The Economic Impact of the Proposed Bunge-Viterra (BV) Merger on the Grain Sector in Western Canada: A Preliminary Assessment

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0. EXECUTIVE SUMMARY

0.1 BACKGROUND

On June 13, 2023, U.S. based Bunge Limited announced their intention to "merge Bunge and Viterra in a cash and stock transaction to create a premier diversified global agribusiness solutions company." (Glencore, 2023). As a prospective merger, it is currently under review by the Competition Bureau, Canada's regulatory agency.

Viterra Canada Limited is currently Canada's largest grain export company, while Bunge Limited is a major shareholder in G3, which in turn operates Canada's largest grain export terminal at the port of Vancouver. Together these firms control 50% of Vancouver grain export capacity at the port. In addition, Bunge is currently one the largest canola crushers in Canada, while Viterra has previously announced plans to build the world's largest canola crushing plant in Regina, the latter potentially rendering it one of the largest canola crushers in Canada. Finally, Viterra and G3 both operate an extensive network of primary elevators in Western Canada that currently compete spatially for the purchase of grains and oilseeds from producers.

0.2 THE PURPOSE OF THE REPORT

The purpose of this report is to analyze the potential effects of the Bunge-Viterra (BV) merger on competition across the grain industry. As described in Competition Bureau Guidelines, we also recognise we are working with sparse data and have made assumptions about behavioral relationships. While we lack the data to provide detailed and precise estimates of market impacts, we are confident that our analysis accurately portrays both the direction and magnitude of likely market impacts potentially stemming from the merger.

0.3 ORGANISATION OF THE REPORT

We undertake three distinct analyses for this large and multi-tiered merger proposal. In Section 2 we begin by examining the implications for grain export services at the port of Vancouver, an essential facility where Bunge is a 25% shareholder in G3, the largest grain terminal at the port, and Viterra is currently the largest shipper of grain from the port. This is followed by a related merger analysis of the canola crushing sector, where we examine the effects of the merger on crushing margins as well as on incentives to build the largest canola crushing facility in the world. In Section 4 we provide a spatial analysis of primary elevation in Western Canada to identify those crop land locations where a Bunge-Viterra merger would substantially reduce elevator competition for grain. In Section 5 we discuss the calculation of Small but Significant and Non-transitory Increase in Price (SSNIP) and provide evidence to suggest the gross margin is the implicit price charged by these grain handling and oilseed crushing firms. In Section 6, we

describe the economic deadweight loss from the proposed merger and show how it is amplified by price distortion that exists in the remainder of the supply chain. Our conclusions are provided in Section 7.

0.4 Summary of Merger Impacts

Summarized in Table 1, by any measure the grain industry in Canada is already very concentrated and will only become more concentrated with a BV merger. A Cournot Nash merger simulation indicates that Vancouver export basis will increase by about 15%, while similar analysis shows canola crush margins will increase by 10% with the merger. In total, this reduces grain producer income by approximately $770 million per year. The merged firm will have reduced incentives to build the large canola crushing facility in Regina, which could have provided additional competition in this growing market.

Table 1: Merger impacts on Vancouver's grain export services, Canola crushing and gross margins from the 2.5 Mt Regina facility

	Without Merger	With Merger
Grain Export Services Vancouver		
Bunge/G3 Capacity Share	18%	--
Viterra Capacity Share	29%	--
BV Merger Capacity Share	--	47%
CR4 % of Capacity	82%	91%
Export Volume Million tonne	32.4	30.8
Grain Export Margin $/t	50.00	57.56
Percent Change Grain Export Margin		15%
Reduction in Farm Price $/t	0	7.56
Farm Revenue Loss $Million/yr.	0	567
Canola Crushing		
Bunge Capacity Share 2025	19%	0%
Viterra Capacity Share 2025	23%	0%
BV Merger Capacity Share 2025	0%	42%
CR4 % of Capacity	77%	89%
Crush Volume Million t	14.65	14.11
Canola Crush Margin $/t	80.00	88.07
Percent Change Canola Crush Margin		10%
Reduction in Farm Price $/t	0	8.07
Farm Revenue Loss $Million	0	202
Increase in Gross Margin from the 2.5Mt Regina Crush facility		
Viterra $Million/yr.	143	--
BV Merger $Million /yr.	--	78
Primary Elevation		
% of Cropland with CR4 > 90%	27%	45%
% of Cropland with CR4 > 80%	70%	80%

0.5 Merger Simulations for the Port of Vancouver

Assessment approach

To assess the impacts of the BV merger we develop a standard Cournot-Nash merger numerical simulation model of the current bulk grain export industry at the port of Vancouver. We begin by calibrating the model to simulate the market equilibrium with current industry ownership, and then simulate the effect of the BV merger on the market equilibrium, on export basis and on the prices received by western Canadian grain producers.

Findings

The results of our merger simulation indicate that the BV merger of two firms that collectively control over 45% bulk grain export capacity at this critical port would increase the price charged for export services by over 15%. The exercise of market power at the port of Vancouver due to the BV merger would also increase the export basis out of the port by $7.56 per tonne, which would lead to a corresponding reduction in farm prices for grain across Western Canada. Conservatively, these factors would lead to an annual loss in producer income on the order of C$570 million per year. Under reasonable economic and financial assumptions and a 5% real discount rate, the present value of this loss is approximately $10-11 billion for western Canadian grain producers.

Recommendations and remedies

Given there are currently only six terminal operators at Vancouver, our modeling suggests that divestiture of the merged firm's terminal operations to either Richardson International or Cargill Limited (who also compete through Prairie elevation) would not appreciably mitigate the price effects of the merger at Vancouver. We believe the only viable option to maintain current competitive levels at port under the proposed merger would be for Bunge to divest its port terminal interest in G3 Ltd, selling these shares either to the other current shareholder SALIC, grain producer shareholders, or to external interests not currently operating at the port of Vancouver.

0.6 Merger Simulation for Canola Crushing

Assessment approach

To assess additional effects of the potential BV merger, we develop another Cournot-Nash merger simulation model of the canola crushing sector in Western Canada. Our analysis is tempered by the fact that Viterra has already announced a plan to build the world's largest 2.5 Mt canola crushing facility in Regina. We therefore conduct a merger simulation for both current crush capacity and then planned 2025 crush capacity. We also use the model to assess incentives to build the planned crush facility both with and without the merger.

Findings

We find that the BV merged firm possesses a much lower economic incentive to build the Regina facility. If BV does not build the plant this would significantly lessen crush capacity, which in turn we find increases industry crush margins from $80/t to $93/t or 16%. Alternatively, if the Regina facility is built, BV would control 37% of crush capacity.

This concentration of market shares would increase crush margins by 10% to $88/t, leading to a non-transitory decrease in farm receipts. Using an average annual canola production of 25 million tonnes, an $8 to $13 dollar increase in canola crush margin would shrink farm receipts by $200 to $325 Million dollars. At a 5% discount rate the present value this loss would be in the order of $4 to $6.5 Billion dollars.

Recommendations and remedies

Given our analysis, we see no apparent divestiture solution for canola crushing. If the merger takes place and the Regina facility is not built, this creates a worst-case scenario of a concentrated industry with limited capacity. If there was to be a requirement for merged BV to build the Regina facility, the Regina facility would give BV a 37% market share, which would in turn still increase crush margins by about 10%. Both outcomes are undesirable and would come at a large cost to Canadian canola producers.

Given the anticipated price effect on crush margins and the large negative effects on Canola producers, we offer that the proposed merger should not proceed. At a minimum our findings suggest that the onus falls on the merger proponents to be able to unambiguously demonstrate that the merger, in spite of all these significant costs/transfers of surplus, is somehow in the best public interest for Canada.

0.7 The Impact of the Merger on Spatial Elevator Competition

Assessment approach

Spatial analysis was used to assess the effects of the proposed BV merger on price competition in primary grain elevation. Combining data for primary grain elevator location, capacity and ownership, and grain-producing locations, we identified the number of existing grain elevators within a 100 km radius of every grain-producing quarter-section (Legal Land Description) in Alberta, Saskatchewan, and Manitoba. Simulating a BV merger, we then identified the geographic areas where the merger could reduce effective elevator competition by shrinking the number of competitors. We then calculated both spatial for-firm concentration ratios (CR4) as well as Herfindahl-Hirschman Indices (HHI)to assess the level of price competition within 100 km of each section, both with and without the BV Merger.

Findings

Our spatial analysis based on a 100 km catchment area only identified two small geographic areas where the merger would result in only a single grain company purchasing grain post-merger. And in each of these cases, the existence of alternative grain elevators/buyers located just outside the 100 km radius would likely mitigate monopsonistic effects. However, the calculation of CR4 and HHI indexes for each Prairie land location revealed surprising levels of spatial market concentration in elevation, in many cases made considerably worse by the proposed merger. In all cases, the ability of grain producers to transport grain to elevator at a conservatively estimated variable cost of about $8/tonne per 100km mitigates, but does not eliminate, concerns over spatial market concentration. Given the size of the grain production sector in Western Canada, even modest non-transitory price impacts, for example $2 or $3 per tonne for 20% of the crop, amounts to producer losses of $30 to $45 million per year.

Recommendations and remedies

If the merger proceeds, we assess that there is not enough of an effect on grain elevation (see Appendix) to necessitate any major remedy. There is only a very small area of a few thousand acres in Alberta that would be subject to monopoly elevation post-merger. In spite of this analysis, by other metrics there remain considerable concerns over elevator market power in many areas in Western Canada, concerns that will only get worse if the industry tries to consolidate.

0.8 Overall Assessment

We find the BV merger will have significant negative consequences for the Western Canadian grain export sector. Grain export capacity at the essential facility in this sector (the port of Vancouver) already has a very concentrated ownership structure, with a CR4 ratio of 80%. A BV merger would place more than 45% of port storage capacity under the control of a single firm, rendering a far from competitive situation even worse. In this market, the proposed merger will generate an estimated C$570 million in annual costs to Canadian grain producers, who will bear the brunt of the increased monopsony power.

In addition, we find the BV merger could also generate severe negative consequences for the canola crushing sector in Western Canada. A BV merger will either prevent the building of a proposed new facility in Regina or will result in very significant increase in industry concentration. Either scenario will have significant negative consequences for western Canadian canola producers. This situation is especially critical given the central role that canola is likely to play in Canada's future clean fuel strategy. A less than competitive canola crushing industry will necessarily impede the development of a robust renewable fuel industry.

Spatial competition analysis suggests that a BV merger would significantly increase grain elevator CR4 ratios within a 100 km radius of a non-trivial number of farms. Post-merger, this could generate a small but non-transitory reduction in farm prices for grains. Even modest price impacts for 20% of Prairie producers would result in farm income losses of $30 to $45 million per year.

As a final note, in these analyses, we did not undertake the task of assessing deadweight losses attributable to the proposed BV merger. We do, however, show that initializing any such assessment would have to incorporate the fact that markets for most agricultural inputs (fertilizer, pesticides, seed, farm machinery, fuel, etc.) are already concentrated, as are the downstream markets of grain buyers, railways, processors, wholesalers, retailers, etc. If each of the components of the grain supply chain is priced above marginal cost, it is highly likely this supply chain is not even close to a competitive equilibrium. As such, the effect of the proposed BV merger, which would further increase market power in grain purchasing and canola crushing, will simply add to existing market distortions. As a result, the proposed BV merger necessarily leads to significant additional deadweight losses across markets, far beyond what a departure from an extant competitive equilibrium would suggest.

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1. Introduction

1.1 The Issue

On June 13, 2023, U.S. based Bunge Limited announced their intention to "merge Bunge and Viterra in a cash and stock transaction to create a premier diversified global agribusiness solutions company." (Glencore, 2023). As a prospective merger, it is currently under review by the Competition Bureau, Canada's regulatory agency.

The grain processing and handling industry in Canada is currently composed of six major firms of varying sizes, with limited fringe competition on the Prairies from much smaller operators. While several mergers have been permitted within the industry over the past 20 years, the latest proposed merger would be the largest on record.

Viterra Canada Limited is Canada's largest grain export company, while Bunge Limited is major shareholder in G3, a grain company that operates Canada's largest grain export terminal at the port of Vancouver. Bunge is one of the three largest canola crushers in western Canada and Viterra has planned to add to their crushing capacity by building the world's largest 2.5 Mt canola crushing facility at Regina. Viterra has the largest network of primary grain elevators across western Canada, while G3 has many large capacity inland terminals. In addition, Bunge Canada owns a number of primary and process elevators in the region. Given the scale of the proposed transaction and the multi-tier effects it will have in the grain supply chain, this briefing offers a preliminary assessment of how the merger could affect competition in the crucial grain export sector. We will also attempt to quantify additional consequences stemming from the proposed merger for the Western Canadian grain sector as well as the Canadian economy as a whole.

1.2 The CB process and relevant Merger Guidelines

In preparing this report, we reviewed the Competition Bureau's 2011 Merger Enforcement Guidelines. We begin by noting that a merged Bunge-Viterra (BV) operational share of export capacity at the port of Vancouver as well as their share of canola crushing capacity in Western Canada would exceed 35% market share, while the post-merger respective four firm concentration ratios (CR4) in each market would exceed 65% -- both of these thresholds being necessary pre-conditions for the Bureau to challenge a merger based on potential concerns about market power. In addition, given Viterra's previously planned 2025 construction of a 2.5Mt canola crushing plant in Regina, the merger could also serve as a means to restrict further competition in that market. Finally, we anticipate that left unchecked, the merged firm will continue to operate all existing grain export terminals and all crushing plants as currently, limiting any potential operational efficiency gains from the merger. Grain exporting and canola crushing have very established technologies that only improve slowly over time, necessarily limiting additional efficiency gains from knowledge sharing within the merged company.

1.3 THE PURPOSE OF THE DOCUMENT

The purpose of this report is to examine some anticipated outcomes that could result from the proposed merger. While we lack the industry level data to provide more detailed estimates of market impacts, we are confident in our analysis as accurately portraying both the direction and approximate magnitude of market impacts. As highlighted in the Competition Bureau guidelines for submissions, we recognise we are working with sparse data as well as uncertain assumptions on behavioral relationships.

1.4 THE ORGANISATION OF THE REPORT

We undertake three distinct analyses for this large and multi-tiered merger proposal. In Section 2 we begin by examining the implications for grain export services at the port of Vancouver, an essential facility where Bunge is a 25% shareholder in G3, the largest grain terminal at the port, and Viterra is currently the largest shipper of grain from the port. This is followed by a related merger analysis of the canola crushing sector, where we examine the effects of the merger on crushing margins as well as on incentives to build the largest canola crushing facility in the world. In Section 4 we provide a spatial analysis of primary elevation in Western Canada to identify those crop land locations where a Bunge-Viterra merger would substantially reduce elevator competition for grain. In Section 5 we discuss the calculation of Small but Significant and Non-transitory Increase in Price (SSNIP) and provide evidence to suggest the gross margin is the implicit price charged by these grain handling and oilseed crushing firms. In Section 6, we describe the economic deadweight loss from the proposed merger and show how it is amplified by price distortion that exists in the remainder of the supply chain. Our conclusions are provided in Section 7.

2. MERGER SIMULATIONS FOR THE PORT OF VANCOUVER

2.1 BACKGROUND AND CURRENT CAPACITY

The development of an efficient grain handling and transportation system has played a critical role in the development of the Canadian economy, dating back to confederation and MacDonald's National Policy. The importance of grain movement for the Canadian economy has motivated public investments such as the completion of the Canadian Pacific Railway, the construction of the St. Lawrence Seaway, and the establishment inland and port terminals (Fowke, 1946).

Market competition in grain handling and transportation is limited by economies of size along and considerable barriers to entry. The inherent market power of grain buyers and railways led to regulation or other forms of policy intervention. Very early in the 20th century grain farmers in Western Canada became displeased with the privately owned grain elevator trade, seizing an opportunity to create so-called cooperative elevator companies, the Prairie Wheat Pools. In addition, the Canada Grain Act was passed in 1912 to regulate the grain trade and to guarantee farmer access to producer grain railcars. Subsequently, between 1935 and 2012 the Canadian Wheat Board (CWB) operated a publicly funded grain marketing mechanism for cereal grains grown across Western Canada.

Over the past twenty years, the grain trade in Canada has gradually returned to private ownership. For example, Viterra Inc. was formed in 2007 as a publicly traded corporation when the Saskatchewan Wheat Pool merged with Agricore United, which was at that time the largest grain handler in Western Canada (Canadian Competition Tribunal, 2007). In turn, as part of the formation of Agricore United and then with

the formation of Viterra, the Competition Bureau ultimately required the divestiture of many inland and grain terminal assets, which were acquired by private competitors, including Cargill Canada, James Richardson International, Paterson GlobalFoods Inc., and Parrish & Heimbecker Ltd.[1] When the CWB's power as the single desk seller of was eliminated in 2012, G3 Global Grain Group purchased a majority stake in the CWB. Since its acquisition of CWB assets, G3 has built several high throughput elevators in western Canada and a new grain terminal in Vancouver.

Since the dissolution of the CWB, there have been some major terminal capacity investments at the port of Vancouver, which is the dominant port for Western Canadian grain exports. In 2020, a new G3 Terminal opened in Vancouver as the largest and likely the most efficient West Coast grain terminal. In 2023, the new Fraser Terminal was commissioned as well. As seen in Table 2, there were also new investments at the five extant grain terminals to expand capacity. The major bulk grain export terminals in Vancouver now have a rated export capacity of 36 Mt, nearly double the capacity that existed a decade ago.

Table 2: Vancouver Grain Terminals - Ownership, Capacity and Year of Upgrade

Terminal Name	Ownership[1]	Storage[2] capacity tonnes	Annual[3] Capacity Mt/yr.	Hourly[3] Capacity* t/hr	Year of Up-Grade[1]
Alliance Grain Terminal	50% P&H[#] 50% Paterson[#]	102,000	3	1500	2018
Cargill	Cargill	240,000	5	1200	2017
G3	75% SALIC Ltd 25% Bunge Limited	180,000	6.5	3000	New terminal 2020
Richardson	100% Richardson International	180,000	6	1100	rail upgrade
Cascadia	25% Richardson 75% Viterra	280,000	6	1200	2022
Pacific Terminal	100%Viterra	136,100	6	2400	2016
Fraser Grain Terminal[2]	50% P&H 50% GrainsConnect Canada	74,000	3.5	2000	New Terminal, 2023

Sources: [1]Corporate Websites, [2]Canadian Grain Commission, [3]Cowley West Shipping Inc.

[1] https://www.canada.ca/en/news/archive/2007/07/competition-bureau-completes-measures-increase-competition-grain-handling-industry.html

[2] It is assumed that the Fraser Grain Terminal closely coordinates with the Alliance Grain Terminal regarding storage, loading, and exporting of grain.

With this recently added capacity, Vancouver has increased its dominance as the leading grain export point from Western Canada. Over the last two crop years, nearly 75% of Canadian grain exports have flowed through Vancouver. Despite land constraints, the port maintains certain advantages. Notably, Vancouver is served by both Canadian railroads, which have maintained long-term, regulated grain transportation services into the port.

The grain terminals located within this vital grain export corridor are owned primarily by 6 firms, (see Table 3). Viterra Canada Ltd. has the largest share, owning 29% of rated annual capacity. Richardson International has 20%, while G3 (Global Grain Group) has 18 %, followed by Cargill Canada Ltd at 14% and P&H, and Paterson Grain with 9% each. Notably, the ownership of grain export capacity at this key port is very concentrated with the top 4 firms having an 80% market share (i.e. CR4 =80%).

As a product and market, the six grain companies operating Vancouver export terminals provide very similar outputs. They purchase and take delivery of grain from farmers across Western Canada through their elevators located on the Prairies. At elevator, grain is graded, cleaned, blended, even stored, but eventually grain is loaded for rail transportation to their grain export terminals for further storage and processing. At the grain export terminals, grain can be cleaned and/or blended again to customer specifications. Subsequently, the grain is loaded into ocean going bulk cargo vessels for overseas delivery to grain customers, who have purchased the grain (free on board) Vancouver at an agreed upon price, among other contract specifications.

Table 3: Grain Terminal Capacity Shares by Ownership, Port of Vancouver

	Annual Cap Mt	Share	t/hr	Share
Viterra Limited	10.5	29.2%	3,300	26.61%
Richardson Int. Ltd.	7.5	20.8%	1,400	11.29%
G3 Ltd. – SALIC/Bunge	6.5	18.1%	3,000	24.19%
Cargill Cdn. Ltd.	5.0	13.9%	1,200	9.68%
P&H Ltd.	3.25	9.0%	1,750	14.11%
Paterson Grain Ltd.	3.25	9.0%	1,750	14.11%
Total Capacity	**36.0**	**100%**	**12,100**	**100%**
BV Merged Capacity	17.0	47.3%	6,300	50.80%
Base mkt power metrics (on capacity)	**CR(4) = 82%**	**HHI = 1968.1**		
After BV merger metrics (on capacity)	**CR(4) = 91%**	**HHI = 3015.7**		

Source: See Table 2

The demand for such export services is derived from the difference between the price at which western Canadian grain producers are willing to sell their grain against the price foreign buyers are willing to pay. Since Canadian grain exporters supply very similar services, they collectively face a common (derived) demand for grain exports from Vancouver. In this instance, each individual firm has an incentive to sell

the quantity of grain that will maximize its profits, subject to their specific cost of input (grain) purchases, the marginal costs to move the grain to export position, their grain movement capacity, and possibly any contract specifications from their grain buyers.

As is well understood in industrial economics, in a market composed of several firms with significant market share, each large firm has some ability to influence the price of their services. If they are aggressive in their sales volume, they can sell a greater output, but must do so at a lower margin. If each firm is maximizing profits, they each make sales to the point where the marginal revenue from an additional tonne of grain is equal to the marginal cost of providing that grain.

Most of the price effects of grain export services are ultimately felt at the farm level. Given Canada's relatively small share in international grain markets, grain sellers tend to be price-takers, and face relatively elastic demand curves. However, the price that grain exporters and grain processors of the farmers is very dependent on the quantity purchased. When there is insufficient grain movement, farm price/receipts fall, as farmers face limited demand for what they have already produced.

2.2 The Cournot-Nash framework for Merger Simulation

Economists use profit maximizing incentives to model potential pricing behavior in oligopoly markets with small numbers of firms. Anti-trust literature uses this type of modeling to try to simulate how potential mergers could affect market prices. One common approach to numerical merger analysis is to develop a Cournot-Nash (C-N) simulation (Davis and Garces, 2010; Faulí-Oller and Sandonís, 2018, Buschena et al., 1998). With C-N simulation modelling, each firm independently chooses the quantity they will sell to maximize their profits, while taking their rival's behavior as given. At the C-N market equilibrium, all firms set their marginal revenue equal to the marginal cost for last unit sold.

We first adopt the C-N approach to try to simulate the effects of the Bunge-Viterra merger at the port of Vancouver. We begin by calibrating the model to reflect observed market shares, prices and quantities. We then change cost structure and the number of firms to reflect the merger and then re-solve for the post-merger market equilibrium.

The two principal elements needed for a Cournot-Nash merger simulation are the specification of the common demand curve faced by the firms, along with the cost structure of each firm in the oligopoly. As a simulation, the demand and cost structures assumed must be consistent with profit-maximizing behavior for each firm in the market, as well as the prices and quantities that are observed in the actual market. For more details on the process followed to build a C-N simulation, please see Appendix A2.

2.2.1 The Model Calibration and the Pre-Merger simulation

Estimating the parameters for the derived demand for grain export services begins with observing the price of these services and the quantity demanded at that price.

According to Quorum Corp, the average export basis for CWRS wheat in the Northwest and Southwest regions of Saskatchewan averaged $90 per tonne over the three most recent crop years. With average rail rates for grain of just under $40 per tonne over that span, the grain companies earned approximately $50/t for their services, which include the transaction costs involved in buying and receiving grain from

producers and selling, assembling, and loading the grain onto ships at the port of Vancouver. Therefore, we calibrate our model to a $50/t price for grain export services. In the simulation exercise, we set up an initial C-N equilibrium with each firm operating at 90% of their current rated annual capacity. At this level, firms collectively ship 32.4 million tonnes of grain through Vancouver at $50 tonne.

The marginal revenue for each firm is derived from an industry derived demand for export services. We also know from recent experience (i.e. in the 2014/15 crop year) that Prairie farmers are willing to ship grain at much higher export basis levels when export capacity is limited relative to exportable supplies. In our base simulation, we assume that producers have a linear inelastic response to higher basis levels, but given historical behavior, we assume they would avoid using the Port of Vancouver if export basis levels reached $200 per tonne.[2] This "choke" price further implies that a 10% increase in basis will reduce grain exports by 3.3%.

To model the supply side of the C-N equilibrium, we assume that each firm has a linear upward sloping marginal cost curve. We assume that the intercept of this cost curve is zero for all firms in our base model. [3] This approach, common in C-N modeling, gives each firm an equal supply elasticity at every price level. The slope of each firm's marginal cost curve is calibrated such that each firm's optimal quantity sold is equal to 90% of their rated capacity, as reported in Table 3. The numerically calibrated slopes are shown in the third column of Table 4 for the pre-merger (base) case. Once calibrated, each firm in the C-N is choosing their own quantity of grain exports to maximize their returns, taking the other firm's quantities as given.

2.2.2 The Post Merger Simulation

Next, the model is used to simulate the Bunge-Viterra merger by assuming that the merged enterprise (BV) will operate the G3 (Bunge) and Viterra grain export elevator capacities as a single firm. The latter requires a minor behavioral assumption. While Bunge currently has only a 25% market share in G3 at the port, Bunge's expertise and large multinational presence as a grain marketing firm creates strong incentives for G3 (within the merged entity) to use Bunge's assets to strategically coordinate the marketing of grain through Vancouver. To capture the market effects of operating G3 and Viterra grain terminal assets under the control of a single merged firm, we need to (horizontally) add up the pre-merger marginal cost curves of these two firms. [4]

The post-merger simulated equilibrium levels of price and quantity are reported in Table 4. To start, we note that the merger of G3 and Viterra operations results in the BV merged enterprise controlling almost 50% of the grain terminal assets at Vancouver. The computed C-N equilibrium increases the price of grain exporting services by 15% from the base level of $50 to $57.56 per tonne. In exercising their market

[2] We later test the sensitivity to this choke price, (See Table A1) and find it has little impact in the merger impacts.
[3] We later test the sensitivity to the level of this common intercept, (See Table A1) and find it has little impact in the merger impacts.
[4] The slope of the marginal cost of the combined firm is equal to bm = 1/ (1/bv +1/bg), where bv is slope of the marginal cost for Viterra and bg is the marginal cost for G3 as reported in the pre-merger simulation.

power, we observe that the merged firm would not fully utilise its newfound capacity, driving up the price charged for its grain export services.

Next, to examine the robustness of the C-N framework, we examine the effects of changing the assumed demand parameters as well as the level of common intercept assumption for the individual firm marginal cost curves. These results are reported in the first five columns of Table A1, in Appendix 1. We find the price effects are not particularly sensitive to either of these base assumptions. Furthermore, in the last two columns in this table we explore the effect of a 10 million tonne increase in the derived export demand from a larger crop, and the effect of a 10 million tonne decrease in the derived export demand from a smaller crop in Western Canada. In accord with our findings about industry pricing, large crops tend to increase the price of export services while a smaller crop reduces this price. Overall, the negative effects on producers from a merged BV grows in absolute terms with a larger crop.

Table 4:G3-Viterra Merger Simulation Port of Vancouver

Premerger (base) Firm	Intercept Marg. Cost	Slope M. Cost	Gross Margin	Quantity sold	90% Annual Capacity
Units	$/t	$/Mt	$M	Mt	Mt
Viterra Ltd.	0.000	0.6614	443	**9.45**	9.450
G3 Ltd. - Bunge/SALIC	0.000	3.9174	225	**5.85**	5.850
Richardson Int.	0.000	2.7778	274	**6.75**	6.750
Cargill Cdn Ltd.	0.000	6.4815	159	**4.50**	4.500
P&H Ltd.	0.000	12.4644	93	**2.93**	2.925
Paterson Grain Ltd.	0.000	12.4644	93	**2.92**	2.925
Total			1,195	**32.40**	**32.40**
Grain Export Margin ($/t)				**50.00**	50.000

Post-Merger Firm	Marg. Cost	Slope M. Cost	Gross Margin	Quantity sold	90% Annual Capacity
Units	$/t	$/Mt	$M	Mt	Mt
Viterra-G3 Merged	0.000	0.5658	603	11.08	15.30
Richardson Int.	0.000	2.7778	363	7.77	6.75
Cargill Cdn. Ltd.	0.000	6.4815	211	5.18	4.50
P&H Ltd.	0.000	12.4644	123	3.37	2.93
Paterson Grain Ltd.	0.000	12.4644	123	3.37	2.93
Total			1424	30.77	32.40
Grain Export Margin $/t				57.56	

Source: Authors' Cournot-Nash Merger Simulation

The large effect on post-merger grain company export service prices remains consistent with our expectations as well as with the large literature on merger analysis. In this case, only examining the conditions of the merger applicable to the Port of Vancouver, the proposed merger creates a new firm having approximately 50% market share. This merged firm market share evaluated on its own or even considered in conjunction with an updated CR4 measure of 91% at the port, far exceed the Competition Bureau's stated thresholds that would necessarily leave a proposed merger unchallenged.

It is also worth noting that on-going land constraints at the port of Vancouver make the entry of an outside grain company through construction of new port terminal capacity exceedingly difficult, not even considering that any potential entrant would likely have to concurrently develop a network of inland terminals across the Prairies. These facts alone seem to us to render the port of Vancouver an "essential" facility in this export market.

Since Vancouver is the only West Coast port served by both Class 1 Canadian railroads in moving grain, future development of new grain export corridors to growing Asian markets even with greater Canadian crop levels seems remote at best. Options for grain export market expansion to Asia exist, but one of them (Portland) is located outside of Canada, and the other (Prince Rupert) is served by just a single Class 1 railroad, so the latter remains affected by market power as exercised by that carrier. The Prince Rupert situation makes us wonder as to considering potential long-term remedies, if the Bureau might want to consider in conjunction with decisions rendered about this potential merger, some concurrent policies permitting another bulk transportation carrier access to the port of Prince Rupert. This solution would give Western Grain shippers slightly more options than they currently possess when shipping grain destined for Asian markets.

2.2.3 The Economic Impacts of the Merger at the Port of Vancouver

The increase in the price charged for grain export services will have a large negative effect on Western Canadian grain producers. In context, in a typical year Western Canada produces about 75 million tonnes of grain, an amount that has been trending up over time. Since most of this grain is exported from the region, farm prices reflect world grain prices, minus the export basis. The latter is comprised of rail rates, which are subject to some regulation, plus the price of grain export services (Serfas et al. 2018). Given the size of the world grain market relative to Canadian supply, a merger induced increase in the price charged for grain export services will necessarily reduce the farm gate price received for grains. As shown in Table 5, our estimated $7.56 increase in the export basis under the proposed merger reduces farm gate revenue in Western Canada by approximately C$570 million per year, which corresponds to a present value of around C$10 billion. The C-N simulation analysis strongly indicates that the proposed Bunge-Viterra merger, centralizing control of two of the largest grain export companies at the Port of Vancouver (which should be classified as an essential facility), will lead to significant harm to the Western Canadian grain economy.

Table 5: Economic Effects of Simulated Bunge-Viterra, Port of Vancouver

Estimated Economic Impact	Base Simulation
Export margin post-merger	$57.56/t
Export Margin Pre-Merger	$50.00/t
Change in Export Margin	$7.56/t
Expected Grain Production t/yr.	75,000,000
Expected Canola Crushing t/yr.	14,000,000
Grain Producer loss $/yr.	$567,000,000
Capital value of producer loss at 5%	$10,212,000,000
Canola Crushing Surplus Gain	$106,000,000

Source: Authors' Cournot-Nash Merger Simulation

2.3 Discussion and Vancouver Port Mitigation Measures

The Vancouver port C-N simulation suggests that the merger of Bunge and Viterra would increase the export basis out of Vancouver by between $7 to $8 per tonne, reducing farm receipts in Western Canada and subsequently creating an annual loss in grain producer income on the order of C$570 million per year. The present value of this loss to producers (assuming a discount rate of 5%) would be on the order of C$10-11 billion.

Given there are only 6 major grain exporting firms operating at the Port of Vancouver[5], we believe that divestiture of G3 terminal operations to another major player like Richardson International or Cargill Limited would not likely mitigate the price effects associated with the proposed merger. Considering this, we offer that one viable option to try to maintain the current level of competition in a post-merger environment would be for Bunge to divest from its holding in G3 Ltd, either selling these shares to SALIC, grain producer shareholders, or external agricultural interests not currently operating in Vancouver.

[5] Paterson Grain and P&H jointly operate two export terminals at Vancouver with a total combined capacity of nearly 6 Mt/yr. The Fraser Terminal has draft restrictions, requiring close coordination in logistics between the two terminals.

3. Merger Simulation for Canola Crushing

3.1 Background

In this section, we look specifically at the impact of the proposed Bunge-Viterra (BV) merger in the Western Canadian canola crushing sector.

As shown in Table 6, as of 2023 there is approximately 12,000,000 tonnes of crushing capacity in Western Canada. Based on reported capacities, this industry currently has a CR4 of 85%. The industry is dominated by Bunge Canada Limited, Richardson International, and Cargill Canada Limited, operating with almost 3 million tonnes of annual capacity each. The three largest firms are followed by ADM, at 1.7Mt, Viterra at 875,000 tons, and then Louis Dreyfus Canada at 850,000 tonnes. The proposed merger would give BV a 30% market share of existing capacity.

Viterra has announced plans for a 2.5 million tonne crush capacity plant at Regina, Saskatchewan to be constructed in 2025. With this new facility, ceteris paribus Viterra will become the second largest canola crusher in Western Canada. Given the large difference between the current situation and planned 2025 capacity, we need to simulate the impact of a BV merger with both 2023 crush capacity and with the planned 2025 capacity. We then use the C-N model to examine the impact of the BV merger on the incentive to build the new facility.

Table 6: Total Canadian Canola Crush Capacity by Owner 2023 and Planned 2025

Owner	2023 Capacity t	2023 % share	2025 Capacity t	2025 % share
Bunge Canada Ltd.	2,712,500	22.7%	2,712,500	16.7%
Viterra Canada Ltd.	875,000	7.3%	3,375,000	20.7%
Richardson Int.	2,900,000	24.3%	2,900,000	17.8%
Cargill Cdn Ltd.	2,900,000	24.3%	3,575,000	22.0%
Louis Dreyfus Canada	850,000	7.1%	2,000,000	12.3%
ADM	1,715,000	14.3%	1,715,000	10.5%
Total	11,952,500	100.0%	16,277,500	100.0%
BV Merger	3,587,500	30.0%	6,087,500	37.4%
Pre-Merger CR4		85.6%		77.2%
Post-Merger CR4		92.9%		89.5%

Source: USDA, 2022 Updated with press releases. *Dual oil plants counted as 50% canola

3.2 The Cournot-Nash framework for Merger Simulation

As described in the previous section, economists use profit-maximizing incentives to model potential pricing behavior in markets with small numbers of firms. Anti-trust analysis often uses this type of modeling to try to simulate how potential mergers could affect market prices. One common approach to

numerical merger analysis is to develop a Cournot-Nash (C-N) simulation (Davis and Garces, 2010; Faulí-Oller and Sandonís, 2018). In these models, each firm independently chooses a quantity to sell that maximizes their profits, taking their rival's behavior as given. At the C-N market equilibrium all firms are setting their marginal revenue is equal to their marginal cost for last unit sold.

We adopt this approach once again to simulate the BV merger but within the canola crushing sector. We begin by calibrating the model to reflect observed market shares, prices, and quantities. We then change the cost structure and the number of firms to reflect the merger and resolve for the market equilibrium. The two principal elements needed for a Cournot-Nash numerical merger simulation are the specification of the common demand curve faced by the firms, along with the cost structure of each firm in the oligopoly. As a simulation, the demand and cost structures assumed must be consistent with profit-maximizing behavior for each firm in the market, as well as with the prices and quantities that are observed in the actual market.

3.3 Simulated Merger with 2023 Crush Capacities

We begin this merger simulation based on 2023 crushing capacities. In our base case, we assume an equilibrium $80/t crush margin and a $300/t choke point for crushing demand, with each firm operating at 90% of their rated crush capacity. As shown in Table 7, we first simulate the pre-merger situation by calibrating the model using Microsoft Excel Solver to numerically find the slope of the marginal cost for each firm, such that each firm uses 90% of their rated annual capacity at the crush margin of $80 per tonne. In the simulation each firm independently chooses their capacity utilization that will maximize their profits, taking the decisions of other firms as given.

In our post-merger simulation, we assume Bunge and Viterra capacities are combined into one firm. BV is operated such that it has a marginal cost composed of the horizontal summation of both Bunge and Viterra marginal cost curves, as reported in the pre-merger simulation. From Table 7, at 2023 capacities, the BV merger has a modest impact on the crush margin, increasing from $80 to $83.44, corresponding to a 4% increase. This change in crush margin is not surprising given Viterra's small (8%) share of current capacity. Merging with this small capacity of a firm has a negligible impact on the market equilibrium.

Table 7:Simulated Bunge-Viterra Merger for Canola Crushing, planned 2023 Capacity

Premerger Firm	Intercept Marg. Cost	Slope M. Cost	Gross Margin	Cournot-N Equilibrium	90% Annual Capacity
Units	$/t	$/Mt	$M	Mt	Mt
Bunge Canada Ltd.	0.000	13.4120	155	2.44	2.441
Viterra Canada Ltd.	0.000	82.2292	38	0.79	0.788
Richardson Int.	0.000	11.2932	170	2.61	2.610
Cargill Cdn Ltd.	0.000	5.5059	229	3.22	3.218
Louis Dreyfus Canada	0.000	85.2171	36	0.77	0.765
ADM	0.000	32.4722	85	1.54	1.544
Total Quantity			628	11.36	11.36
Crush Margin				80.00	80.000

Post-Merger Firm Units	Marg. Cost $/t	Slope M. Cost $/Mt	Gross Margin $M	Cournot-N Equilibrium Mt	90% Annual Capacity Mt
Units	$/t	$/Mt	$M	Mt	Mt
Viterra-Bunge	0.000	11.5312	183	2.70	3.23
Richardson Int.	0.000	11.2932	185	2.72	2.61
Cargill Cdn Ltd.	0.000	5.5059	249	3.36	3.22
Louis Dreyfus Canada	0.000	85.2171	39	0.80	0.77
ADM	0.000	32.4722	92	1.61	1.54
Total Quantity			749	11.19	11.36
Crush Margin				83.44	35.00

Source: Authors' Cournot-Nash Merger Simulation Model (please see text for details)

3.4 Simulated Merger with 2025 Crush Capacities

We repeat the merger simulation using 2025 planned crush capacities. In this case the capacity of Viterra's 2.5Mt Regina facility, and other plant expansions are incorporated into the simulation. As indicated in Table 6, the BV merged firm would be the largest firm in the industry with 37% of industry capacity. If the merger does not take place, we further assume that the new facility is operated by Viterra. If the merger does take place, this facility and Viterra's existing capacity would be operated as part of the BV merged firm.

We find that under these conditions, the merger has a much larger effect on crushing margins. As shown in Table 8, the planned expansion of Viterra increases their capacity to over 3,000,000 tons, making it the second largest crusher in Western Canada. When this much larger capacity is combined with Bunge's large existing capacity, the merger leads to a noteworthy effect on crush margins, increasing from $80 to $88 per tonne, a 10% increase. The simulation also suggests that if the Regina plant is built, the merger will also have a large impact on canola crush margins. Considering this $8 increase in crush margins with

approximately 25 million tonnes of Canola production, farm gate revenues would fall by $200 million per year. Note these latter effects on producers result in addition to those computed from the changes in market power occurring through a merged BV at the port of Vancouver.

Table 8: Simulated Bunge-Viterra Merger for Canola Crushing with Planned 2025 Capacity

Premerger Firm	Intercept Marg. Cost	Slope M. Cost	Gross Margin	Cournot-N Equilibrium	90% Annual Capacity
Units	$/t	$/Mt	$M	Mt	Mt
Bunge Canada Ltd.	0.000	17.75	142	**2.44**	2.441
Viterra Canada Ltd.	0.000	11.32	191	**3.04**	3.038
Richardson Int.	0.000	15.63	156	**2.61**	2.610
Cargill Cdn Ltd.	0.000	9.84	206	**3.22**	3.218
Louis Dreyfus Canada	0.000	29.42	96	**1.80**	1.800
ADM	0.000	36.81	80	**1.54**	1.544
Total Quantity			791	**14.65**	**14.65**
Crush Margin				**80.00**	

Post-Merger Firm	Marg. Cost	Slope M. Cost	Gross Margin	Cournot-N Equilibrium	90% Annual Capacity
Units	$/t	$/Mt	$M	Mt	Mt
Viterra-Bunge	0.000	6.91	298	4.02	5.48
Richardson Int.	0.000	15.63	189	2.87	2.61
Cargill Cdn Ltd.	0.000	9.84	250	3.54	3.22
Louis Dreyfus Canada	0.000	29.42	117	1.98	1.80
ADM	0.000	36.81	97	1.70	1.54
Total Quantity			950	14.11	14.65
Crush Margin				88.07	80.00
Increase in Crush Margin				10.1%	

Source: Authors' Cournot-Nash Merger Simulation Model (please see text for details)

3.5 The Impact of the Merger on the Incentive to Build the Regina Facility

Larger firms within concentrated industries have a legal obligation to act strategically in the interest of their shareholders. Bunge currently owns three Canola crushing facilities in Western Canada. From their perspective, a competitor who is the largest grain handler in Western Canada (Viterra) is planning to build the world's largest crushing facility to serve the region. In the absence of a merger, the construction of the Regina facility will lead to an increase in low-cost crushing capacity, providing more competition with other crushing facilities in the industry, including Bunge's. But instead, a BV merger might allow BV to suppress increased competition. As shown in Table 8, the merged firm has an incentive as well as the ability to use its market power to limit the price effects of additional competition from the Regina facility.

But perhaps more worrying from a social welfare perspective, the merger may change incentives sufficiently to prevent the construction of the Regina facility.

Table 9: 2025 Effects of the Regina Facility, With and Without Merger

Premerger	Scenario A: With Regina Facility			Scenario C: Without Regina Facility		
Firm	Slope M. Cost $/Mt	Gross Margin $M	Cournot-N Quantities Mt	Slope M. Cost $/Mt	Gross Margin $M	Cournot-N Quantities Mt
Bunge	17.753	142	2.44	17.753	180	2.75
Viterra	11.320	191	3.04	82.229	48	0.93
Richardson	15.634	156	2.61	15.634	197	2.94
Cargill	9.847	206	3.22	9.847	261	3.62
LDC	29.427	96	1.80	29.427	122	2.02
ADM	36.813	80	1.54	36.813	101	1.74
Total Quantity Mt			14.65			13.99
Crush Margin $/t			80.00			89.98
Crush Margin % Chg.						12.4%
Post Merger	Scenario B: With Regina Facility			Scenario D: Without Regina Facility		
	Slope M. Cost $/Mt	Gross Margin $M	Cournot-N Quantities Mt	Slope M. Cost $/Mt	Gross Margin $M	Cournot-N Quantities Mt
Viterra-Bunge	6.91	298	4.02	14.601	220	3.14
Richardson Int.	15.63	189	2.87	15.634	210	3.03
Cargill Cdn Ltd.	9.85	250	3.54	9.847	278	3.74
Louis Dreyfus Canada	29.43	117	1.98	29.427	130	2.09
ADM	36.81	97	1.70	36.813	107	1.79
Total Quantity Mt			14.11			13.79
Crush Margin $/t			88.07			92.92
Crush Margin % Chg.			10.1%			16.2%

Source: Authors' Cournot-Nash Merger Simulation Model (please see text for details)

To explore the effects of the proposed merger on incentives to build the new crushing facility, we rely again on a C-N simulation framework. In this case we need to consider Viterra's incentives to build the Regina facility, comparing this incentive against the BV merged company in building the facility. To make the simulations economically comparable, we will calibrate the model to a 2025 scenario, where the Regina facility is built, and the C-N market equilibrium is an $80/t basis. Holding this demand curve constant we then compare the C-N outcomes with and without the Regina facility, and with and without the merger.

3.5.1 Scenario A: 2025 Regina Plant without Merger

As illustrated in the upper left quadrant of Table 9, we calibrate the model to a baseline where the Regina facility is built without a merger. As was done in Table 8, we calibrate the model to 90% capacity utilization with an $80 per tonne crushing margin. Total canola crushing here is 16.65 Mt. In this case, Viterra earns a gross margin of C$191 M and Bunge earns a gross margin C$142 M.

3.5.2 Scenario B: 2025 Regina plant with Merger

The lower left quadrant of Table 9 shows results with the Regina plant built and operated by the BV merged firm. As previously described in Table 8, the merger results in reduced industry canola crushing output to 14.11Mt, increasing crush margins from $80 to $88.07 per tonne. Here, the merged BV firm generates a gross margin of C$298 M. Note that other competing crushing firms also benefit from the higher crush margin in this scenario, once more at the expense of Canola producers.

3.5.3 Scenario C: 2025 Without Regina plant, without merger

In this scenario we examine the case where no merger takes place, and the Regina plant is not built to take advantage of the increased demand as of 2025. As reported in the upper-right panel of Table 9, with limited capacity, canola crushing is limited to 13.99Mt, while the crush margin increases to $89.98 per tonne. Despite these higher prices, without the proposed expansion, Viterra's gross margin is limited to C$48 M, while Bunge's profits increase to C$180 M per year.

3.5.4 Scenario D: 2025 Without Regina Plant, with Merger

In this scenario, the merger proceeds but the Regina plant is not built. As shown in the bottom right panel, this represents a worst-case scenario for canola producers. The quantity crushed would be reduced to 13.79Mt, and the Canola crush margin would increase to $92.92/t. The gross margin of BV in this scenario would be C$220M per year.

3.5.5 The Incentives to Build the Regina Facility

The ability to simulate market outcomes and gross margins in these four scenarios also allow us to compare the incentives for building the Regina facility, both with and without the merger. These comparisons are summarised in Table 10.

Table 10: The impact of the merger on the incentive to build the Regina crush plant

	With Build	w/o Build	Change
	Gross Margin $M/yr.		
Viterra	**190.8**	**48.1**	**142.7**
Bunge	142.4	180.1	-37.7
Bunge-Viterra Merged	**298.0**	**219.7**	**78.3**
	Annual Crush -Mt		
Viterra	3.0	0.9	2.1
Bunge	2.4	2.7	-0.3
Bunge-Viterra Merged	4.0	3.1	0.9
	Crush Margin $/t		
Crush Margin without Merger	80.0	90.0	-10.0
Crush Margin with Merger	88.1	92.9	-4.8

Source: Author's calculations

Viterra on its own has nearly double the economic incentive to incur the cost to build the Regina facility, as compared to a merged entity. Building the Regina facility increases Viterra's gross margin from $48 million to $191 million. The gross margin of the BV merged firm increases from $220 Million to $298 Million. If the Regina facility operates for 20 years, at a 10% real interest rate, the present value of the additional gross margin from building the Regina facility is $1.22 billion for Viterra alone versus $664 million for BV. This difference in assessed economic incentive to build the Regina facility is reasonable given its construction will reduce the value of other crush plants in the industry, whereby the BV merger will have more of these plants. BV will surely consider the effects of a possible decrease in crushing margin, from $93 to $88, on their other crushing plants.

Our comparison begs the question of whether the merged firm will really build the proposed Regina facility. It also begs the question of whether the merger, which in addition prevents a reduction in Bunge's gross margin from $180 to $142 Million, is in fact a means to suppress competition in canola crushing. This situation is relevant because under section 2.10 of the guidelines, the Bureau must consider *Prevention of Competition* in their assessment of a proposed merger.

A merger would significantly reduce economic incentives to build the proposed canola crushing facility at Regina, as planned by Viterra for 2025. If this reduced incentive changes the decision to build additional capacity, it could increase canola crush margins in the order of $13/t, leading to substantial economic harm to producers. Moreover, if the Regina facility is built, the proposed merger would further result in BV being by far the largest canola crusher in Western Canada, with a capacity approaching 40% of the total market. Our merger simulations suggest the additional market power brought about by the merger would have the effect of increasing canola crush margins by about 10%, reducing canola prices by $8/t, all of which will lead to significant decreased receipts for canola producers.

3.6 Discussion and Mitigation Measures

While virtually impossible to accomplish, by far the best outcome for canola producers would be a decision by the Bureau to disallow the merger and Viterra proceeds with their plans to build the Regina crushing facility. If the merger is allowed, our analysis shows it will either effectively block the construction of the Regina facility or it will create more extreme concentration in the industry. Either of these outcomes will cause substantial economic harm to Canadian Canola producers, who will face reduced receipts of about $8 to $10 per tonne. Given expected Canadian canola production of approximately 25 million tonnes per year, the economic transfer from a BV merger on just the canola sector would be in the range of $200 to $250 Million per year, with a capitalized value approaching C$4 billion. Once again, the canola associated losses for producers would be over and above the losses incurred from the merger and subsequent changes in export basis out of the Port of Vancouver.

4. The Effect of the Merger on Spatial Competition in Primary Grain Elevation

Most grain produced in western Canada is sold to primary elevators, with a significantly smaller share sold directly to processors. Farmers typically sell most of their production after harvest. However, a significant amount of production is contracted prior to harvest. These forward contracts alleviate price risk for both farmers and elevators. Although local elevators post a public price, the actual contracted price between a farmer and elevator is often negotiated. The contract price depends on several factors including the producers' size, negotiating ability, and historical relationship with the elevator.

Economic theory suggests that if elevators compete only on posted prices, then the distance between competing grain elevators would be the key determinant of output price. [6] Conversely, if prices were individually negotiated between farmers and elevators, then each farmer would receive a unique price determined in part by the farmers' ability to transport their grain to a competing elevator.

To determine the potential effects of the merger on local competition, we examined how the proposed merger could affect the number of grain elevators that farmers can access within a radial distance of 100kms. Past evidence has suggested that most farms transport their grain less than 100km – though it is not unheard of for farmers to transport their grain farther.[7] In a 2018 survey, the government of Alberta found that the cost of hauling grain is around $7.00/t with an additional $1.00 charge for each 20kms. Quorum Corp (2024) reported in Table 4A-1Q, composite trucking costs of $16/t for 100km distances, which are $9/t higher than the reported 10 km rates, in the 2013-14 crop year. While more recent data is difficult to find, the marginal cost of hauling grain for 100kms appears to be around $8 to $10/t, which is close to 1% of the current price of canola and somewhat more than 2% of the current wheat price. Farmers who haul grain themselves face additional costs for fuel and their own labour when hauling.

Figure 1 provides an overview of the location of primary elevators in western Canada, singling out the location of Viterra and Bunge/G3 elevators. Table 11 provides details on the number of elevators and total capacity of grain handling companies in western Canada.

[6] In most simple location models (e.g., Hotelling and Salop circle models) prices increase as the distance between sellers. Similarly, prices decrease in the distance between buyers.

[7] In the Competition Tribunal case involving Parrish and Heimbecker's purchase of Louis Dreyfus elevators, the Commissioner's economic expert testified that most farms in proprietary dataset received from grain handling companies transported their grain less than 100kms.

Figure 1: Location of primary elevators in Western Canada. The polygons represent areas in which the proposed merger will reduce the number of grain buyers with 100km of a crop producer (as of 2021)

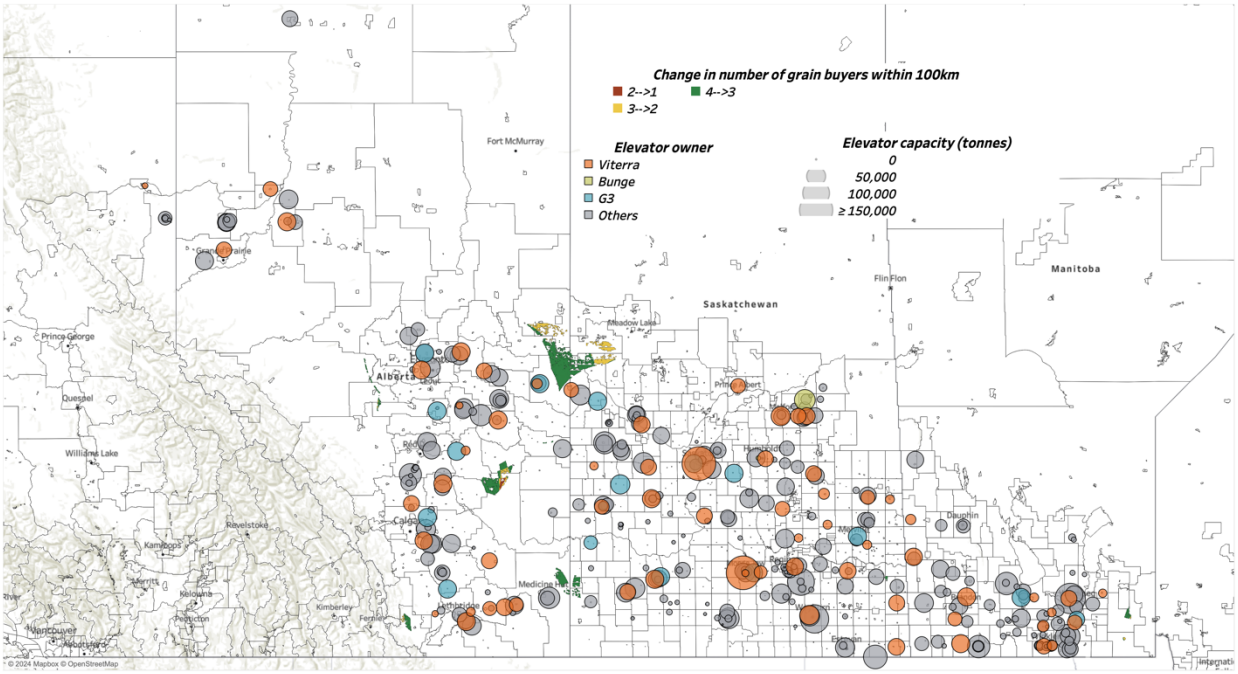


Table 11: Number of elevators and total capacity of elevators in Western Canada by company

Company	Total capacity of elevators (tonnes)	Number of elevators
Viterra	2,029,426	65
Richardson International	1,817,898	55
Parrish and Heimbecker, Paterson Global Foods	1,721,010	49
Cargill	697,350	25
G3	655,250	17
Bunge	57,600	2
Others	1,527,670	143

Source: CGC

4.1 The Impact of the Merger on Local elevator Competition

4.1.1 Number of elevators/buyers within 100km

Figure 1 illustrates the areas in which the merger would reduce the number of grain elevators producers have access to within 100km. To this end, we evaluated the straight-line distance between a farm and an elevator. A more detailed analysis would consider the travel time and quality of infrastructure between a farm and the elevator. The green area denotes regions in which the number of grain buyers would decrease from 4 to 3, the orange area denotes regions in which the number of grain buyers is reduced from 3 to 2, and the red area denotes regions in which the number of grain buyers is reduced from 2 to 1. As in our previous analysis, we assume that G3 elevators behave as if they are part of the merged enterprise. Given that Bunge has sole ownership of very few elevators, the issues we raise here would be obviated if Bunge divested its stake in G3 or if other guarantees were in place to ensure that G3 elevators would not be jointly managed alongside Viterra elevators as part of the merged enterprise.

Overall, there are two geographic areas where producers would see a reduction in the number of grain buyers within 100km reduced to a single buyer; an area north of Lloydminster and an area between Red Deer and the Saskatchewan border. However, for most producers they will still have access to at least two grain buyers within a 100km radial limit.

In the area to the east of Red Deer, there are several other elevators that are almost as close to producers as the Bunge-Viterra elevators. In Table 12, we focus on the most affected Township in the region to the west of Red Deer in Figure 2 (the Township is located in the Berry Creek-Sullivan Lake Special Area). This township contains farmland in which the number of grain buyers within 100kms will change from 2 to 1 after the merger (i.e., the red area in Figure 2). In Table 12, we provide the distance from the midpoint of this Township and the nearest grain elevators. Viterra/G3 own three of the four elevators that are within 100kms of the Township. However, there are four other grain buyers within 120kms of the Township. There are a further 19 elevators that are between 120 and 150kms from this Township.

The relative proximity of these elevators serves to make their pricing more competitive. Furthermore, the cost to producers of transporting their grain to a competing elevator just a few extra kms beyond the 100km boundary is not likely to be significantly different than the cost of transporting their grain to the Bunge/G3 or Viterra elevators.

Table 12: Elevators in the most affected Township of Berry Creek-Sullivan Lake Special Area

Station	Province	Owner	Distance in KM from township (4.13.33)	Capacity (tonne)
Elevators within 100 kms				
Stettler	AB	Viterra	80	48,100
Stettler	AB	G3	93	206,450
Trochu	AB	Viterra	100	210,750
Huxley	AB	GrainCorp Operations Limited	100	175,000
Elevators between 100 and 120kms				
Equity	AB	Cargill	102	149,050
Killam	AB	Viterra	106	210,750
Killam	AB	Great Northern Grain Terminals Ltd.	106	52,950
Oyen	AB	Richardson International	107	53,250
Daysland	AB	Parrish and Heimbecker, Paterson Global Foods	119	300,600
A further 19 elevators are between 120kms and 150kms from the midpoint of the township				

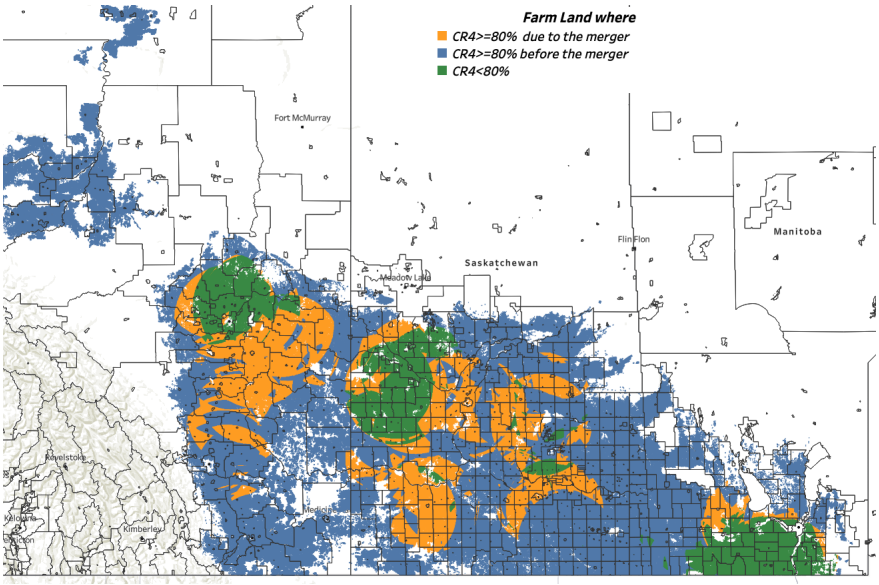
4.1.2 CR4 and HHI within 100km radius of each land location

Spatial four-firm concentration ratio (CR4) and Herfindahl-Hirschman indices (HHI) suggest that most parcels of land currently face limited competition within a 100km radius, and that this limited competition becomes significantly more reduced under a BV merger. In Figure 2 we plot all of the cropland locations currently facing a CR4 ratio for grain buying greater that 80% within 100 km. Notably, 60% of the cropland area currently face CR4 ratios greater that 80%. The proportion of cropland area with a CR4 >80% increases to 82% post BV Merger.

In Figures 3 and 4, we plot the four-firm concentration ratio and Herfindahl-Hirschman indices (HHI) within 100km of each quarter section of cropland in Manitoba, Saskatchewan, and Alberta. Interestingly, the vast majority of farms currently face elevator CR4s above 65%, reflecting the dominance of the five largest grain buyers. As shown in Figure 2, prior to the merger nearly 60% of Prairie farms faced a CR4 above 80%. After the merger this increases to over 80% of Prairie land parcels. Possibly a more troubling finding is that prior to the merger, 27% of farms faced an elevator CR4 above 90%, but post-merger this metric increases to 45%.

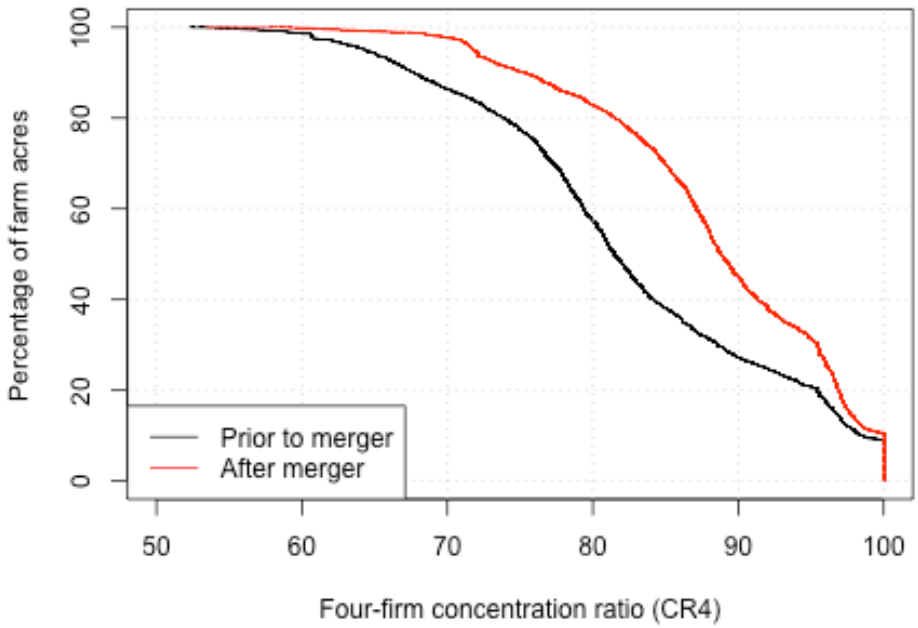
As shown in Figure 4, the HHI shows comparable results. While most markets operate with at least four of these firms active, predominantly their HHI remains greater than .18, a level considered to be very concentrated by the U.S. Department of Justice. Specifically, over 70% of current cropland parcels have an HHI for grain elevation/buyers greater than .18 within a 100km radius. This metric increases to over 90% of cropland parcels post-merger.

Figure 2: Spatial Location of Cropland with CR4 Ratios for Grain Elevators within 100km Greater than 80 Before and After Merger



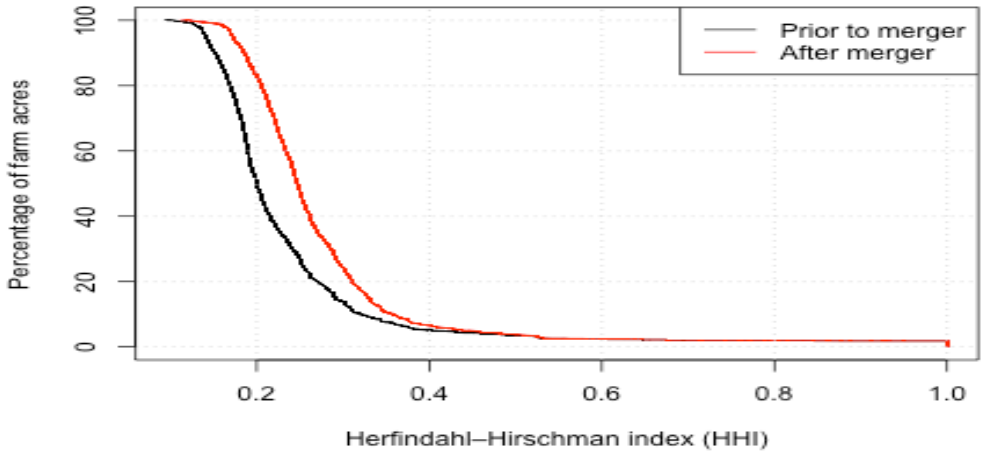
Sources: AAFC Cropland GIS database and Canadian Grain Commission

Figure 3: Four-firm concentration ratio (CR4) facing farms. Figure shows the percentage of farm acres (vertical axis) for which the CR4 of grain buying capacity within 100km of the farm is above a certain level (horizontal axis).



Source: The Authors calculate the CR4 ratio (based on elevation capacity) within a 100km radius of every quarter section of Crop land in Western Canada before and after the proposed BV merger.

Figure 4: Herfindahl-Hirshman index facing farms. Figure shows the percentage of farm acres (vertical axis) for which the Herfindahl-Hirshman index of grain buying capacity within 100km of the farm is above a certain level (horizontal axis)



Source: The Authors calculate the Herfindahl-Hirshman index (HHI) (based on elevation capacity) within a 100km radius of every quarter section of crop and in Western Canada before and after the proposed BV merger.

4.2 Discussion

Unfortunately, little is known about the exact nature of competition among Canadian grain-handling companies. We know favorable grading and blending can be used to induce supply, and producer transport is sometimes subsidized by companies through trucking incentives, but to our knowledge most producer contracts remain confidential. Computing both a spatial CR4 and HHI suggests that most locations face a very concentrated elevator/buyer market within a 100km radius, a situation that on average is made significantly worse with a BV merger.

Provided the current handful of grain handling firms competes robustly for grain purchases, the measured level of spatial concentration may not be worrying. However, as the number of competitors shrinks it also becomes easier for firms to engage in tacit forms of cooperation that weaken price competition. Contract confidentiality is one aspect of this market that continues to be worrisome to us in this regard. Transactional transparency among market participants is frequently essential for a viable competitive market to exist. Assuming the variable cost of trucking grain 100km at about $10/t or less, we expect reductions in elevator competition due to a BV merger could reduce farm gate prices for grain by about $1 to $2 per tonne or about 6 to 12% of posted primary elevation rates[8]. When multiplied by 75 million tonnes of grain sold each year, such a modest sounding reduction in average farm gate prices due to the BV merger could reduce grain producer revenues by an additional $75 to $150 million per year.

[8] G3 and Viterra have posted primary elevation charges of the $15/t and $16/t (CGC, 2024)

5. ASSESSING A SMALL BUT SIGNIFICANT AND NON-TRANSITORY INCREASE IN PRICE (SSNIP)

The Competition Bureau can choose to apply a threshold of 5% for a Small but Significant and Non-transitory Increase in Price (SSNIP). In the case of the BV merger, whether this threshold is met depends critically upon what price is used to calculate the 5% SSNIP threshold.

Importantly, the Canadian Competition Bureau recently used the *product price*, rather than the *implicit price* for grain handling services, for the calculation of the 5% SSNIP threshold in Parrish & Heimbecker's (P&H's) recent purchase of Louis Dreyfus Canada's (LDC's) elevators. The P&H case centered on buyout activity in a region of southeast Saskatchewan and southwest Manitoba.

The Competition Bureau argued that P&H's acquisition of LDC's elevator in Virden would substantially reduce competition in the corridor between Virden and an elevator in Moosomin, which was owned by P&H and the Competition Bureau's economic expert argued that the acquisition would increase the cost of grain handling services for wheat by $5.88 per tonne at the Virden elevator and by $9.03 per tonne at the Moosomin elevator. For canola, the cost increases were $1.51 and $2.76 at Virden and Moosomin, respectively. The Competition Bureau further argued that grain elevators could be thought of as selling grain handling services as opposed to purchasing grain. Thus, the appraised increase in the cost of grain handling services for wheat was assessed to be 21.6% at Virden and 26.0% at Moosomin. For canola, the corresponding percentage increase in grain handling prices were 7.6% at Virden and 22.2% at Moosomin.

However, the Tribunal ultimately found in favour of P&H, and ultimately rejected the argument that the transacted product was grain handling services. Instead, the Tribunal assessed that the relevant product under scrutiny was not the handling charges, but instead the grain itself. Based on this ruling, the price effects found by the Commissioner's expert all fell below 1.2% (i.e. when compared to full commodity prices), well below the 5% threshold necessary to act against the merger due to a small but significant and non-transitory increase in price (SSNIP).

We contend that the grain companies' gross markup is the relevant "implicit price" for measuring the threshold for a SSNIP. The grain companies involved in this merger do not produce grain. Instead, they are in business to profit from purchasing grain; adding value by transforming the grain in space, form, or time; and then selling the transformed grain to buyers. The profitability of grain companies is based on their gross margin which is the difference between their sales revenue minus their variables cost, including the cost of grain. The "*implicit price*" these firms charge for their services is not the sale price of grain. It is the difference between the price they sell the transformed grain for minus the price they pay for grains, or in other words, their gross markup. Importantly, both the grain purchased, and products sold by these companies are traded commodities, making their markup or implicit price straightforward to calculate.

While the Canada's Competition Bureau's own Merger Guidelines are silent on whether the *product price* or the *implicit price* is the relevant price, the 2023 US Department of Justice & Federal Trade Commission's Merger Guidelines *are not*. On page 43 of their guidelines, they state:

"The Agencies may base a SSNIP on explicit or implicit prices for the firms' specific contribution to the value of the product sold, or an upper bound on the firms' specific contribution, where these can be identified with reasonable clarity. For example, the Agencies may derive an implicit price for the service of transporting oil over a pipeline as the difference between the price the pipeline firm paid for the oil at one end, and the price it sold the oil for at the other and base the SSNIP on this implicit price." (Page 43, Merger Guidelines, Department of Justice and the Federal Trade Commission, 2023)

The highlighted example of oil movement as a service with an *implicit price* (not the commodity price) maps very closely onto the nature of grain handling services for the modern Canadian grain elevator industry, which purchase grain at one end of their business and sell commodity grain or grain products at the other. These markups can be identified with *reasonable clarity*. On business day grain companies are posting the cash prices they are willing to purchase grain from producers at, while FOB sales prices at Vancouver are posted by AAFC each week. Similarly, crush margin can be calculated from the difference between the value of the canola oil and canola meal produced from a unit of canola, and their posted purchase price for canola.

For these reasons, we feel the precedent set in the P&H case is based on a misinterpretation of the relevant price for SSNIP within vertical supply chains. The P&H ruling is inconsistent with the nature of the grain industry and is inconsistent with current US DOJ&FTC Merger Guidelines. If this precedent is liberally applied to all mergers, it implies that any merger that result in higher markups of less than 5% of product price, should be allowed. Modern supply chains can have many links. If each actor in the supply chain purchases the product and then sells it on to another actor in the supply chain, price increasing mergers occurring at multiple points in the supply chain would have large cumulative effects, but each merger would be exempt from regulation.

Our analyses, presented above in Sections 2 to 4 of this report, indicate that significant market concentration currently exists in grain export terminals at the Port of Vancouver, in the canola crushing sector in Western Canada, and in primary elevation. In each case, we showed that the proposed BV merger would lead to a significant reduction in competition, falling well beyond the established thresholds of concern over market power as outlined in the Competition Bureau's 2011 Merger Enforcement Guidelines. Using a well-known merger simulation framework, we also found potential reductions in the farm price of western Canadian grains.

The increase in market concentration among grain export terminals results in an approximately a $7.50/t increase in Vancouver export basis. A BV merger creates an additional problem for competition in canola crushing, leading to either a $13/t increase in the price of canola crushing if the planned Regina facility is not built or alternatively a $9/t increase in the price of canola crushing if the planned facility is built and operated by the BV merged firm. These modelled price increases far exceed the 5% SSNIP requirement when applied to the implicit price of the service being provided.

If the P&H precedent has locked the Competition Bureau into using the product price, this should not preclude the Bureau's consideration of BV as causing significant harm to the Canadian economy. The magnitude of rent transfers we find in our analyses surely, warrant consideration. Rigidly adhering to a

5% threshold for SSNIP could be viewed inconsistent with US DOJ&FTC Merger Guidelines, which appears to suggest a greater latitude in the application of the threshold.

"What constitutes a "small but significant" worsening of terms depends upon the nature of the industry and the merging firms positions in it, the ways that firms compete, and the dimension of the competition at issue. When considering price, the Agencies will often use a SSNIP of 5 percent of the price charged by firms for products or services to which the merging firms contribute value. The Agencies, however, may consider a different term or a price increase that is larger or smaller than 5 percent." (Page 43, Merger Guidelines, Department of Justice and the Federal Trade Commission, 2023)

6. ECONOMIC DEADWEIGHT LOSSES

The economic dead weight loss (DWL) potentially created by a merger is an important consideration in determining whether a merger is in the national interest. The DWL is equal to the net loss in economic surplus brought about by merger induced price increase. The Competition Bureau's guidelines note in paragraph 12.27 that "The estimate of deadweight loss generally includes …the losses in producer surplus that arises when market power is being exercised in the relevant market prior to the merger" and in footnote 67 also notes that "When premerger conditions are not competitive, the deadweight loss arising from a merger may be significantly understated if this loss to producer surplus is not taken into account."

When modelling the effects of a merger in the grain industry, it is important to consider that grain processors and grain buyers are providing goods and services as part of much longer agricultural supply chains. For instance, grain producers typically purchase production inputs and services, which are then used to grow grain. The grains are sold to primary elevators, which then load, clean, and store the grain, before it is loaded once again onto rail cars. If destined for export the grain is transported by rail to export terminals where grain is sold and then loaded on shipping for ocean transport to other countries. Buyers in the importing countries then clean and process the grain into multiple products sold to wholesale organizations. These organisations eventually sell and distribute grain products to the retail sector, which eventually sell to restaurants and consumers.

The demand for services within the supply chain is a demand derived from the difference in what buyers are willing to pay for the transformed grain product and the price for which they can purchase the untransformed product. Increases in the margin or prices charged above the marginal cost for any of the services within the supply chain will translate through the supply chain as signals to reduce the derived demand for other components of the same supply chain. For example, an increase in rail transportation rates decrease farm receipts and increase the consumer cost for exported grain. Lower grain prices and higher consumer prices will translate into less demand for grain elevation, or the processing of Canadian grain.

Agricultural supply chains are unusually long, concentrated, and subject to economies of scale. Upstream, grain producers face concentrated sellers of seed, fertilizer, pesticides, and farm machinery. There is an

extensive literature indicating that each of these industries have non-competitive market structures and charge market prices above marginal cost. Downstream from producers, rail services, grain handling, processing, food wholesalers and food retailers are also concentrated, and each has been subject to considerable regulatory scrutiny in the past. Some participants are subject to regulation to reduce (but not eliminate) inherent concerns over market power exertion over their part of the supply chain. The additive price effects of these uncompetitive market structures for most upstream and downstream participants suggest agricultural supply chains are far from perfectly competitive to start with.

As a result of these distortions from competition, food prices are significantly higher than would be prevalent if every good and service that made up the food supply chain was instead priced at marginal cost. Upstream, at the other end of these supply chains, input providers see their product demand reduced by increased margins downstream. And firms partway along these supply chains see the derived demand for their products reduced by price markups downstream, as well as their marginal costs increased by growing upstream price markups. The Competition Bureau's 2011 Merger Enforcement Guidelines exposition about pre-existing price markups in (grain) supply chains must be considered in examining the DWL associated with this particular merger.

The economic impact of a merger within a link or portion of the supply chain can be examined using the derived demand for the services for that link in the supply chain. Charging higher prices for the good or service will reduce the quantity demanded. The extent to which that quantity will be reduced will depend on the size of the merger induced price increase and the slope (or price elasticity) of the derived demand curve.

In Table 13, we compute the deadweight loss associated with a 2% merger induced price increase. Stated as a percent of industry losses, the impact of a proportional change in prices is very limited when starting from an (incorrect) extant 0% distortion in the supply chain. For example, with a demand elasticity of 1, the area of the DWL triangle {½ (1.02 x 1.02) -1} is only equal to .02% of the industry gross revenue. It is also evident in Table 13 that the deadweight loss is proportional to the elasticity of derived demand for grain handling, elevation and marking services. Larger elasticities imply larger impacts on the quantity produced, creating wider areas (triangles) of DWL. Notably, pre-existing price distortions have very significant impacts on the DWL associated with a 2% merger induced price change.

In the case of pre-existing price distortions in the supply chain, the relevant DWL includes the familiar triangle of DWL, plus a rectangle representing the height of the pre-existing price distortion, with the width of the quantity reduction induced by the merger. In this case the merger is increasing the dimensions of the pre-existing DWL triangle, such that the increase in area of DWL is a function of the size of the affected DWL triangle.[9] As seen from Table 13, an existing 10% price distortion in the grain supply

[9] If x is pre-existing price distortion, the DWL is initially equal to $\frac{1}{2} e x^2$, where e it the slope of the demand curve. Adding an additional merger price distortion of k the area of DWL increases to $\frac{1}{2} e (x+k)(x+k) = \frac{1}{2} e (x^2 + 2kx + k^2)$. So, the change in the DWL due to the merger is $\frac{1}{2} e (2kx + k^2)$ or $kex + \frac{1}{2} e k^2$

chain increases the DWL from a 2% merger induced price distortion from .02% to .22%, which is an 1100% increase from an extant 0% distortion. Clearly a larger pre-existing price distortion in grain supply can significantly amplify the DWL associated with very small merger induced price distortions.

As a more concrete example, in the lower two parts of Table 13 we apply a proportional increase in DWL from the upper table to the estimated gross margin in Canadian grain value chains. In 2022, Canadian agricultural GDP reached $144 billion and farm crop receipts reached $87 Billion (AAFC, 2024). In the middle panel of Table 13, the value of Canadian grain supply chains from farm inputs to consumer plates, is assumed to be $100 billion dollars/yr. This assumes that every $1 in crop receipts results in about $2 in value to agricultural supply chains. Given these assumptions, plus a 20% pre-existing price distortion in the grain supply chains and a long-run supply elasticity of -.5 (a conservative figure commonly used in the literature), an incremental 2% merger-induced price distortion would create a dead weight loss of $210 million dollars per year.

In the bottom panel we provide DWL associated with a 2% merger-induced price effect, assuming a $50 billion gross value in grain supply chains. Even with this conservative estimate of gross value, with a 20% pre-existing price distortion in grain supply chains and long run supply elasticity of -.5, an additional 2% merger induced distortion would create a DWL of $105 million dollars per year.

Precisely quantifying the size of the pre-existing price distortions in grain related supply chains would be a very large undertaking beyond the scope of our analysis. However, as we outlined above, given the economies of size and concentrated markets in several links in the supply chain, it is easy to anticipate total price markups of at least 10 to 30% above marginal cost in the supply chain. Given the likelihood of large pre-existing distortions, their impact on the deadweight loss from the merger should be explicitly considered in the Competition Bureau's analysis.

Table 13: The Deadweight Loss (DWL) Associated with a 2% Merger-Induced Price Increase

Percent of Market Revenue

pre-merger	Derived Demand Price Elasticity			
distortion	-0.2	-0.5	-1	-2
0%	0.004%	0.010%	0.020%	0.040%
5%	0.024%	0.060%	0.120%	0.240%
10%	0.044%	0.110%	0.220%	0.440%
15%	0.064%	0.160%	0.320%	0.640%
20%	0.084%	0.210%	0.420%	0.840%
25%	0.104%	0.260%	0.520%	1.040%
30%	0.124%	0.310%	0.620%	1.240%

Deadweight Loss ($millions) For a $100 billion grain industry

pre-merger	Derived Demand Price Elasticity			
distortion	-0.2	-0.5	-1	-2
0%	4.00	10.00	20.00	40.00
5%	24.00	60.00	120.00	240.00
10%	44.00	110.00	220.00	440.00
15%	64.00	160.00	320.00	640.00
20%	84.00	210.00	420.00	840.00
25%	104.00	260.00	520.00	1,040.00
30%	124.00	310.00	620.00	1,240.00

Deadweight Loss ($millions) For a $50 billion grain industry

pre-merger	Derived Demand Price Elasticity			
distortion	-0.2	-0.5	-1	-2
0%	2.00	5.00	10.00	20.00
5%	12.00	30.00	60.00	120.00
10%	22.00	55.00	110.00	220.00
15%	32.00	80.00	160.00	320.00
20%	42.00	105.00	210.00	420.00
25%	52.00	130.00	260.00	520.00
30%	62.00	155.00	310.00	620.00

Source: author's calculations based on Linear supply and demand

7. CONCLUSIONS

In the preceding analysis of the BV merger, we find the merger results in single market shares and four-firm concentration ratios well above the action thresholds in the Competition Bureau's 2011 Merger Enforcement Guidelines. Worrisome levels of market concentration will exist at an essential facility (Port of Vancouver), in the canola crushing industry, and in primary grain elevation. We also flag our concern that the merger may be a means for Bunge, in particular, to prevent competition from what would be the world's largest canola crush facility, built by Viterra in Regina.

In our merger simulations we identify non-transitory price affects for the grain export basis at the vital Port of Vancouver. This non-transitory price effect, of about $7.5/t will reduce grain producer revenue in excess of the $500 Million per year. For canola crushing, a BV merger will result in a $8 per tonne increase in crushing margin if the Regina plant is built, and a $13/t increase in crush margin if BV does not build the plant. These price changes will further reduce farm incomes by about $200 million per year. Our detailed spatial analysis also reveals a troubling level of extant four-firm concentration ratios measured within a 100 km radius for a large proportion of farms, and this spatial concentration becomes even more acute in the event of a BV merger. While the price effect of this concentration change is difficult to quantify, it is likely to be material for many grain producers. In combination, if allowed, the BV merger will have very large and substantial economic effects on the well-being of Western Canadian grain producers. Lower prices will impede their ability to innovate and to increase productivity over time.

As for assessing DWL stemming from the merger, many links in agricultural supply chains are controlled by very concentrated industries. We showed in Section 6 that limited price competition at several levels of an existing supply chain could significantly amplify deadweight losses associated with the BV merger. For comparison, if other existing distortions in the agricultural supply chain represent just 5% of the existing commodity price, an additional 2% price distortion (from a merger) would lead to a deadweight loss equivalent to the deadweight loss of a 6% price increase, the latter starting (as frequently assumed) with a zero-price distortion. If a 10% pre-existing price distortion exists, a 2% merger induced price increase would lead to a DWL equivalent of a 10% merger induced price increase, again beginning with zero price distortion. Computing accurate DWL estimates in such a complex and multi-tier industry is not an easy task.

In summary, we find the proposed BV merger is likely to cause substantial economic harm to grain producers. Estimates of the deadweight loss from the BV merger should necessarily consider the pre-existing lack of competition and price distortions across agricultural supply chains. Given the lack of existing competition, each additional non-competitive price will in turn lead to substantial economic losses for the Canadian economy. At a time when farm income and consumer food budgets are under pressure, agricultural businesses and markets need to be carefully scrutinized using policies supported by sound economic analysis.

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APPENDIX A

Table A1: Sensitivity Analysis and Economic Effects, Port of Vancouver simulations

Firm	Annual Export Capacity (Million t)						
Viterra Ltd.	**10.5**	10.5	10.5	10.5	10.5	10.5	10.5
G3 Ltd. - Bunge/SALIC	**6.5**	6.5	6.5	6.5	6.5	6.5	6.5
Richardson Int.	**7.5**	7.5	7.5	7.5	7.5	7.5	7.5
Cargill Cdn. Ltd.	**5.0**	5.0	5.0	5.0	5.0	5.0	5.0
P&H Ltd.	**3.3**	3.3	3.3	3.3	3.3	3.3	3.3
Paterson Grain Ltd.	**3.3**	3.3	3.3	3.3	3.3	3.3	3.3
90% of Total Capacity	**32.4**	32.4	32.4	32.4	32.4	32.4	32.4
Export margin	**50.0**	50.0	50.0	50.0	50.0	50.0	50.0
Demand Price intercept a	**200**	**180**	**220**	200	200	**246.3**	**153.7**
Slope of demand - b	4.630	4.012	5.247	4.630	4.630	4.630	4.630
Supply intercept Q= 0	0.000	0.000	0.000	**-50.00**	**5.000**	0.000	**0.000**
Pre-Merger			Export Volume Million t				
Viterra Ltd.	9.45	9.45	9.45	9.45	9.45	11.64	7.26
G3 Ltd. - Bunge/SALIC	5.85	5.85	5.85	5.85	5.85	7.20	4.50
Richardson Int.	6.75	6.75	6.75	6.75	6.75	8.31	5.19
Cargill Cdn Ltd.	4.50	4.50	4.50	4.50	4.50	5.54	3.46
P&H Ltd.	2.93	2.93	2.93	2.92	2.93	3.60	2.25
Paterson Grain Ltd.	2.93	2.93	2.93	2.92	2.92	3.60	2.25
Total Quantity	32.40	32.40	32.40	32.40	32.40	39.90	24.90
Export Margin	50.00	50.00	50.00	50.00	50.00	61.57	38.43
Gross margin per firm			Producer Surplus $Million				
Viterra Ltd.	443	415	471	469	419	672	262
G3 Ltd. - Bunge/SALIC	225	215	236	271	211	342	133
Richardson Int.	274	260	288	320	257	416	162
Cargill Cdn Ltd.	159	153	166	201	148	242	94
P&H Ltd.	93	90	96	124	86	141	55
Paterson Grain Ltd.	93	90	96	124	86	141	55
Post-Merger			Export Volume Million t				
Viterra-G3	11.08	11.32	10.98	12.41	10.98	13.64	8.51
Richardson Int.	7.77	7.66	7.84	7.25	7.84	9.57	5.97
Cargill Cdn. Ltd.	5.18	5.11	5.23	4.84	5.22	6.38	3.98
P&H Ltd.	3.37	3.32	3.40	3.14	3.40	4.15	2.59
Paterson Grain Ltd.	3.37	3.32	3.40	3.14	3.40	4.15	2.59
Total Quantity	30.77	30.72	30.86	30.79	30.84	37.89	23.64
Export Margin Merger	57.56	56.73	58.11	57.46	57.24	70.89	44.24
Gross margin per firm			Producer Surplus $Million				
Viterra-G3	603	578	636	713	566	915	356
Richardson Int.	363	335	389	389	347	551	215
Cargill Cdn. Ltd.	211	197	224	243	200	320	125
P&H Ltd.	123	116	129	149	115	187	73
Paterson Grain Ltd.	123	116	129	149	115	187	73
Economic Impacts							
Export Margin post-Merger ($/t)	57.56	56.73	58.11	57.46	57.24	70.89	44.24
Export Margin Pre-Merger $/t	50.00	50.00	50.00	50.00	50.00	61.57	38.43
Change in Export Margin ($/t)	7.56	6.73	8.11	7.46	7.24	9.31	5.81
Grain Production Mt	75	75	75	75	75	**90**	**60**
Canola Crushing Mt	20	20	20	20	20	20	20
Grain Producer loss $M/yr.	511	454	547	504	489	754	314
Capital value at 5% discount $M	10211	9081	10942	10075	9777	15080	6278
Canola Crushing Surplus Gain $M	151	135	162	149	145	186	116

Source: Simulation.

Table A2: Farmland acreage impacted by the merger within a 100km radius

Change in the number of grain buyers within 100 km	2-->1	3-->2	4-->3	5-->4	6-->5	7-->6
Alberta	4,087	19,222	320,965	341,891	693,480	1,375,103
Manitoba	----	1,010	10,227	120,171	128,121	110,954
Saskatchewan	----	40,284	69,069	438,927	400,422	----
Prairies	4,087	60,516	400,262	900,989	1,222,023	1,486,057

APPENDIX B

TECHNICAL DETAILS ON THE C-N MODEL

In our Cournot-Nash simulation the industry faces a common linear downward sloping demand for their services, where the price received is equal to:

$$P = a - b\sum_{i=1}^{n} Q_i,$$

Where a is the demand price intercept or choke price, $-b$ is the slope of the industry demand curve and $\sum_{i=1}^{n} Q_i$ is the sum of the output of each firm Q_i, and n is the number of firms in the industry. Marginal revenue for any firm i is equal to:

$$MR_i = a - 2bQ_i - b\sum_{j\neq i}^{n} Q_j$$

Each firm i, is assumed to have a linear marginal cost where:

$$MC_i = z + k_i Q_i$$

Each firm chooses Q_i to maximize profits, which occurs when $MR_i = MC_i$ or:

$$a - 2bQ_i - b\sum_{j\neq i}^{n} Q_j = z + k_i Q_i$$

Simplifying and solving for Q_i:

$$a - z - b\sum_{j\neq i}^{n} Q_j = k_i Q_i + 2bQ_i;$$

$$a - z - b\sum_{j\neq i}^{n} Q_j = (k_i + 2b)Q_i.$$

The profit maximizing quantity for each firm *i* is equal to:

$$Q_i^* = \frac{a - z - b\sum_{j\neq i}^{n} Q_j}{k_i + 2b}.$$

The simultaneous Cournot-Nash equilibrium, where all firms are simultaneously maximizing profits, can be found numerically in a spreadsheet by having each firm sequentially choosing their optimal quantity, taking other firms output as given, and repeating this sequential process until convergence occurs where all firms are maximizing profits given the optimal choice of all other firms.

The process to calibrate this model to reflect the observed price and quantities in the Pre-Merger simulation, begins with the parameters for the demand curve, $P = a - bQ$. After the price intercept or choke point a on the demand curve is chosen, the slope – b is calculated from the price and quantity observed in the market, where $b = \frac{a-P}{Q}$.

Once the parameters of the demand curve have been calibrated, the parameters for each firm's marginal cost curve are chosen to reflect the observed capacity of each firm:

$$MC_i = z + k_i Q_i$$

This process begins with choosing a common price intercept z. A negative price intercept creates an inelastic supply curve, a positive intercept will create elastic marginal cost curves, and zero price intercept implies all marginal cost curves have an elasticity of one. The slope of each firm's marginal cost curve, k_i, are numerically chosen by Solver in MSExcel, such that the Cournot-Nash equilibrium quantity, Q_i^*, is the observed firm operating capacities in the observed Pre-Merger equilibrium. This parameter calibration ensures the simulated Cournot-Nash equilibrium is consistent with the observed equilibrium.

The post-merger market simulation is created by maintaining all of the demand and marginal cost parameters from the Pre-Merger simulation except for the firms involved in the merger. The two firms involved in the merger are removed from the model and are replaced with a single firm, with a marginal cost curve that is the horizontal summation of the marginal cost curve for the two firms that were merged. Mathematically the slope of the merged firm's marginal cost curve, k_m, is equal to:

$$k_m = \frac{1}{\frac{1}{k_i} + \frac{1}{k_j}};$$

where k_i and k_j are the slopes of each of firms marginal cost curve that are merged.

Once these substitutions are made the new Cournot-Nash market equilibrium where all firms are simultaneously maximizing profits can be found numerically in a spreadsheet by having each firm sequentially choosing their optimal quantity, taking other firms output as given and repeating this sequential process until convergence occurs and all firms are maximizing profits given the optimal choice of all other firms.

The MS Excel spreadsheet used for the simulations in the report, is attached and available for inspection.