the merger. According to the merging parties, the merger was only implemented in mid-2013, and so the conditions

would have applied to the 2014, 2015 and 2016 sales seasons. The key dates for the analysis are summarised in Figure 1.

**Figure 1: Timeline of the merger**



*Source: Authors' own compilation*

The assessment has been significantly constrained by the fact that only limited information is available publicly which can be analysed for the post-merger period in particular. In the process of the study, a detailed information request was submitted to the merged entity to which they had not responded at the time of writing. The analysis therefore relies on a mixed methodology of drawing together both qualitative and quantitative data gathered from case documents filed at the time of the transaction, the Tribunal hearing record, submissions by Monsanto and various customers of the seed companies, and 10 detailed interviews conducted with several farmers (in different climatic regions), agribusinesses and Grain SA and the Agricultural Research Council (ARC). The details of the interviews conducted are provided in Annexure A. The limitations of the data are highlighted where relevant throughout the analysis, although notably extensive price list and seed characteristic information was obtained from Grain SA and ARC which aided the analysis considerably.

### **3. Background to the industry and the Pioneer/Pannar transaction**

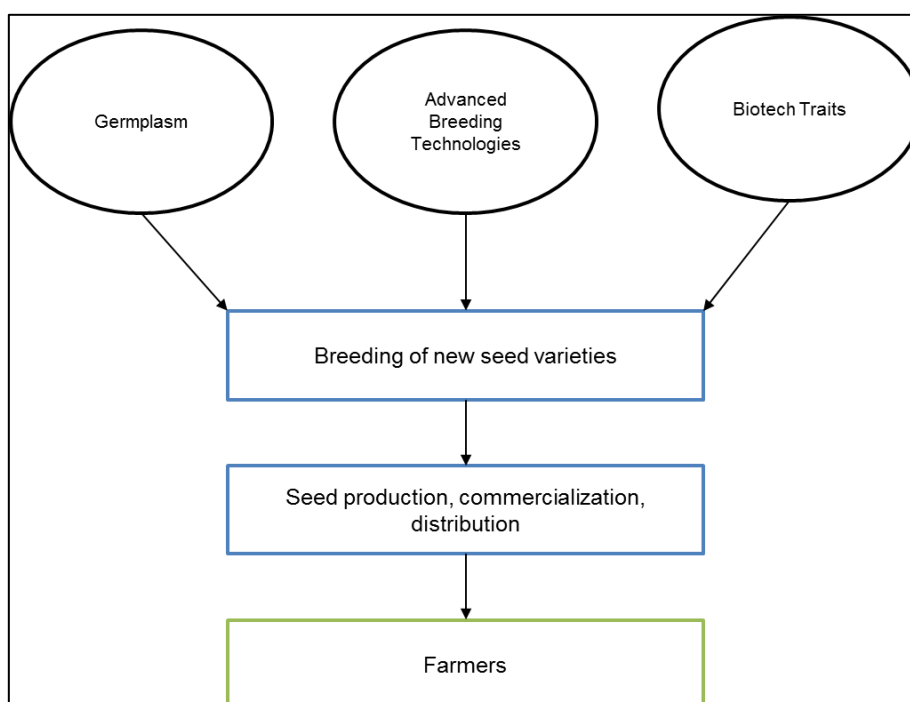
#### **a. Maize seed breeding in South Africa**

The market for hybrid maize seeds constitutes the largest proportion of the total turnover from agronomic crops of the South African seed industry. The market is considerably concentrated with Monsanto, a global leader in agrochemicals production, and Pioneer and Pannar accounting for the vast majority of maize seed sales.

Commercial maize seeds are generally classified into two categories, hybrid and open pollinated. Hybrid seeds are formed when 'two genetically unrelated "pure" parent lines' are crossed to result in a seed that contains desired genetic characteristics of both parents. Open pollinated varieties do not come from genetically pure plant lines, and are essentially cheaper and lower yielding varieties which develop naturally.

The seed value chain consists of two main levels: breeding (research and development); production (including multiplication) and distribution of seeds (Figure 2). The activities at the level of breeding are especially relevant in the consideration of the Pioneer/Pannar transaction given the different capabilities of the parties in the various activities involved in breeding. The assessment of the transaction largely centred on the effects of increased concentration at the breeding level where the parties are active (with different strengths) along with Monsanto. The parties are also involved in production and distribution where there are several other market participants as discussed below.

Figure 2: Seed production value chain



The development of new varieties or ‘cultivars’ of maize seed with higher yields (output per acreage planted with seeds) and with resistance to disease, drought and other environmental stresses relies extensively on activities at the breeding level involving R&D and innovation by seed companies. Pioneer, Pannar and Monsanto, are active in R&D and breeding and selling of hybrid maize seed in South Africa. The horizontal merger therefore involved the combination of their capabilities in breeding of hybrid maize seeds, and the elimination of competition between them leaving two major players in the market. Part of the rationale for the transaction related to the fact that the parties claimed the companies had different and complementary strengths in terms of the various stages and inputs into the production of maize seeds.

The development of new cultivars involves the combination of two main components being a diverse germplasm pool and advanced breeding technologies (ABTs). *Germplasm* comprises the genetic material specific to an organism from which hybrid seeds are cross-bred, containing the genetic code that identifies the characteristics of the plant (Competition Tribunal, 2011). Reference is made in the industry to a ‘germplasm pool’ as a bank of large amounts of different germplasm from which new hybrids can be developed from cross-breeding. Typically, the germplasm pool should be locally adapted to increase the chances of developing hybrids that are fit for domestic conditions. Pannar, Pioneer and Monsanto each have locally adapted pools.

ABTs are the wide ranging and expensive technologies used to effectively exploit a germplasm pool by crossing different lines. These technologies improve the speed, efficiency and precision of the breeding process, by identifying “with more precision the exact genes possessed in parental lines that a breeder wants to have expressed in a finished hybrid, as well as the combinations of inbreds most likely to be successful” (Competition Tribunal, 2011: 11). The nature of competition in the industry is such that the main players compete on the basis of the ability to rapidly identify and extract the best combinations of lines to produce higher yielding seeds. The use of ABTs significantly enhances the ability to do this, and has become an essential part of the competitive advantage of the major global companies. The merged entity argued extensively that one of the key reasons for the decline in Pannar’s competitiveness in the industry was its lack of resources to invest in the technology necessary to leverage its unique, locally adapted germplasm pool and build on its strong local brand. The

counterfactual in the parties' version was thus one in which Pannar is no longer able to compete with the two multinationals, declines in competitive significance (not invoking the failing firm doctrine, however), and the market inevitably becomes controlled by Monsanto.

A third element, genetic trait selection or development, can be added as an input to the process of breeding new varieties. In the case of genetically modified seeds, genetic or biotech traits are inserted – this involves inserting genes derived from non-related plant material or animal material into maize seed genetics to add certain desirable characteristics to the maize seed hybrid (Competition Tribunal, 2011: 13). Notably, not all hybrid maize seeds contain GM traits, and as such there is a distinction between GM and non-GM hybrids. It is estimated that 75% of maize seeds sold in South Africa at the time of the merger contained biotech traits, which have been adopted due to the significant benefits they can bring for farmers (Competition Tribunal, 2011: 13). Monsanto is a leading developer of these GM traits globally, and at an additional license or royalty cost Pioneer and Pannar both licensed these from Monsanto. At the time of the merger Monsanto provided all the biotech traits sold in South Africa.

Together these three components comprise the main inputs in the breeding of new varieties. The relative strengths of the companies in the different areas was an important consideration in the evaluation of the transaction, with Pannar in particular lacking capabilities in terms of ABTs (a strength of Pioneer) to exploit its strong local germplasm pool. One of the issues considered in this analysis is whether the combination of Pioneer and Pannar has meant better combined output in terms of high yielding maize seeds leveraging these combined strengths.

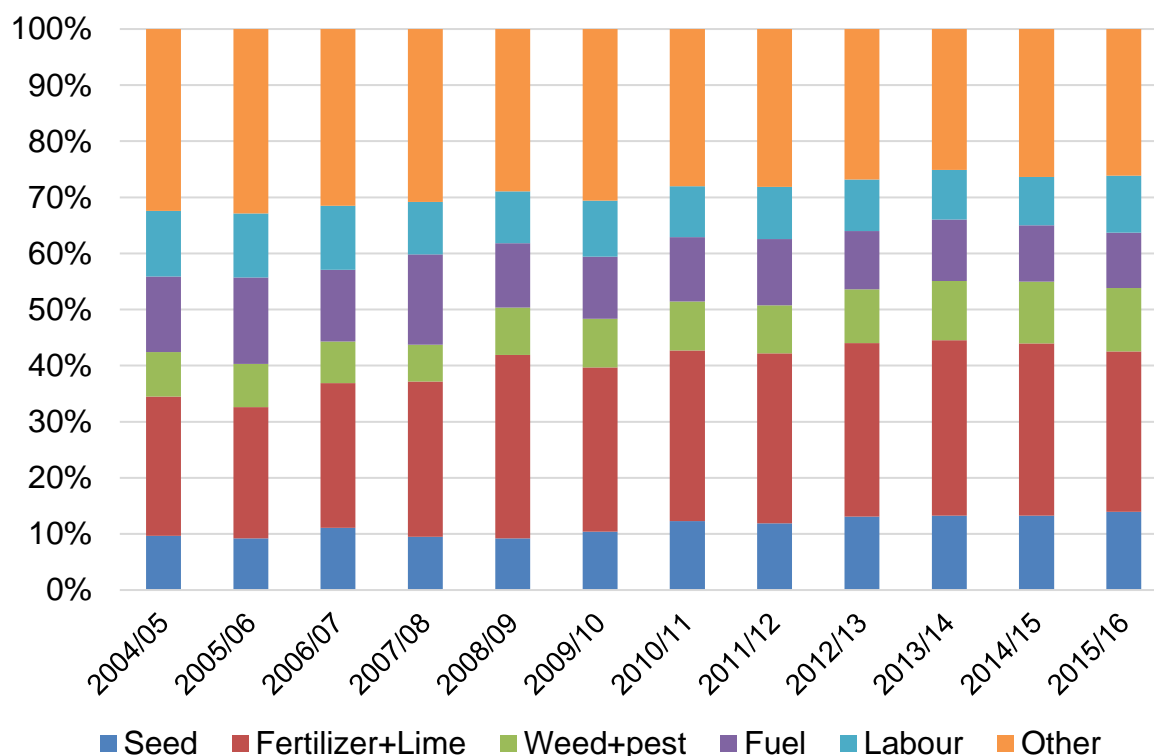
#### **b. Production and seed costs in maize production**

Limited emphasis was placed in the merger hearings on activities further down the value chain, including seed multiplication, commercialisation and distribution. Each of the main companies have capabilities in this area, and some of these activities can also be outsourced to smaller production and distribution companies present in South Africa.

Maize seed production declined from around 56,000 tons in 2011/12 to 40,000 in 2014/15 (DAFF, 2015). This is at least partly explained by severe drought conditions experienced in the Southern Africa region over the past few years. However, as discussed further below, the price of seed per hectare of maize planted as a proportion of total variable costs per hectare has gradually increased since 2010/11 (Figure 3). The average share of seed costs in total cost from 2004/5 to 2009/10 was 10%, and rose to 13% from 2010/11 to 2015/16, although this could reflect falls or lower increases in the price of some other inputs such as labour and fuel, and that of 'Other' variable costs including license and insurance, repairs and parts, and marketing costs.



**Figure 3: Composition of maize production costs (national average), 2004-2016**



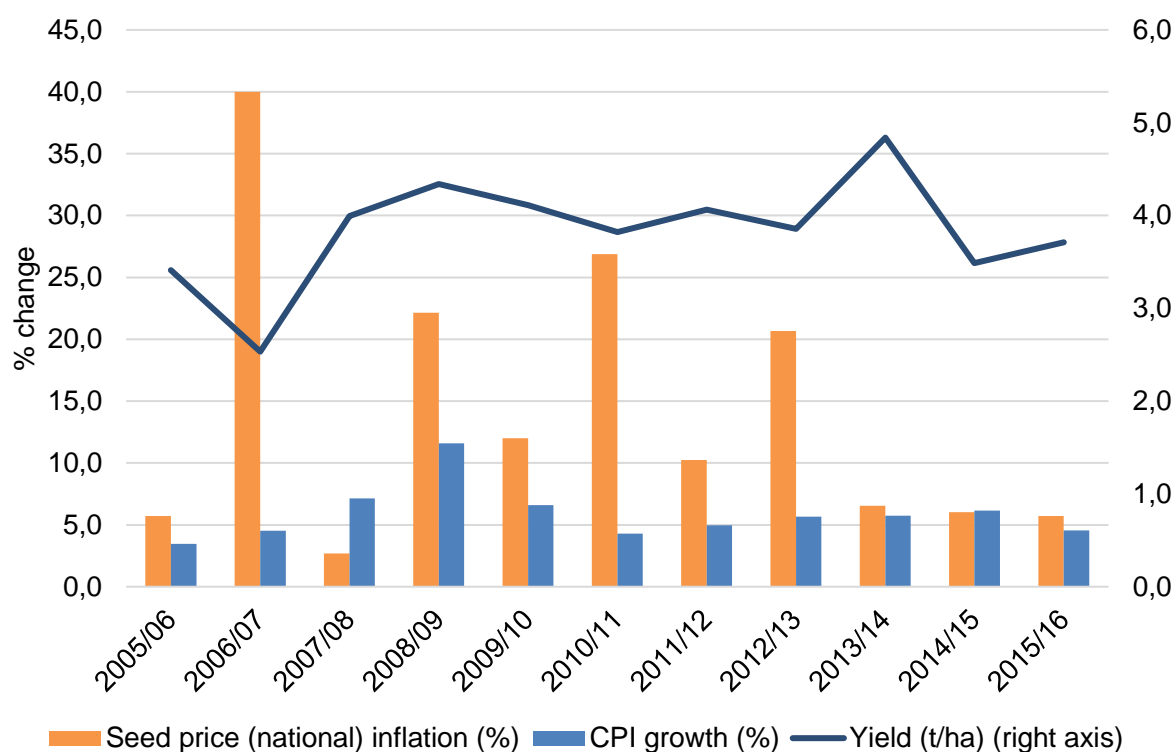
*Source: Authors' calculation from Grain SA data*

As explained below, some farmers and agribusinesses interviewed noted that seed prices are high and that prices typically increase at a faster rate than inflation, while the producer price of maize and the price of other inputs can fluctuate and may fall substantially in some years.<sup>4</sup> This points to the presence of market power for the seed companies, and inelastic demand. This is confirmed in the later analysis of specific cultivars and the chart below which shows the year to year change in seed costs per hectare relative to inflation from 2005 (Figure 4). However, the growth in seed costs per hectare needs to be considered relative to the yields per hectare that farmers obtain. Farmers are prepared to pay higher prices for a seed that provides relatively high and consistent yields. This was confirmed in interviews wherein yield is the most important consideration for most farmers.<sup>5</sup> Interestingly, however, from the mid-2000s sharp price increases are not necessarily matched by increases in yields which suggests there may be other explanations for seed cost increases not related to yields.

<sup>4</sup> Interviews conducted with various farmers, November 2017.

<sup>5</sup> Interviews conducted with various farmers and agribusinesses, November 2017.

**Figure 4: Change in seed cost per hectare, inflation and yield per hectare for maize, 2005-2016**



Source: Grain SA, StatsSA, SAGIS data

These issues are considered in detail in sections to follow. The growth in prices generally exceeds the level of inflation, although dynamics differ by region and seed type as well. Interestingly, this is true of the period prior to the approval of the merger in 2012, following which increases in maize seed costs per hectare are broadly consistent with the level of inflation. This may have to do with the conditions laid out by the CAC in its approval of the transaction, which were essentially drawn with few changes from those proposed by the parties at the time of the Tribunal hearings. Perhaps the most important aspect of these conditions was that the prices for all Pannar maize hybrids, for which the theory and evidence predicts the largest price increases would occur post-merger, and for OPVs, were not to exceed inflation for a period of three sales seasons. This condition arose from the evidence led by economic experts on both sides that there was a clear likelihood of upward pricing pressure post-merger, and the debate therefore centred on whether these anti-competitive effects would be outweighed by the claimed efficiencies. We return to the theoretical considerations and the relevance for the merger in section 4.

### c. Relevant markets and market power

An important dimension of competition in the industry is the geographic or climatic conditions in which farmers operate, and there are clear distinctions by 'climatic region' in terms of which seeds are required or preferred by farmers, but also in terms of which of the three main players have larger shares of the market. Hybrid maize seeds are differentiated and differ significantly in terms of their characteristics. The most important aspect, as noted, is yield although this is also affected directly by whether the right seed is used for the right region. The fact that a seed performs well in one small local area (even a few large farms), does not mean it will work well in the next. There are general differentiating factors which have also meant the companies have historically had clear areas of strength more broadly. In terms of maize growing, there is a distinction between seeds for the dryland areas which are rain-fed and have historically required medium to long maturity periods, versus the irrigated areas where there is extensive

use of irrigation and farmers require short maturity seeds which also allow for planting and harvesting more than once in a season (double-cropping of maize in summer and, say, wheat in winter).

The definition of relevant markets formed an important part of the deliberations in the hearings. The merging parties and the Commission agreed on functional markets for hybrid maize seed breeding, separate from production and distribution activities (commercialisation), and that no separate markets were defined for white and yellow maize. Although there are price and performance distinctions between GM and non-GM hybrids, it was agreed that the relevant market comprises both of these categories. However, the parties and Commission disagreed primarily on whether there was a market for 'ultra-early maturity hybrids' (Competition Tribunal, 2011). The term ultra-early delineates those varieties with a comparative relative maturity (CRM) of 115 days or less, generally used as a yardstick to reflect the number of days to maturity although this can be affected by other factors including heat (i.e., number of heat units per day) in an area (Competition Tribunal, 2011).<sup>6</sup> Pannar's germplasm is historically suited to long maturity and resistance to disease and pests specific to South Africa whereas Pioneer had strength in high yielding early maturity seeds derived from its development of seeds in the US market with hot, shorter summers (Competition Tribunal, 2011). However, it was shown that Pannar had performed increasingly well in the irrigated regions as discussed further below.

Longer maturity implies a trade-off between the risk of a later harvest but higher yields, versus lower risk of drought and other adverse climate conditions (frost etc.) that comes with shorter maturity seeds planted and harvested in the highest rainfall period of a season (with increasingly competitive yields over time). There is a shift towards these early-to-late varieties, sold largely in the eastern (humid) and western (hot and dry) regions whereas ultra-early varieties are sold mostly along the Vaal and Orange river banks (Northern Cape) and Mpumalanga (Competition Tribunal, 2011: 24). Thus, the Tribunal found that it did not make sense to define a separate market for ultra-early cultivars or the irrigated regions, since in practice those cultivars were sold much more widely across the country.

Monsanto upon entering the market in the 1990s established a very strong presence through a 'blockbuster' cultivar that performed considerably better than others on the market around the early 2000s, particularly in the 'western' maize growing regions including the western Free State.<sup>7</sup> The Free State accounts for the majority of maize production in the country, and the 'Western' climatic region includes parts of the North West province as illustrated in Figure 5. This has been confirmed through interviews whereby Monsanto effectively accounted for more than 80% market share through the 2000s in the western region.<sup>8</sup> The strength of Monsanto in the main growing region meant market shares nationally in hybrid maize seed based on origin of germplasm and in terms of sales were around 50% for Monsanto, 30% for Pioneer and 20% for Pannar in 2009/10. These shares had evolved from a situation where in 2001/2 Pannar held around 50% of the market, and the other two companies had around 25% each. This evolution was partly because of Monsanto's development of competitive seeds, and also strategic acquisitions of Carnia and Sensako in 1999 and 2000. The parties argued that Pannar's declining market share was also partly because Pannar lacked competitive germplasm for early and ultra-early maturity hybrids which it has had to license from Monsanto in particular (and Monsanto would not license its best germplasm to a close rival) as well as a failure to keep up with trends in the use of ABTs.

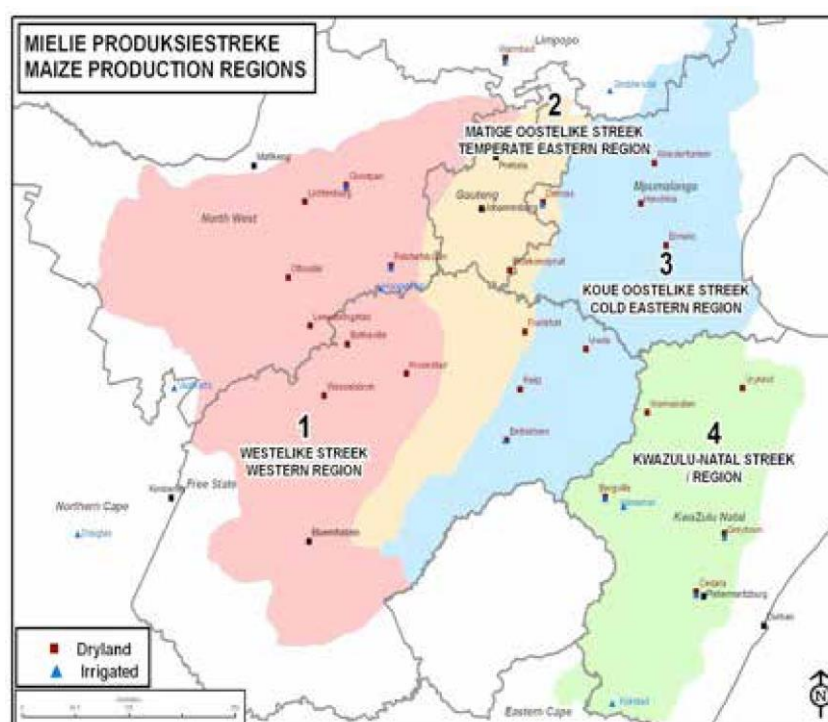
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<sup>6</sup> See: [http://www.pannar.com/blog/detail/waar\\_kom\\_opbrengs\\_vandaan](http://www.pannar.com/blog/detail/waar_kom_opbrengs_vandaan)

<sup>7</sup> Interview conducted with farmer, November 2017.

<sup>8</sup> Interviews conducted with various farmers and agribusinesses, November 2017.

**Figure 5: Map of the maize growing regions of South Africa**



*Source: Agricultural Research Council*

Pioneer and Pannar have been more competitive at different times in the eastern and irrigated areas, and the shorter or early maturity regions.<sup>9</sup> Geography, as a broad proxy for climate regions, is thus a critical dimension. In this report we adhere to the broad definition of a market for hybrid maize seeds, consistent with the Tribunal's conclusions but we also consider specific aspects of competitive dynamics by climatic region where relevant. Interviews were conducted with market participants in each of the four main climatic regions Annexure A (see Annexure A).

In the broad market considered, at the time of the merger, the merged entity accounted for 40-50% of the total market share, such that the transaction was a 3-to-2 merger in a highly concentrated market for the breeding of hybrid maize seeds. This is also the case in the market for production and distribution of maize seed with similar market share implications, although in both markets there is a competitive fringe of smaller companies (such as Klein Karoo, Link Seed and Agricol) that accounted for around 5% of the market. Barriers to entry are high and were effectively raised through the merger, particularly because of the costs and investment required to access ABTs and a large locally adapted germplasm pool required in a market which is characterised by high levels of innovation (Competition Tribunal, 2011).

The main barriers relate to the prohibitive costs of research and the extended period required to gain regulatory approval (African Centre for Biodiversity, 2017). As discussed above, there are three components of the breeding level of the value chain, a germplasm pool, advanced breeding technologies and biotech traits. With regards to the pool of germplasm, it requires a number of years to develop competitive germplasm suitable to the local environment to enable breeding of competitive seeds. Prior to the merger between Pioneer and Pannar, Pioneer had been present in South Africa for 18 years but was yet to develop germplasm suited to the regions of South Africa or Africa. Monsanto did appear to have a large stock of local genetics

<sup>9</sup> Interviews conducted with various farmers, November 2017.

due to its acquisition of local companies, Carnia and Sensako, which in itself may have raised barriers to entry by removing sources of local genetics for other companies in the market.

Furthermore, ABTs are expensive to acquire. Similarly, the development of biotech traits requires significant capital investment. Both of these components can be accessed through contracts and licensing with large companies such as Monsanto. This, however, means that companies are forced to source essential inputs from their rivals.

Should an entrant be able to access the funding to start a greenfield project for biotech trait development, they would still need at least eight years to go through the regulatory process required to begin trait development. Should the trait already be developed, the developer would still need to acquire regulatory approval for the use of these traits within South Africa in a process that can take between three to five years (Competition Tribunal, 2011).

The Tribunal found that significant entry, even by a rival with access to financial resources and ABTs on a global scale, would take years based on the time it would take to develop local germplasm. Entry was therefore considered unlikely to be timely, likely and sufficient to undermine the exercise of market power post-merger. In this regard, one of the conditions stipulated related to ensuring access for licensing of plant materials in the genetic material list to public institutions on a non-exclusive and perpetual basis.

Indications from interviews are that there has not been significant entry or growth of smaller rivals and as such the analysis concentrates on competition between the three major players discussed above.

#### **d. The assessment of the merger by the competition authorities**

The merging parties advanced a number of rationales for the transaction. First, they argued that Pannar's market share and ability to compete was in decline, due to its lack of ABTs which made it more difficult for Pannar to compete with companies such as Monsanto (Competition Tribunal, 2011). They argued that a merger with Pioneer would enable Pannar to access these ABTs necessary to compete in the market. In turn, Pioneer could benefit from Pannar's deep and diverse germplasm pool in order to create and develop new hybrid varieties. The merging parties also argued that should the merger not go ahead, Pannar faced a risk of closing down due to the lack of resources to compete effectively. They also presented a number of arguments related to efficiency gains, outlined further below.

The Competition Commission prohibited the merger on the basis that it would result in a duopoly and significant price increases, incentivise collusive behaviour and raise barriers to entry. The Commission determined that the potential efficiency gains were insufficient to outweigh the competitive concerns raised by the merger.

The Tribunal agreed with the approach by the Competition Commission. The Competition Appeal Court, however, took a different view, accepting the parties' argument that the Competition Tribunal did not fully consider the relevant counterfactual including Pannar's claimed decline. The parties suggested that should the merger not take place, Pannar would eventually leave the market making obsolete the wide pool of germplasm Pannar holds. The view of the Competition Commission and Competition Tribunal was that it was more likely that in this scenario Pannar would merge with another international company (other than Pioneer). However, the CAC disagreed as it judged that there was insufficient compatibility between the germplasm pools of Pannar and the two international companies (Dow and Syngenta) which testified in the Tribunal.

The Appeal Court also criticised the approach that the Commission and Tribunal used in analysing the efficiencies argument presented by the merging parties. The Commission had focussed on quantification of the efficiencies but the Appeal Court argued that verification rather than the precise quantification of efficiencies should have been the focus, arguing that

the Tribunal should have looked at long term dynamic efficiency gains rather than short term static gains. The CAC thus overturned the Tribunal's decision to prohibit the merger. However, it did attach a set of remedies which had been put forward by the merging parties in response to the concerns raised. The key elements of this set of conditions were the following:

- For a period of three sales seasons from the date the merger is implemented, the annual increase in the prices of all Pannar maize hybrids in South Africa available for sale in commercial quantities and all current commercialised Pannar OPVs will not exceed CPI. This would not apply to new hybrids.
- For a period of three sales seasons, there will be no increase in prices of the Developing Farmer Products (hybrid and OPV seed varieties sold by Pannar to developing farmers)<sup>10</sup> and thereafter, actual selling prices of the products will not increase beyond CPI on an annual basis for a further five sales seasons.
- All Pannar customers will continue to receive discounts based on volumes, timing of payment and customer type on no less advantageous or favourable terms during this period.
- There will be no job losses or retrenchments for a period of two years.
- The parties commit to establishing an International Research and Technology Hub in South Africa by 2016.
- The parties commit to establish and participate in community programs and partnerships in the interest of farmers.
- The parties will maintain the same maize hybrids and OPVs currently marketed and sold by Pannar in South Africa for a period of three years.
- The parties will keep in place the Developing Farmer Products in sufficient commercial quantities for developing farmers.
- The parties commit to maintain breeding programmes related to sunflower, grain sorghum, forage sorghum, wheat, dry beans and soybeans for five years.
- The parties commit to licence the plant materials in the Genetic Material List to public institutions on a non-exclusive and perpetual basis and to negotiate in good faith to make available and license the same materials to Dow and Syngenta on a non-exclusive and perpetual basis.

The impact of these conditions on competition and on farmers will be discussed where relevant in the analysis of the effects of the merger.

#### **4. Nature of competition, innovation and effects in horizontal mergers**

##### **a. Horizontal merger effects and innovation**

A horizontal merger between two firms in a differentiated product market will result in price increases absent efficiency gains. Where products are strategic complements (firms compete on price), an increase in the price of one product will lead some proportion of customers to switch to purchasing competing products. In this context, any firm which increases its price will lose sales to competing products. A merger between firms which produce two competing products allows them to internalise the losses due to a price increase. When they merge, the firms take into account the negative externality they impose on one another and jointly raise

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<sup>10</sup> Developing Farmer Products are defined in Appendix C of the Competition Appeal Court Decision case no. 113/CAC/NOV11 as those “*current and replacement hybrid maize seeds and open pollinated maize varieties ordinarily sold by Pannar to Developing Farmers including the following products: PAN 6479, RO 413, PAN 53, PAN 67, PAN 7M-07 (white hybrid maize); PAN 6480, PAN 6966 (yellow hybrid maize); PAN 6671 (white OPV); and PAN 66 (yellow OPV)*”.

their price (Motta, 2004). Another way of thinking about this is that the market power the firms combined is greater, since consumers have fewer distinct alternatives available. The price increase will be larger *the more closely the firms compete with one another*, or the greater the proportion of customers of one firm which would switch to the other firm in response to a price rise and vice versa. In this situation, competing firms outside the merger will also raise their prices, as the competitive constraint on them is lessened by the increase in prices by the merging firms. The price increase by outsider firms will be lower than that by the merging parties, however (Motta, 2004). This means that an increase in price as a result of a merger need not result in significant consumer switching.

In addition, a horizontal merger in a concentrated market may increase the likelihood of a coordinated outcome which would dampen competition and lead to price increases. This is most likely where the market is highly concentrated and where the merger alters the industry dynamics so as to make it easier for firms to generate and sustain a coordinated outcome. This may be the case if the merger reduces the number of parties which need to reach agreement, increases transparency in the market or increases the symmetry between players resulting in their incentives being better aligned.

Another possibility which has been explored in several recent cases is that a horizontal merger could dampen incentives for innovation by the merging firms or in the industry more generally (EC, 2016). Economic theory has been divided on the relationship between competition and innovation for a long time. Schumpeterian theory argues for the benefits of large firms, based on the logic that the less competition in an industry, the more the innovator will be able to capture the profits or gains from innovation, and the greater incentive it will have to innovate (Schumpeter, 1942). Potential entrants will see the benefits being earned by the innovator and seek to challenge it, providing it with the impetus to invest in innovation to retain its dominant position. On the other hand, Arrow (1962) and others argued that greater competition in an industry would incentivize more innovation, as firms seek to win market share from their rivals.

Shapiro (2012) explains that in fact these two positions are not incompatible with one another from a competition policy perspective. This view puts forward three “guiding principles” for thinking about the relationship between competition and innovation: contestability, appropriability and synergies. Incentives for innovation will be improved where there is contestability; i.e. where firms’ innovation efforts lead to rewards in terms of greater market share. Appropriability speaks to the ability of firms to capture the benefits from their innovations, and incentives to innovate will typically be higher where appropriability is high, for example if imitation is difficult. Synergies occur when there are complementarities between firms’ innovation assets. A merger in which there are substantial innovation synergies may therefore lead to a more efficient combination of assets.

The explanation for why a merger could lead to a dampening of innovation is similar to the logic which shows that a merger between two horizontal competitors will lead to an increase in price. Before the merger, each company has an incentive to invest in research and development in order to compete with its rivals for market share. When two competing innovators merge, their incentive to innovate is reduced as an innovation by one will cannibalize the profits of the other which creates an opportunity cost to innovation and depresses the incentive to innovate.<sup>11</sup> Again, similar to the case of price competition, the closeness of competition matters, and *“This effect is stronger if the merger brings together two out of a few significant innovators in a concentrated market, which absent the merger would have been likely to divert sales from each other by investing in innovation.”*<sup>12</sup>

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<sup>11</sup> EC decision in the Dow/DuPont merger, case M.7932 (2017). See Annex 4 to the decision, “Implications of the economic theory on mergers, competition and innovation in light of the features of the transaction”.

<sup>12</sup> EC (2017).

A merger may also impact the profitability of innovation due to the change in the amount of competition in the industry as a whole. The effect of this is ambiguous. If a merger increases the appropriability of the value of innovation, for example due to the removal of a potential innovator, this would have a positive effect on innovation in the industry, counteracting the direct unilateral effects on the merging parties' incentives described above.<sup>13</sup> However, where appropriability is already high because, for example, imitation is unlikely and product innovation is more important than process innovation, a merger is more likely to lead to a negative impact on innovation in the industry due to the reduction in competition and decline in contestability. An exception noted by the EC is where a merger corrects the problem of imperfect licensing, which prevented the innovator from capturing the full benefits of its innovation pre-merger. However, this would only lead to a pro-innovation effect where there is some reason that the innovator could not license the technology to its rival absent the merger.

Recently, several studies have empirically investigated the impact of mergers on research and innovation. For example, two studies focussed on the pharmaceutical industry find evidence that mergers have a negative effect on research intensity and the number of patents granted both for the merging firms and for non-merging rivals.<sup>14</sup>

From a collusion perspective, economists have generally suggested that collusion is more difficult to sustain, and hence less likely to be observed, in innovative markets. The reason for this is that innovation can increase firms' prospects of gaining a significant advantage over rivals which reduces the value of future collusion and also makes it more difficult for rivals to effectively punish deviations from the collusive agreement (Ivaldi et al, 2003). From a merger effects perspective, however, a merger in a concentrated industry may increase the probability that firms tacitly coordinate their conduct by focusing their research efforts in different areas.

## **b. Case precedents**

Despite the theoretical debate around the impact of competition on levels of innovation, merger control has not historically been too concerned with the potential for mergers to impact on innovation. Until recently, the EU had not intervened in a merger on the basis only of a likely general reduction in innovation in an industry.

More recently, it has proposed what has been called the "Significant Impediment to Industry Innovation" ("SIII") theory of harm, which stems from the horizontal merger guidelines which state: "*effective competition may be significantly impeded by a merger between two important innovators.*" This portion of the guidelines had been used in the past for situations where a merger may affect specific foreseeable innovations, whereas the EC is now using it more generally for mergers which could impact the level of innovation in an industry as a whole (Petit, 2017; EC, 2017).

In a number of recent cases the EC has been concerned that a merger between two firms engaging in competing research efforts pre-merger would lead to a reduction in innovation post-merger. There have been several pharmaceutical and medical device mergers in markets where only a handful of players were engaging in research and development around the specific product and where, consequently, the EC felt that the amount of research would be reduced as a result of the merger.<sup>15</sup>

The potential for reduced innovation has also been a key issue in recent mergers in the biotechnology sector. In the merger between Syngenta and Monsanto's sunflower seeds business, the EC was concerned about the removal of a "strong innovative market player" and

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<sup>13</sup> EC (2017).

<sup>14</sup> See Ornaghi (2009) and Haucap and Stiebale (2016).

<sup>15</sup> See EC (2016) for several examples.



that the merger could lead to a lower rate of innovation particularly in relation to the Hungarian market (Petit, 2017). The EC found that Syngenta and Monsanto were competing in innovation in the Spanish market pre-merger, and as a result of the merger:

*“the transaction could, by reinforcing Syngenta’s capabilities in breeding, lead to the long term strengthening of its market power in the commercialisation of sunflower seed. As such, the broadening of Syngenta’s germplasm through the incorporation of Monsanto’s and the disappearance of the latter as an independent breeder could lead to the reduction both directly and indirectly of the total number of new hybrids commercialised on the Spanish market. Directly, as Syngenta will “cannibalise” any possible duplications in the germplasm portfolio existing before the concentration by avoiding the commercialisation of competing products and indirectly by creating an “unbeatable” breeder discouraging other competitors from engaging in costly breeding activities.*

*Given the above, it is concluded that, as a result of the transaction, Syngenta would remove the competitive constraint Monsanto represented as a strong innovator in Spain thereby ensuring its leading position also in the long run.”<sup>16</sup>*

Syngenta argued that Monsanto was not a strong innovator in the sunflower seed market and had struggled to remain competitive, however, the EC disagreed, finding that Monsanto had rapidly grown its presence in the Spanish market, had a very good germplasm portfolio well adapted to local circumstances, and was “regularly bringing new improved hybrids on to the market”. In Hungary as well, Monsanto’s germplasm pool was found to be particularly well adapted to the market.

The EC had significant concerns around the impact of the merger on innovation in Spain and Hungary – despite the fact that Syngenta was the market leader in both markets and that Monsanto’s market share was only 10-20% and 0-5% respectively in value terms. The merger was approved on the basis that Syngenta would divest Monsanto’s hybrids commercialised in Hungary and in Spain in the last two years, as well as the hybrids already under official trial for registration. The parties also offered to divest Monsanto’s parental lines used to develop these hybrids, as well as the pipeline parental lines currently under development. The firms acquiring the divested lines would have the right to use, cross, breed and license the offered parental lines, and to commercialise and license the resulting hybrids.

In early 2017, the EC approved the merger between Dow and DuPont, conditional on the divestiture of some parts of DuPont’s pesticide business.<sup>17</sup> The Commission had concerns that the merger could reduce competition in a number of markets for pesticides, which would have resulted in higher prices, reduced choice and less innovation in these markets. The Commission noted that *“Innovation, both to improve existing products and to develop new active ingredients, is a key element of competition between companies in the pest control industry, where only five players are globally active throughout the entire research & development (R&D) process.”* Importantly, this approach makes it clear that innovation in such markets is an integral part of the competition process and the nature of competition.

The EC found that innovation was a key element of competition in order to capture sales from competitors and defend existing sales, since farmers value improvements in pest resistance. The merger could reduce innovation competition since the parties’ innovation pipelines showed that they were competing head-to-head in a number of areas and would have an incentive post-merger to discontinue some of these efforts. It also found evidence that the merged entity would have lower incentives and ability to innovate post-merger and would have

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<sup>16</sup> Case no COMP/M.5675, Syngenta/Monsanto’s Sunflower Seed Business.

<sup>17</sup> EC Press release, 27 March 2017. ‘Mergers: Commission clears merger between Dow and DuPont, subject to conditions’. Available [here](#).

cut back its spending on innovation. In order to remedy the concerns, the parties will divest several of DuPont's pesticides businesses and almost the entirety of DuPont's global R&D organization. The possibility for reduced innovation in the relevant markets and the need to protect innovation levels were therefore key elements of the Commission's decision.

In contrast to this, the US approach is to define separate upstream "innovation markets", which enables the authorities to focus on the R&D process and firms' incentives to commit resources towards R&D (Petit, 2017). According to the FTC intellectual property licensing guidelines (US DOJ/FTC, 1995), an innovation market consists of the research and development directed to particular new or improved goods or processes, and the close substitutes for that research and development. The close substitutes are research and development efforts, technologies, and goods that significantly constrain the exercise of market power with respect to the relevant research and development, for example by limiting the ability and incentive of a hypothetical monopolist to retard the pace of research and development.

It is self-evident that for a reduction in innovation to be an impediment to competition, innovation must be shown to be an important competitive parameter (Petit, 2017). This is the case in the hybrid maize seed industry, where high yields are the most important factor in farmers' decisions in terms of what to plant, and where, consequently, large amounts of money are spent on the technology and research required to produce better yielding seeds. In the Pioneer/Pannar merger, the merging parties' claim of Pannar's declining competitive significance was alleged to be caused by its lack of sufficiently deep pockets to keep up with its multinational competitors in the research arena. It is thus in line with recent EU case law to consider whether the merger was likely to have, and indeed since has had, a significant dampening effect on innovation in a market which went from an already concentrated three-player oligopoly to a tight duopoly with two symmetrical firms.

### **c. Reflections on Tribunal and CAC judgements**

The Tribunal's analysis of the likely effects of the merger on pricing followed standard economic theory. As discussed above, a merger between two competing firms in a differentiated product market will result in price increases, absent efficiency gains which outweigh the anti-competitive effect. In this instance, the merger resulted in a substantial increase in concentration, reducing the number of competitors from three to two. This is likely to lead to a significant increase in prices and would be serious cause for concern for any competition authority.

Furthermore, evidence led by the Commission illustrated that, contrary to the merging parties' assertions, Pioneer and Pannar were competing closely with one another. The Commission estimated diversion ratios based on the parties' internal analysis which led them to suggest that the merger would lead to price increases of at least 19% for Pioneer and Pannar and 6% for Monsanto relative to the counterfactual scenario where the merger did not take place. The Commission's calculations were not ultimately disputed by the merging parties, who instead argued that efficiency gains would be sufficient to offset these increases. Further disputes ensued about the likeliness, timeliness and merger specificity of the claimed efficiencies, but ultimately the Commission and Tribunal were in agreement that these were not sufficient to offset the predicted harm to competition as a result of the merger.

By contrast, the CAC's approach to unilateral effects focussed on the fact that the market for the development of hybrid maize seed market is an "innovation market", which led it to conclude the following:

*"In addition, the preservation of the economic incentive to innovate, by the application of the advanced breeding technology and germplasm of Pioneer, to the germplasm of Pannar, in a market which is dominated by innovation competition, is also of importance. This is particularly so where Monsanto is the market leader, in respect of which **increased innovation***

***competition, as a consequence of the proposed merger, is a desirable and likely consequence***” [emphasis added] (CAC, 2012).

From the literature above, it is clear that the potential impact of a merger between two close competitors in a market where innovation is an important dimension of competition can have both positive and negative effects on innovation. The CAC’s contention that the merger was likely to result in stronger competition against the third player, Monsanto, in our view did not sufficiently take into account the potential for anti-competitive unilateral effects on the incentives to innovate, caused by the cannibalisation effect of one firm’s research activities on the profits of the other. The CAC’s assessment followed partly from its view that the correct counterfactual for the merger was Pannar’s long-term decline in competitive significance. However, this did not take into account the evidence led which showed that Pannar was Pioneer’s closest competitor in a number of areas and that there was therefore likely to be a substantial increase in market power in the market which could lead to a dampening of incentives to innovate. The CAC did not argue with the Tribunal’s conclusion that the merger would be likely to lead to an increase in price, but concluded that efficiency gains resulting from the merger would be sufficient to offset this effect.

The CAC accused the Tribunal of being too concerned with static rather than dynamic efficiency and welfare effects. Efficiencies between Pioneer and Pannar may have been capable of delivering improved innovation outcomes, but there is also a possibility that the reduction in competition and raising of barriers to entry could result in a dampening of incentives to innovate in the industry as has been found in many instances in the EU merger cases described above. This is an inquiry which the EU has been concerned with in recent biotech mergers in particular. A reduction in competition in a highly concentrated industry therefore also has the potential to have long-term dynamic effects on incentives to invest in innovation. Neither the Tribunal, nor the CAC therefore fully evaluated the potential effects of the merger on innovation.

In addition, neither the Tribunal nor the CAC gave a lot of attention to the coordinated effects theory of harm raised by the Commission. The Tribunal stated that there was no need to decide on the issue given that it had already found that the merger would raise significant concerns from a unilateral effects perspective. However, it did note that the merger would significantly increase the likelihood of tacit coordination. In the CAC’s view, coordination is unlikely in a market “which is dominated by innovation competition”, but the only evidence advanced to support this position is the statements of Pannar’s executives that head-to-head competition in terms of innovation is the norm in this market in South Africa and globally. Another theory that was not fully explored, therefore, was the potential for the merger to lead to tacit coordination between Pioneer/Pannar and Monsanto, where the companies could simply avoid competing head on in terms of their innovation activities and product characteristics.

It is our view that had the Tribunal concluded on the likely coordinated effects aspects of the merger evaluation, this may have added greater weight to the anti-competitive effects arising from the transaction, perhaps outweighing the efficiencies which were ultimately accepted by the CAC.

#### **d. Hypotheses to test in relation to the Pioneer/Pannar merger**

From theory and empirical studies, it seems there are a number of ways in which the merger between Pannar and Pioneer could have impacted on competitive outcomes. First of all, to the extent that Pannar and Pioneer were close competitors in the market (as argued by the Commission), we would expect that the merger would lead to significant unilateral price increases, absent any cost efficiencies. Economic theory suggests that although we would expect Pannar and Pioneer’s prices to increase the most, Monsanto’s prices would also be likely to increase. On the other hand, if efficiencies were sufficiently large as to outweigh the

impact of the price increase by the merging parties, one would expect the merging parties to have benefited at the expense of competitors who would not have experienced a similar efficiency gain. In the latter scenario therefore, one would expect to see Pannar and Pioneer becoming stronger competitors in the market.

Alternatively, the merger may have made a coordinated equilibrium more likely, in which case we would expect to see prices rising across the market and possibly evidence that the remaining players (Pioneer and Monsanto) are keen to avoid taking each other on head-to-head. This could involve patterns consistent with tacit or explicit market allocation, where each concentrates on its strengths (which pre-merger were arguably complementary) and avoids taking on the other.

The potential impact of the merger on innovation outcomes is also complex. From a competition perspective, we know that horizontal mergers in markets with differentiated products lead to a dampening of competition which results in a reduced incentive for the merging parties to innovate so as not to cannibalise one another's research efforts. In addition, to the extent that increased market power allows firms to appropriate the gains from innovation more easily, this would increase incentives for greater innovation efforts, but where the market becomes less competitive and less contestable due to higher barriers to entry, the incentives to engage in costly innovation may be reduced, as firms do not need to innovate so intensively to retain their market share.

The parties were shown to be close competitors of one another from farmers' perspective, and, although this was not evaluated explicitly, this suggests they were also close competitors from a research and development perspective, as they would have been competing to deliver cultivars with similar characteristics desired by farmers. While Pannar's research efforts in some areas (notably in the ultra-early maturity segment) were based on genetics licensed from Monsanto, the Tribunal found that it was engaging in its own breeding activity, based on the licensed parent lines. Thus, it is likely that there would be anti-competitive unilateral effects in terms of reduced innovation as a result of reduced incentives to invest in developing rival products.

The hybrid seed breeding market is characterised by both product and process innovation, although product innovation seems to be more important than process. Seed breeding companies typically improve their portfolio of seeds from year to year by combining pre-existing genetic lines in new ways. This leads to incremental improvements in the attributes which farmers value – yield, disease-resistance, pest-resistance, early maturity etc. – from year to year. Breakthrough innovations such as the advent of genetic traits leading to the production of GM hybrids are relatively rare.

As discussed, it is also important to consider whether the merger will have an impact on the appropriability of the gains from innovation or the contestability of the market. As noted above, the EC considers two factors to be important when assessing whether a merger is likely to increase appropriability: whether there are spillovers and imitation from innovation, and whether innovation is largely in the form of product rather than process innovation. Where imitability is low and innovation is largely in terms of products rather than processes, a merger is less likely to impact on appropriability.

Imitability of a company's germplasm is generally not high, which is why the removal of Pannar's germplasm as a possible licensing opportunity due to the merger was argued to significantly raise barriers to entry. There is a system of Plant Breeders' Rights which effectively protects companies' genetic material. The opportunity for licensing, however, should ensure that the appropriability of the gains from innovation for the innovator is high. In terms of process innovation, merging parties may argue (as they did in this case) that a merger could generate efficiencies by allowing a firm with superior technology to apply it to the products of the other firm. In the Dow/DuPont merger, however, the EC pointed out that

innovation in the crop protection market was mostly related to product innovation, and that process innovation would therefore be less relevant from an appropriability perspective, as well as that a decrease in competition can reduce incentives for market-wide process innovation as well as product innovation.<sup>18</sup> These arguments hold for the hybrid maize seed market as well. There are grounds therefore to believe that the merger was unlikely to have a significant impact on the appropriability of the gains from innovation.

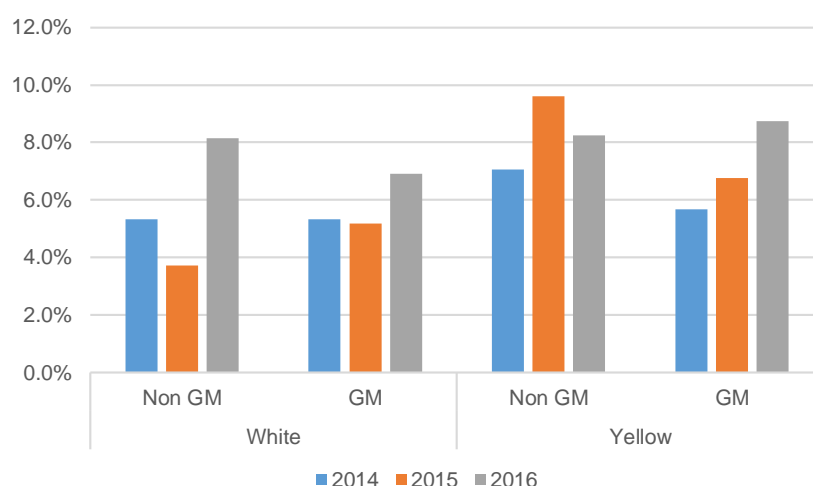
In terms of contestability, there were concerns that the merger would raise barriers to entry due to Pannar's germplasm being removed from the market, as discussed. This, together with the removal of a key competitor to Pioneer, could have led to a reduction in the contestability of the market, and hence reduced the incentives to innovate.

The evidence presented in the Tribunal hearing was inconclusive on the question of whether combining Pioneer's technology, resources and germplasm with Pannar's locally-adapted germplasm would lead to significant increases in yield that are additional to increases that would have been achieved absent the merger. Even if it did, the discussion above suggests that there could have been a simultaneous reduction in the incentives for Pannar/Pioneer and Monsanto to invest in innovation post-merger. It is therefore possible that the merger could result in lower R&D intensity and better outcomes simultaneously.

## 5. Assessing post-merger price effects

The Department of Agriculture, Forestry and Fisheries tracked the pricing of hybrid maize seed from 2014 to 2016. Figure 6 illustrates the average annual price increases experienced during this period, which range from 3.7% to 9.6%. The highest overall increase took place in 2016, when prices increased between 6.9% and 8.7%. The price of yellow maize seeds has increased by more than the price of white seeds over the four-year period.

**Figure 6: Average price increases of maize seed in South Africa, 2014 - 2016**



Source: (DAFF 2015, 2016)

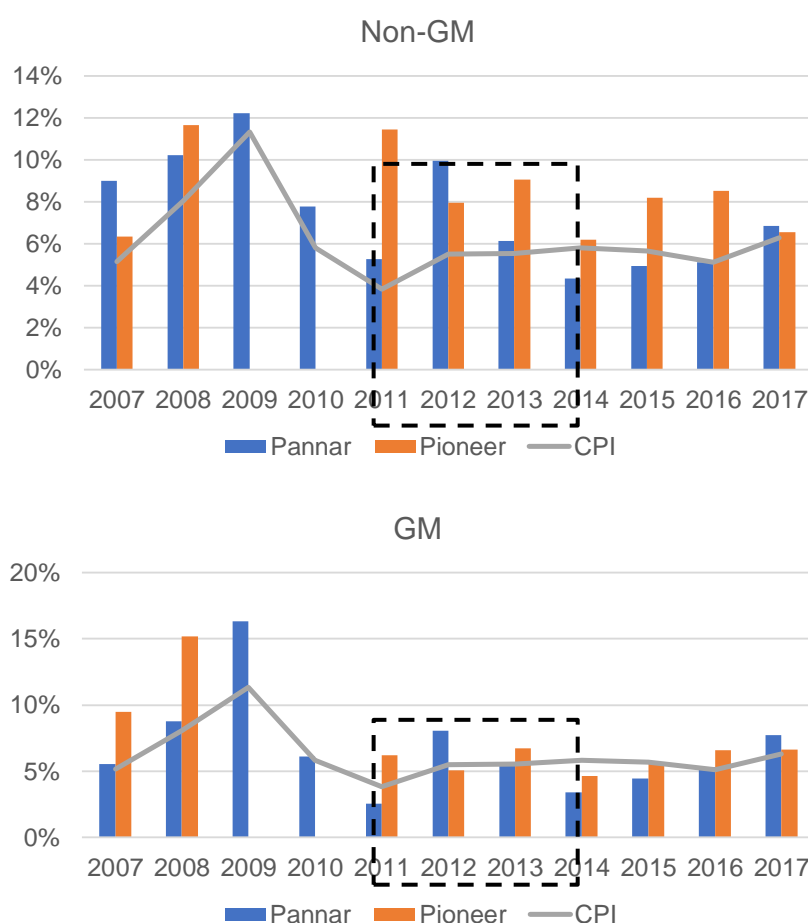
Using the seed companies' published price lists, we calculated average price increases for Pannar- and Pioneer-branded cultivars from 2007 to 2017 for GM and non-GM cultivars. Since we did not have sales volume information, these price increases were calculated as simple

<sup>18</sup> See EC (2017).

averages across all cultivars sold in each year. They may not therefore be reflective of the actual increase in seed prices experienced by farmers based on their purchases.

Figure 7 illustrates that the average annual price increase for Pannar-branded cultivars has ranged from 4.4% to 12.2% for non-GM cultivars and 2.6% to 16.3% for GM cultivars. From 2007 to 2017, it averaged 7.4% per year for non-GM cultivars and 6.7% for GM cultivars. The average annual price increase for Pioneer-branded has ranged from 6.3% to 11.7% for non-GM cultivars and from 4.6% to 15.2% for GM cultivars, averaging 8.4% and 7.3% over the period respectively. The price of non-GM cultivars has therefore increased slightly faster than the price of GM cultivars.

**Figure 7: Average price increases across cultivars for Pannar and Pioneer, 2007 – 2017**



Source: Company price lists

Note: price increases were calculated for all listed cultivars available in each year for 80 000 kernel bags of seed. Dotted lines indicate the years in which the CAC's pricing remedy applied to the prices of Pannar-branded cultivars.

The Commission's analysis, endorsed by the Tribunal, found that the merger was likely to lead to a price increase by the merged entity of around 19%, over and above the increases which would have taken place if the merger had not occurred. Given the limitations of the data available for this study, it is impossible for us to comment on whether the price increases observed have been greater than those which would have occurred absent the merger. However, we can compare the price increases to inflation and to the pre-merger period and consider the differences in price increases between Pioneer-branded and Pannar-branded hybrids, given the pricing condition which applied to Pannar-branded seeds.

Figure 7 illustrates that price increases for Pannar- and Pioneer-branded cultivars have both generally been above CPI before and after the merger. The dotted lines illustrate the years in which the CAC's pricing conditions would have applied to Pannar-branded seed. In terms of non-GM seed, the average price increase for Pioneer-branded cultivars has been higher than the increase in CPI in every year for which we have data. In respect of Pannar-branded cultivars, this is true except for the period from 2014 to 2016 when the pricing condition applied. Turning to GM cultivars, the increase in price for Pannar-branded cultivars was lower than the increase in CPI in 2011 and again from 2013 to 2015. The average price increase in Pioneer-branded cultivars was higher than CPI in all years apart from 2012, 2014 and 2015.

Although price increases have been higher than inflation for the most part, barring the years in which the conditions applied for Pannar-branded cultivars, it is hard to discern a clear change in trend as a result of the merger. This may be because there are a range of other factors which may impact on seed prices in addition to competition dynamics such as changing demand and supply conditions, weather patterns and other factors. For example, if there has been a decline in demand during the period following the merger, prices may have increased more slowly than they would have if demand was at the levels seen prior to the merger. We do not have sufficient data to control for all the factors which may impact on supply and demand for hybrid maize seed in this study. However, one major development which likely had an impact on demand was the severe drought experienced in the 2015 and 2016 growing seasons. Some interviewees indicated that the volumes of maize planted during this time fell.<sup>19</sup> Although those interviewed stated that the seed companies did not offer discounts or change prices to counteract this effect<sup>20</sup>, it is possible that the depressed demand for seed had a dampening effect on seed prices during that period and that prices would have increased faster if it had not been for the drought.

The pricing condition applied by the CAC appears to have had an impact on Pannar's price increases following the merger. The decision states that the price condition will apply for three years from the first sales season following the implementation of the merger. We understand that the merger was only implemented in mid-2013, and so we would expect to see the impact of the conditions in the 2014, 2015 and 2016 sales seasons. The wording of the condition suggests that the price increases for each individual cultivar of Pannar's should not exceed CPI in that year, except for new cultivars which are exempt. In Figure 5, we see that the increases in Pannar's average list price seem to have for the most part been lower than the CPI increase from 2013 (the first season following the date of approval of the merger) to 2016 and lower than the price increases implemented for Pioneer-branded hybrids, which suggests that it may have been effective in restraining price increases for Pannar-branded seeds following the merger. In addition, the price of Pannar-branded cultivars increased by more than CPI and more than the increases in Pioneer-branded cultivars in the 2017 season.

This analysis suggests that the pricing of Pannar-branded hybrids following the merger was constrained by the condition imposed by the CAC and that higher prices would have been experienced had the conditions not been applied. However, whether or not this would have been higher than the prices if the merger had not gone ahead we cannot evaluate with the available data. In addition, we cannot evaluate whether discounts to farmers have been reduced, as we do not have access to actual prices paid. However, some stakeholders interviewed noted that they had not noticed a change in the discounting policies or their ability to negotiate with the seed companies.<sup>21</sup>

The Commission also predicted that Monsanto's prices would increase by 9% as a result of the merger, compared to a situation where the merger did not take place. Although some data

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<sup>19</sup> Interviews conducted with various farmers, November 2017.

<sup>20</sup> Interview conducted with various farmers, November 2017.

<sup>21</sup> Interviews conducted with various farmers, November 2017.

has been received to analyse this outcome, it is unfortunately covered by confidentiality undertaking and not presented here.

The views of farmers and agri-businesses were generally that there has not been any change in the general trajectory of list prices since the merger. Each year the seed companies implement an increase of roughly 6 to 8% across their list prices. It was noted as a concern by some respondents that seed prices always increase at a faster rate than inflation, while the producer price of maize and the price of other inputs can fluctuate and may fall substantially in some years.<sup>22</sup> However, the respondents did not link this to the merger but raised it as a general concern.<sup>23</sup>

The ability to systematically increase prices regardless of varying industry dynamics may be indicative of market power on the part of the seed companies. This may not have been created by the merger but could have worsened as a result. An example of this is the drought which affected maize farmers in the 2015/16 growing season. Respondents reported that in most areas of the country, this significantly affected the amount of maize planted and accordingly the demand for maize seed.<sup>24</sup> One respondent noted that the seed companies had significant excess supplies of seed due to the fall in demand which they could not easily carry over to the following season as seed does not store well and loses at least 20% of its germination productivity with each year it is stored.<sup>25</sup> In spite of this, there appears to have been no response by the seed companies in terms of price, although reportedly some farmers were offered longer payment terms.<sup>26</sup>

As noted above, it is also important to note that we do not know what the price trajectory would have been if the merger had not gone ahead. It is possible that given the difficulties experienced by farmers in recent seasons, the seed companies may have had more incentive to compete for sales by offering discounts to farmers or implementing lower price increases.

## **6. Efficiencies and effects on innovation**

In the Pioneer/Pannar merger both the merging parties and the Commission (and later the Tribunal) recognised that there was a high likelihood of upward pricing pressure in the short term as a result of the merger, although there was some disagreement between economic experts regarding the extent of increases in price. As such, the Tribunal was required to consider the possibility for efficiency gains to arise from the merger that would outweigh any anti-competitive effects.

In Trident/Dorbyl<sup>27</sup>, the Tribunal identified the following issues to be considered when assessing efficiencies:

- The burden of proof lies with the merging parties;
- Efficiencies fall along a continuum with innovation or R&D efficiencies as the most beneficial and desirable; production efficiencies lying between innovation and pecuniary

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<sup>22</sup> Interviews conducted with various farmers, November 2017.

<sup>23</sup> Interviews conducted with various farmers, November 2017.

<sup>24</sup> Interviews conducted with various agribusinesses, November 2017.

<sup>25</sup> Interviews conducted with a farmers' association in August 2017 and farmer in November 2017.

<sup>26</sup> Interview conducted with farmer, November 2017.

<sup>27</sup> Case Number: 89/LM/Oct00. Also see "Impact Evaluation of Merger Decisions: Submission of South Africa for Competition Committee Roundtable, 29-30 June 2011".



efficiencies; with pecuniary efficiencies which are not 'real' cost savings being the least compelling<sup>28</sup>;

- Efficiency gains are sometimes not measurable or comparable and as such the authorities are required to exercise their discretion; and
- The Tribunal recognised that there is an inverse relationship between real economies and benefits to consumers (pass through) in the form of lower prices.<sup>29</sup> Showing evidence of a pass through to consumers is not necessary when there are real efficiencies.

This approach formed the basis for assessment in the Pioneer/Pannar transaction. The greater weighting of dynamic or real efficiencies is consistent with economic theory which weighs as most important the ability to produce more and better quality of goods using the same inputs, or better still the production of new products and services through innovation and technology. In its decision the CAC adopted the same view that “.....*antitrust enforcers must be careful not to pursue immediate, static efficiency gains at the expense of long term, dynamic efficiency improvements, since the latter are likely to create more consumer welfare than the former*” (CAC, 2012)<sup>30</sup>; although there was arguably limited evidence as the Tribunal found that these dynamic efficiencies were adequately demonstrated in the case.

Contestation in the hearings related to the extent to which efficiencies were quantifiable and verifiable, and the consideration of dynamic or real efficiencies which were expected to occur in the distant future most likely beyond the five year period applied by the Commission and Tribunal (Competition Tribunal, 2011).

The merging parties argued that *cost savings* would arise from the incorporation of Pannar under the more favourable global biotech trait license fee agreements with Monsanto which Pioneer enjoyed. The Tribunal's view was that the forecasted trait penetration rates presented in the parties' model were pecuniary, not merger-specific<sup>31</sup> and overestimated the likely gains.<sup>32</sup>

The merging parties also claimed that *dynamic efficiencies* would arise firstly through the combination of germplasm pools (primarily Pannar's). Secondly, Pioneer and Pannar would be able to apply Pioneer's advanced breeding technologies and global access to biotech traits, to the larger, more diverse germplasm pool. This would in turn lead to efficiencies particularly

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<sup>28</sup> In another transaction, the *Tongaat-Hulett Group Ltd and Transvaal Suiker Bpk & Others* Case Number: 83/LM/Jul00), the Tribunal also suggested that the types of efficiencies considered would be those that, for example, evidence new products or processes that will flow from the merger of the two companies, or that identify new markets that will be penetrated as a consequence of the merger, markets that neither firm on their own would have been capable of entering, or that significantly enhance the intensity with which productive capacity is utilised.

<sup>29</sup> Case Number: 89/LM/Oct00, at page 21.

<sup>30</sup> In a presentation- George Mason University Law Review, 11<sup>th</sup> Annual Symposium on Antitrust), Thomas Barnett the Assistant Attorney General, Antitrust Division, U S Department of Justice on 31<sup>st</sup> October 2007.

<sup>31</sup> As Pannar had already signed an agreement with Syngenta to access traits at fees which were lower than those which Pannar was obtaining from Monsanto.

<sup>32</sup> There was also no evidence led during the proceedings which demonstrated the GM penetration rates used in the simulation model were estimated during Pannar's ordinary course of business, rather, the penetration rates were estimated solely for the purposes of the merger simulation. On such important inputs into the model, the Tribunal's approach would be to rely on evidence that would be determined during the normal course of business rather than in preparation for trial. The Tribunal heavily discounted the modelled results.

in terms of maize seeds through the combined ability to accelerate the process of discovery, testing and commercialization, and improvements in yields.

Most relevant for this assessment is to assess the claim that yield gains have improved as a result of the merger, and whether these gains outweigh any short-term pricing effects as argued by the parties. The key question is therefore whether there have been significant improvements in maize seed yields, if the rate of introduction of new varieties has increased, and where possible to assess whether these yield gains can be said to have outweighed any unilateral price effects?

For this assessment, it is perhaps less relevant whether the Tribunal agreed with the claims by the merging parties as the merger was ultimately approved by the CAC. It is more relevant to focus on measuring yields, introduction of new varieties, and the overall impact of this relative to increases in prices. It is worth noting however that the Tribunal disagreed with the parties, finding that evidence of previous trials between the parties showed gains less than what was claimed would arise from the merger, efficiencies were not merger-specific, and that any gains would only arise in the distant future (more than five years) with a low likelihood of offsetting harm.

The CAC accepted evidence that new hybrids would be commercialized by 2015/16 and that the dynamic efficiencies claimed were verifiable even if not necessarily quantifiable. The contrast between the decisions of the two authorities is that the Tribunal emphasized quantification of the efficiencies whereas the CAC placed greater weight on evidence that verified their existence arguing that this was an innovation market in which companies faced strong incentives to introduce new varieties.

Our understanding from market participants is that the merging parties have indeed adhered to the condition requiring them to invest in a new research and technology hub.<sup>33</sup> In order to investigate the impact of the merger on the degree and effectiveness of innovation in the market, however, we turn to the data on seed performance and varieties below. As noted above, the claims made by the merging parties led the CAC to believe that substantial dynamic efficiencies would be achieved as a result of the merger, leading to new, higher yielding cultivars being developed, at least from 2015/16 onwards. In this section therefore, we trace how the number of cultivars on the market has changed since the merger, and analyse data on yields from the Agricultural Research Council.

#### **a. Varieties analysis**

Using the seed companies' published price lists, we were able to trace the cultivars which were on sale in each year from 2006 to 2017. There may be other cultivars available from the different companies that are not published on the price lists, however we assume here that the companies would at least have their main cultivars available on the lists.

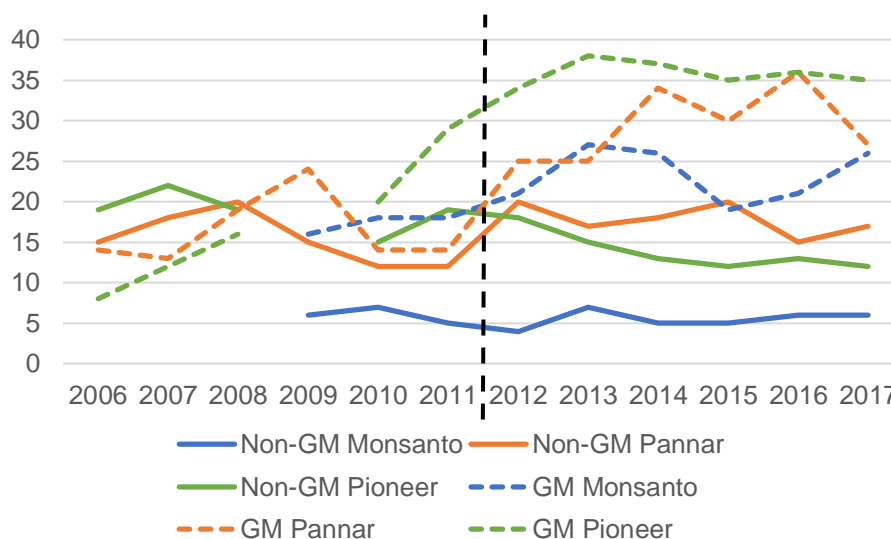
Figure 8 illustrates the number of cultivars on sale for each company, split by GM and non-GM cultivars. From 2010 onwards, all three companies have increased the number of GM cultivars they have on the market. *The number of GM cultivars offered by or branded as Pioneer increased from 19 in 2010 to 35 in 2017. The number of GM cultivars offered by or branded as Pannar increased even more substantially from 14 in 2010 to 35 in 2016, possibly as a result of gaining access to more affordable genetic traits as a result of the merger with Pioneer.* The number declined again to 26 in 2017 for Pannar, however. GM cultivars offered by Monsanto also increased from 16 in 2010 to 26 in 2017.

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<sup>33</sup> Interview conducted with a farmers' association, August 2017.

Meanwhile, the number of non-GM cultivars on the market have stayed fairly constant over the period.

**Figure 8: Number of cultivars listed per company, 2006 – 2017**



*Source: Company price lists*

*Note: dotted line indicates when the merger was implemented, according to the merging parties*

Following the merger, therefore, there does seem to have been an increase in the number of GM cultivars offered by the three major firms, but not in the number of non-GM cultivars. It is also unclear whether this was a trend which was already on-going before the merger as a result of a general shift towards growing more GM maize.

Most of those interviewed were of the view that Pannar and Pioneer have continued to produce new, competitive cultivars since the merger.<sup>34</sup> In the Western region where Pannar had historically been uncompetitive, respondents suggested that the quality of its cultivars has improved. This has not translated into a significant increase in market share, however, which may mean that Monsanto's cultivars are still the highest performing, or be partly explained by farmers' reluctance to switch away from cultivars which have served them well in the past before they have tested new cultivars over several growing seasons. It may therefore be too soon to observe the impact of Pannar's improved cultivars on its sales volumes. It is also unclear whether these improvements were brought about as a result of efficiencies due to the merger, or if Pannar would in any event have improved its performance in the region.

Another improvement noted by respondents was that Pannar and Pioneer have both been able to become stronger in some areas due to their complementary strengths.<sup>35</sup> For example, one respondent suggested that prior to the merger, Pioneer had been stronger in short to medium cultivars whereas Pannar had better performing long maturity cultivars, whereas now both have a broader range of both types of seed. However, it is unclear whether Pannar's increasing success in the early maturity segment is a result of the merger or pre-dated it. During the merger hearings, it was argued by the merging parties that Monsanto was the strongest in the irrigated areas after entering "with a bang" in 2010/11. These areas require ultra-early cultivars due to the need for double-cropping. However, the Tribunal found that

<sup>34</sup> See, for example, interviews conducted with a farmers' association in August 2017 and various agribusinesses, November 2017.

<sup>35</sup> Interviews conducted with various agribusinesses and farmers, November 2017.

Pannar had grown to become the strongest in the irrigated areas and was in fact the market leader with 40% to 50% of the market.<sup>36</sup>

A respondent in the KZN region noted that Pioneer recently withdrew the most suitable cultivar for his needs – a niche cultivar well-adapted for the “transition” region in KZN – from sale. This raises the concern that in areas where Pioneer and Pannar were close competitors pre-merger, they may face a reduced incentive to compete through offering farmers greater choice and specially adapted cultivars, particularly where volumes sold are relatively low.

There is therefore no clear evidence that the merger has resulted in increasing rates of innovation or increased choice for farmers. Anecdotal evidence from farmers raises the concern that where Pioneer and Pannar were close competitors pre-merger, they may be competing less strongly to provide the best products to farmers.

## **b. Yields analysis**

Farmers and agribusinesses interviewed consistently noted that the yield potential of maize seeds was the primary factor considered by farmers in deciding which seeds to use in a season. It is important to note that there is a lag in terms of how farmers adopt new cultivars, with a strong preference for varieties that they are familiar with. This is despite the fact that many farmers reported testing competing cultivars on their land, a process which in itself may require several years before farmers switch to or incorporate new varieties.<sup>37</sup> Even in the case of agribusinesses, they are generally guided by the preferences of farmers and will generally only buy and re-sell the leading varieties in the market.<sup>38</sup> Some reported that they were looking to try out emerging varieties in future although notably some of the major agribusinesses such as Senwes (Hinterland) do not conduct any testing of their own.

The yield potential of a particular seed is also a useful measure by which to benchmark the relative performance and technology embodied in a cultivar developed and sold by a company. We conducted an analysis comparing the different seed companies’ cultivars in terms of their highest ranking by yield in the ARC trials, in different regions of the country. Some of the yield data did not indicate whether particular cultivars were yellow or white maize varieties and so the data was matched with the price list data in order to identify the type of maize for each cultivar. Some of the cultivars tested did not match with cultivars in the price list for the relevant year and these were therefore excluded on the basis that the price lists should account for all cultivars on sale in a given year and hence which are available for farmers to purchase. For each company, in each area, we identified the best-performing cultivar and that cultivar’s rank. This allows us to summarise the highest ranking achieved by each company in each region.

While this approach focuses only on the “best” cultivar offered by each company in each region and does not compare the performance of the companies across all their cultivars, it enables us to see when new, high-yielding cultivars come onto the market and improve on the existing products. In addition, if there is a significant gap between one company’s highest rank in a particular region and another’s, it suggests that one dominates the high-performing cultivars in the region. On the other hand if two companies’ highest ranks in the region are very similar, this suggests that their cultivars may be more competitive with one another.

The results from 2006 to 2012 are based on yields achieved in one-season trials whereas those from 2013 to 2017 are based on average performance across two and three-season trials. The data available was more disaggregated by region in later years, and so this data has been aggregated by averaging the highest rank achieved by each company across sub-

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<sup>36</sup> Competition Tribunal (2011), paragraphs 132 to 140.

<sup>37</sup> Interviews conducted with various farmers, November 2017.

<sup>38</sup> Interviews conducted with various agribusinesses, November 2017.

regions to come to a regional average of each company's highest rank. Data for KZN was only available from 2013.

Table 2 and Table 3 illustrate the results for the four main types of growing area for yellow and white cultivars, respectively. In terms of yellow cultivars, in the Eastern region, Pannar has had high performing cultivars from 2008 onwards. Monsanto had high ranking cultivars in the early years but its cultivars have performed less well recently, especially since 2015. Pioneer has typically had the lowest ranking cultivars in the Eastern region but its performance improved somewhat from 2012 onwards. This reflects the findings from the interviews, where those from the Eastern region explained that all three companies are competitive and have been so for the past few years.<sup>39</sup>

In terms of the irrigated region, the ARC trial data reflects the trends noted by the Tribunal, with Pannar's performance in the irrigated regions starting in third position but improving to become the best performing from 2011 onwards. As pointed out by the Tribunal, however, these improvements were already starting to be visible between 2009 and 2010, before the merger was notified, and so it is uncertain to what extent the merger contributed to this effect.

In the Western region, Monsanto was the clear market leader from 2006 to 2010. However, since then, Pioneer and Pannar both appear to have improved their performance in the region. From 2012, Pannar's performance has been the strongest. Those interviewed stated that Monsanto was historically very strong in the Western region and remains so, although Pannar has been improving its performance there in terms of cultivars in recent years.<sup>40</sup> It is not clear, however, whether this has translated into a significant increase in market share for Pannar as there can be a lag between introducing new high-performing cultivars and farmers adopting these cultivars in large volumes.

Finally, in KZN we only have data for five years but these show Pannar with a consistently high ranking and Pioneer improving over time with Monsanto's performance quite mixed. A farmer interviewed in KZN stated that all three companies are competitive in the region.<sup>41</sup>

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<sup>39</sup> Interviews conducted with various farmers, November 2017.

<sup>40</sup> Interviews conducted with farmers and agribusinesses, November 2017.

<sup>41</sup> Interview conducted with farmer, November 2017.

**Table 1: Highest ranking cultivar by yield for yellow cultivars in each growing region per company, 2006 – 2017**

	Eastern			Irrigated			Western			KZN		
	Pannar	Pioneer	Mon	Pannar	Pioneer	Mon	Pannar	Pioneer	Mon	Pannar	Pioneer	Mon
2006	13	6	1	3	2	1	8	24	2			
2007	4	13	1	7	16	1	10	15	4			
2008	2	17	1	3.5	3.5	5.5	8	23	3			
2009	1	11	2	6	2	4	9	25	6			
2010	2	16	3	2	1	7	13	22	11			
2011	3	16	1	1	3	8	14		1			
2012	2	5		2	6.5	1.5	4	17.5				
2013	4.0	11.0	9.8	1.0	2.5	5.5	6	14	12	1	9	13
2014	4.1	6.3	2.0	1.0	5.3	4.8	3.75	10.5	7	2	10	1
2015	2.5	8.3	3.0	1.5	10.3	4.5	4.75	19	11.5	2	10	1
2016	2.0	10.0	9.5	1.0	8.5	7.0	6.5	13	6	2	8	7
2017	1.0	6.5	17.0	1.0	10.8	6.8	3.5	7.5	18	2	4	21

*Source: ARC field trials data*

*Notes: Grey denotes the company with the highest average rank in the region for that year. 1 year vs. 3 year averages, averaging over regions, based on yield published by ARC, not other characteristics.*

In terms of white cultivars, the patterns are quite different. In the Eastern region, Pioneer was historically strong but from 2010 onwards, Monsanto and Pannar have produced high ranking cultivars as well. In the Western region, all three companies appear to have been strong initially, but Pioneer's performance has worsened over time, leaving Pannar and Monsanto with the best ranked cultivars. Again, in KZN, there is only data available from 2013, during which time Pannar has been the strongest performer with the other two companies experiencing variable performances from year to year. Data for the irrigated region for white cultivars was incomplete and so the results are not reported here.

Across the board, the rankings achieved by Pannar's white cultivars have been high from 2010 onwards. Pioneer's however have tended to experience similar or worsening performance over the period, while Monsanto's have had a mixed performance.

**Table 2: Highest ranking cultivar by yield for yellow cultivars in each growing region per company, 2006 - 2017**

	Eastern			Western			KZN		
	Pannar	Pioneer	Monsanto	Pannar	Pioneer	Monsanto	Pannar	Pioneer	Monsanto
2006	7	4	3	3	5	1			
2007	7	5	14	3	1	6			
2008	8	3	11	9	1	2			
2009	8	3	5	2	5	1			
2010	1	7	5	1	2	5			
2011	2	5	6		6	2			
2012	3.5	1	3.5	2	7	1			
2013	1.0	7.6	4.8	1	2.5	5.25	2	8	9
2014	3.0	2.8	10.0	1	3.5	7	5	5	12
2015	2.3	9.1	2.0	1	6.75	3	3	5	5
2016	1.8	5.0	3.5	1.5	11	1.5	3	1	5
2017	3.8	13.0	9.0	1.25	7	2	3	14	9

Source: ARC field trials data

Notes: Grey denotes the company with the highest average rank in the region for that year. See Table 1

The performance of Pannar's cultivars has generally been strong since 2012, and in some cases has improved compared to the pre-merger period. However, as noted in relation to the irrigated region, it was argued during the merger hearings that Pannar's cultivars were already improving in the irrigated area and in terms of its "ultra-early" cultivars before the merger with Pioneer, so it is unclear how much of this performance can be attributed to efficiencies due to the merger. Pioneer's performance seems to have worsened since the merger in a number of areas, which could indicate reduced incentive to invest in producing better seeds, particularly in niche areas as discussed above, and areas where Pannar is strong. Without accurate volume data, however, it is impossible to determine whether or not the ARC trial results are representative of how farmers actually feel about the different brands' competitiveness in the growing conditions which they face. In addition, farmers noted that the ARC trials form only part of the information which they consider in taking decisions about which cultivars to plant and are necessarily less accurate than the test plantings they conduct themselves.<sup>42</sup>

## 7. Discussion and conclusions

From the merger review process, two main views of the merger were put forward. On the one hand (according to the Commission and Tribunal), the merger would lead to price increases in the short term, efficiencies were only likely to be realised far in the future, were overstated and could not be verified, and that efficiencies possibly were not merger-specific and were certainly not sufficient to outweigh the significant anti-competitive harm that would arise. On the other hand, the merging parties argued (and the CAC agreed) that any price increases would be outweighed by the cost savings and dynamic efficiencies relating to the ability to produce more and better seed cultivars through their combined germplasm and ABTs, and the ability of the merged entity to better contest Monsanto's position in the market. In the following sections we draw on the findings from our analysis to assess these different views of the merger.

### The counterfactual

<sup>42</sup> Interviews conducted with various farmers, November 2017.

A central issue in the evaluation of the Pioneer/Pannar merger was the discussion of the appropriate counterfactual to be applied. As discussed, the merging parties' version was a world in which Pannar is no longer able to compete with the two multinationals, declines in competitive significance, and the market is ultimately controlled by Monsanto. On the contrary, the Commission and Tribunal argued that Pannar was still an important competitor with the ability to produce excellent hybrids and it would be likely to find another way of gaining access to the ABTs and traits it needed to remain competitive through exploring partnerships with other multinational players.

To a large extent, we are in no better position to assess whether market outcomes are better or worse as a result of the merger than the authorities were when the case was evaluated. In the absence of information from the parties on the sales volumes and prices over time, it is not possible to conclude with a reasonable degree of certainty that the market outcomes would have been better or worse absent the merger. However, we can make some remarks from the theory, interviews and review of the case documents on the way in which the issue of the appropriate counterfactual was analysed.

The evidence from interviews points to the fact that although Monsanto had established itself as the lead player particularly in the dry regions in the west due in large part to notable blockbuster products, Pannar was already beginning to make inroads in these areas before the merger. In addition, Pannar was stronger than Pioneer in some regions and has been an effective competitor in key regions where Pannar-branded cultivars have ranked well relative to Pioneer and Monsanto. The evidence presented earlier shows that Pioneer-branded cultivars generally perform worse than Pannar-branded cultivars and Monsanto's cultivars, although this differs by growing region. Furthermore, pre-merger Pannar maintained a strong presence in other African markets and a reputable brand in the South (and Southern) African market. As such, although the parties initially argued that Pannar would cease to be an effective rival in the market, the evidence presented before the Tribunal suggested otherwise.

Firms are able to lead a failing or flailing firm defence (section 12A(2)(g) of the Act)<sup>43</sup> in support of a merger where it is believed that the target firm's assets (or those of both firms) may exit the market absent the merger. There are specific tests in the international precedent and guidance for this specific defence, evidence of which was not put forward by the merging parties with reference to Pannar. In any event, the experts for the Commission and the merging parties eventually agreed that the conditions which Pannar faced did not fulfil the requirements under the failing/flailing firm doctrine (Competition Tribunal, 2011). The implication is that Pannar would have likely remained in the market in the foreseeable future (five years as considered by the Tribunal) absent the merger, even though it would not necessarily command a large market share in the 'national' market compared to Monsanto. However, this does not mean that Pannar would not have remained significant as a rival in certain product market or geographic growing regions.

Our view in this regard is that the parties could not seek to rely on claims of the imminent demise of Pannar as a significant competitor, without actually invoking a failing firm defence and satisfying the requisite tests. While the Tribunal adopted this view, the CAC took a different approach, effectively accepting without much further consideration the argument advanced of Pannar's 'decline as a competitive force'. Even if this is the case, the competition law test is not whether a company is declining as a competitive force.

## **Effects on prices**

Based on the simple trend analysis, it is difficult to discern any impact of the merger on prices. The context, as described, is one in which the major seed companies have generally always

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<sup>43</sup> Section 12A(2)(g) considers "whether the business or part of the business of a party to the merger or proposed merger has failed or is likely to fail".



implemented significant price increases from season to season, in many cases above CPI in both the pre- and post-merger periods. This pattern does not appear to change post-merger from each of the three main firms, nor has the level of discounts and/or discount structure changed, at least as perceived by the farmers and agribusinesses. The general concerns around high and/or rising prices are therefore not necessarily related to the merger but have been a feature of the market for many years. However, it is also important to note that we do not know what the price increases would have been in the counterfactual scenario absent the merger, and given challenging conditions for maize farmers in recent seasons, it is possible that lower increases could have been seen if the merger had not taken place.

There does appear to have been compliance with the pricing conditions which required that price increases for Pannar-branded seeds remained in line with CPI for three years, whereas the price increases for Pioneer-branded cultivars which were not constrained by the conditions were higher in the relevant years.

The fact that the pricing condition appears to have constrained the pricing of Pannar-branded cultivars indicates that these prices would have been higher if it had not been for the condition. The condition was only binding on Pannar-branded cultivars, and the price of Pioneer-branded cultivars increased more during the condition period, which lends further support to this argument. Furthermore, the price increases for Pannar-branded cultivars in 2017, after the end of the condition period, have been higher again and above inflation, although this is only based on one year's data. However, we have not been able to control for other factors which impact on prices, so we cannot conclude on whether the merger itself is the reason for the upward pricing pressure. In particular, the recent drought led to substantially reduced plantings by farmers and observed prices may therefore be lower than they would have been in different conditions.

Overall, some respondents express a general concern that each year seed prices always increase at a faster rate than inflation, while the producer price of maize and the price of other inputs can fluctuate and may fall substantially in some years. This cannot be linked directly to the merger but raised it as a general concern. However, the ability to systematically increase prices regardless of varying industry dynamics may be indicative of market power on the part of the seed companies. As noted, this may not have been created by the merger but could have worsened as a result. While we cannot provide evidence to show that the merger had a significant impact on pricing, it was certainly correct for the Commission and Tribunal to be concerned about the effect of a three to two merger in a market where there was evidence of existing market power where an effective competitor was being removed from the market.

### **Effects on innovation**

Engagement with stakeholders revealed a general view that Pioneer- and Pannar-branded seeds are each competing more strongly in what would have been the other's traditional stronghold regions since the merger. However, this is not necessarily as a result of the merger, and indications of market shares given by stakeholders suggest that it has not been reflected in sales, although as noted above there is typically a lag before farmers adopt a new high performing cultivar in large volumes. In addition, the ARC trials suggest that the performance of Pioneer-branded cultivars has not improved substantially.

The yield potential to farmers is extremely important to consider in order to understand the nature of competition in the maize seed market. Whereas lower prices typically attract customers to a product in a market for homogenous goods such as fertilizer, price is important as a consideration for farmers but is not the only factor on which the choice of seeds is made. The yield is critical in determining the relative attractiveness of different cultivars. This suggests that the evidence of upward pricing pressure led at the Tribunal, was perhaps overemphasised relative to the importance of evidence led on yield improvements and their quantification.

As discussed, Pannar and Pioneer offered substantially more GM cultivars in the market when comparing 2010 to lists in 2016. In the case of Pannar, this is possibly as a result of gaining access to more affordable genetic traits as a result of the merger with Pioneer, and access to advanced technologies. By comparison, the number of non-GM cultivars on the market has stayed fairly constant over the period. In terms of competition at the regional level, some respondents noted that in the Eastern region all three companies are competitive and have been so for the past few years whereas Monsanto was historically very strong in the Western region and remains so, although Pannar has been improving its performance there in terms of cultivars in recent years. This is borne out to some extent through the data ranking companies by their lead hybrids in different regions. The performance of Pannar-branded cultivars has generally been strong since 2012, and in some cases has improved compared to the pre-merger period, although it is not clear whether this is merger-specific as Pannar-branded cultivars were already improving in the irrigated area and in terms of its early varieties. A consistent theme is the declining performance of Pioneer-branded hybrids which could indicate a reduced incentive to invest in producing better seeds, particularly in niche areas, which we return to below. Without accurate volume data, however, it is not possible to determine whether or not the ARC trial results are representative of how farmers actually feel about the different brands' competitiveness in their growing conditions.

In practice the strategy has been to continue to represent Pioneer and Pannar as separate in the market, which is confirmed in most of the interviews. This may have to do with the desire to maintain the separate brands in the market which have ubiquitous presence and reputation. In fact, Pannar and Pioneer have since the merger continued to use separate sales teams and strategies and by most accounts appear to be competing at the retail level.<sup>44</sup> This is not to suggest that expected price effects are somehow reduced (as from a breeding and strategic perspective, the companies have merged their operations), but that there is a strategy to maintain the independent brands as part of maintaining market share positions. It is also likely that part of the post-merger strategy is to leverage the strength of the existing brands and cultivars by region – that is, channel the best cultivars for a particular local area or region through the brand with the strongest position in that region. Pioneer's declining performance may actually form part of a strategy to leverage the Pannar brand, and introduce some of the best or new seeds through to the market under the Pannar banner especially where it was already strong. The reality of this strategy is only borne out through the views of some of those interviewed, but cannot be analysed further without more complete information and data from the parties. Nonetheless, in the counterfactual of the merger not being approved, Pioneer would have had to maintain its own distinct cultivars in different regions.

Despite significant data limitations, it was possible to show however that Pannar, as with the other companies, have introduced a range of new hybrids in the market. However, reflecting back on the process by which new hybrids are developed, it is important to note that it is not surprising that the parties have been able to at least put *some* new cultivars in the market. Given access to ABTs, the merged entity would naturally be able to introduce new combinations of genetics with some yield improvements. The question is whether the incentive to keep innovating to introduce new 'blockbuster' hybrids, is retained post-merger. The theory and recent cases in Europe suggest that the companies may face reduced incentive to do so beyond this initial period. The entity clearly faces reduced incentive to continue any separate research programmes which would have been in competition with one another pre-merger, and indeed it appears from interviews that the investment in a joint research hub which the entity had committed to in the course of the merger evaluation has taken place.

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<sup>44</sup> See, for example, interviews conducted with various farmers and agribusinesses, November 2017.

## Conclusion

In conclusion, our view is that the correct counterfactual to consider in relation to the merger was the one put forward by the Commission and Tribunal, and not the one argued by the CAC. In terms of the impact of the merger on pricing, we have not been able to conduct a full analysis due to incomplete data, but the analysis has shown that pricing certainly has not been more competitive as a result of the merger. The fact that the conditions were successful in constraining the pricing of Pannar-branded cultivars at CPI and the lack of response by the seed companies to the recent drought in terms of reducing prices suggests the presence of market power, which is likely to have pre-existed the merger but may have been compounded as a result.

Farmers interviewed had the perception that the merged entity has been strengthened as a result of the merger in terms of the competitiveness of its products, but it is very hard to separate the effect of the merger from Pannar's improving performance before the merger. In addition, the data analysis shows no evidence that innovation has increased or that better cultivars come to market as a result of the merger, and in fact Pioneer-branded seeds appear to still perform poorly compared to Pannar-branded and Monsanto cultivars. In addition, there are some worrying signs from an innovation perspective such as the reduced choice of cultivars noted by a farmer in a region where Pioneer and Pannar were close competitors pre-merger. As noted in section 3, theory suggests it could be the case that the initial bringing together of Pioneer's ABTs and germplasm with Pannar's germplasm provided an immediate benefit in terms of improved cultivars, while at the same time the reduction in competition has lowered the long-term incentives to innovate.

Given the above, it is our view that on the balance of probabilities, a prohibition was not an irrational decision by the Commission and Tribunal. If the additional likely impact on innovation incentives had been considered as in recent EC merger decisions, this would have added weight to the argument for prohibition. However, the limitations of our analysis mean that we cannot say conclusively that the merger has had or will have a negative impact on competition or on farmers.

## 8. Recommendations

We set out a brief set of recommendations for consideration and further research on the main areas where authorities can adapt their evaluation of cases based on the lessons in this case.

*Increased focus on assessment of innovation competition:* As noted above, while prices are a key consideration for farmers, information on yields of different seeds is critical and farmers are willing to pay more for new or higher yielding varieties. This suggests that in a market characterised by innovation and in which companies compete on the basis of introducing high performing and innovative products, it is especially important for the authorities to give significant weight to evidence on the effects on innovation competition on the one hand, and technological improvements and efficiencies on the other. This is not to discount the evidence on upward pricing pressure, but to ensure that there is a thorough evaluation and weighting of the likely effects of a merger on innovation competition which as explained above goes beyond considering the mere existence of dynamic efficiencies. In this regard, it is recommended that the competition authorities assess in detail the likelihood that a merger will chill innovation and give these potential anti-competitive effects significant weight in balancing merger effects with claimed efficiencies.

For cases in the seed industry, and other innovation markets, the above recommendation suggests a different approach to the typical treatment of product improvements as only contributing to the set of 'procompetitive gains' to be balanced against anti-competitive effects. Instead, the international case precedent suggests that the authorities must protect the *process* of innovation and innovation competition itself, rather than just the outcomes. Said

differently, the likely effects on the incentives for innovation need to be considered as part of assessing anti-competitive effects.

*Evaluation of efficiencies:* The Commission, Tribunal and the CAC did not explicitly consider innovation theories of harm as advanced in recent international cases. The evaluation focussed on the efficiencies that the parties claimed would arise post-merger. In this regard, the Tribunal considered in some detail the evidence presented by the parties regarding efficiencies that would arise post-merger, as discussed. The Tribunal found that there was in fact insufficient evidence in terms of verification and quantification of the efficiencies claimed. The CAC, on the other hand, found the efficiencies to be verifiable even if not quantifiable. In its decision the CAC argued that by virtue of the seeds industry being an innovation market, market participants faced strong incentives to innovate, as if the incentives to innovate do not change. In taking this view, the CAC in our view failed to recognise that even in so-called innovation markets companies can face powerful incentives (post-merger) to innovate less (and it should not assumed by courts that they will innovate).

*Weighting of anticompetitive effects (including on innovation) and efficiencies:* On the issue of coordinated effects, the Tribunal agreed that there was a likelihood of tacit coordination in a duopoly market between the merged entity and Monsanto. However, as discussed above, the Tribunal chose not to conclude on this issue given it has already found strong evidence of likely unilateral effects and weak evidence on efficiencies that could away the unilateral effects. Anti-competitive effects on innovation were not considered as they have been in recent international cases, and weighed against efficiencies.

In this regard, we suggest that the Tribunal should have concluded on the likely coordinated effects aspects of the merger, particularly where there was contestation about the verifiability and measurability of efficiencies. As a practice, it is prudent for the Tribunal to consider and conclude on all the evidence presented on efficiencies and anti-competitive effects, to the extent that this evidence may be material in the overall balancing of anti-competitive effects and efficiencies, and in appeal proceedings, as in the Pioneer/Pannar transaction.

*Obtaining data for ex-post assessments:* Lastly, this analysis has been constrained by the lack of critical information from the parties. In recognising the value of ex-post assessments in terms of measuring impact and informing the Commission's future work, creating a mechanism for getting access to data is critical. This not only applies to ex-post evaluation of mergers, but to cartel and abuse of dominance interventions as well. Currently the Commission has limited powers to obtain this information, even in cases where there has been a set of conditions issued by the authorities, which presumably justify some degree of monitoring over time – notwithstanding the work of the Commission's monitoring function which may respond to complaints lodged about compliance with merger conditions, as we understand it. One possibility which could be explored is for the authorities to include provisions in merger conditions in particular which require the submission of certain information related to the substance of the conditions (e.g. price and volumes in the Pioneer/Pannar case) at pre-set intervals (e.g. every year) to the Commission. This process would also serve to ensure the parties to any merger exercise greater discipline in adhering to the terms of the conditions, with the knowledge that the authorities may be reviewing their compliance on an ongoing basis. In this regard, we believe the proposed Competition Act amendments (2017) are a critical step in the right direction, with the authorities being *empowered to investigate and analyse the impact of decisions made*, and it will be important to emphasise a mechanism for obtaining key information that enables the authorities to do this effectively.

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## Annexure A

	<b>INTERVIEWEES</b>	<b>ORGANISATION/ LOCATION</b>	<b>DATE OF INTERVIEW</b>
1	Corné Louw, Dirk Strydom	Grain SA	31 August 2017
2	Thinus Prinsloo	Agricultural Research Council (ARC)	21 September 2017
3	Louw Linde	VKB	9 November 2017
4	Arno Van Vuuren	NWK	10 November 2017
5	Elmarie Joynt, Daan Bronkhorst, Yolanda Steenkam	Senwes Ltd	17 November 2017
6	Jaco Minnaar	Welkom, Free State	8 November 2017
7	Ryk Pretorius	Ermelo, Mpumalanga	8 November 2017
8	Jaco Breytenbach	Eastern Free State	9 November 2017
9	Tommie Olkers	Eastern Gauteng, into Mpumalanga	20 November 2017
10	Ralf Küsel	Pietersburg, Northern KZN	22 November 2017