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THE COMPETITION TRIBUNAL

IN THE MATTER OF THE *COMPETITION ACT*, R.S.C. 1985, c.C-34, as amended, and the *Competition Tribunal Rules* SOR/94-290, as amended (the "Rules");

AND IN THE MATTER OF an inquiry pursuant to subsection 10(1)(b) of the *Competition Act* relating to the proposed acquisition of ICG Propane Inc. by Superior Propane Inc.

AND IN THE MATTER OF an Application by the Commissioner of Competition for an order pursuant to section 92 of the *Competition Act*

COMPETITION TRIBUNAL
TRIBUNAL DE LA CONCURRENCE

FILED SEP 17 1999

REGISTRAR — REGISTRAIRE

OTTAWA, ONT. #132

B E T W E E N:

THE COMMISSIONER OF COMPETITION

Applicant

- and -

SUPERIOR PROPANE INC. and ICG PROPANE INC.

Respondents

REBUTTAL AFFIDAVIT OF MICHAEL R. WARD

I, Michael R. Ward, of the City of Urbana, in the State of Illinois, United States of America, MAKE OATH AND SAY THAT:

1. I was retained by the Commissioner of Competition to provide expert economic evidence in this matter, to review the expert reports submitted by the expert witnesses of the Respondents, and to provide my comments with respect to those reports.

2. I have reviewed the expert witness affidavit of Dennis Carlton filed herein. Attached hereto and marked as Exhibit "A" is a true copy of my comments with respect to that Affidavit. The contents of Exhibit "A" and the findings and opinions expressed therein are true to the best of my knowledge, information and belief.

3.   Attached hereto and marked as Exhibit "B" is a true copy of my curriculum vitae.

4.   I make this affidavit pursuant to Rule 47(2) of the *Competition Tribunal Rules*.

SWORN BEFORE ME   )

AT   )

THIS 14th DAY OF September 1999   )

Michael R. Ward

A NOTARY PUBLIC

OFFICIAL SEAL
Carole A. Geis
Notary Public, State of Illinois
Commission Expires June 18, 2000

1.   Introduction

I was asked by the Canadian Competition Bureau to evaluate the affidavit of Prof. Dennis

W. Carlton executed August 17, 1999. Specifically, I was asked to evaluate the price analysis in

this affidavit. My evaluation raises two main criticisms. First, the methodology underlying the

analysis is flawed because it does not account for how market structure is determined. Second,

alternative measures of market structure suggest different conclusions about the effect of

competition on Superior's margins. Finally, I attempt to re-estimate Prof. Carlton's empirical

model to accommodate these criticisms. These estimates suggest that the merger will lead to

higher margins and prices for Superior.

2. .   The Underlying Methodology for the Price Analysis is Flawed

Economic theory implies that, in less competitive markets, firms are able to charge higher

prices. Specifically, in markets with a more concentrated industry structure or in those which are

more conducive to oligopolistic conduct, we can expect poorer market performance - higher

prices and greater deadweight losses. Thus, the ability of one firm to exert a competitive effect

on a second firm might be detected from the association between the second firm's price and

measures of the competitive pressure that the first firm exerts. In practice, inferences about

competitive pressure are drawn from estimates of the relationship between prices and market

structure for a number of similar markets. The price analysis employed by Prof. Carlton, often

referred to as a Structure-Conduct-Performance (S-C-P) analysis, makes such inferences.

The major criticism of the S-C-P methodology is that market structure is not assigned

randomly. There is a reason why many firms are present in some markets but few are present in

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2. .   The Underlying Methodology for the Price Analysis is Flawed

Economic theory implies that, in less competitive markets, firms are able to charge higher prices. Specifically, in markets with a more concentrated industry structure or in those which are more conducive to oligopolistic conduct, we can expect poorer market performance - higher prices and greater deadweight losses. Thus, the ability of one firm to exert a competitive effect on a second firm might be detected from the association between the second firm's price and measures of the competitive pressure that the first firm exerts. In practice, inferences about competitive pressure are drawn from estimates of the relationship between prices and market structure for a number of similar markets. The price analysis employed by Prof. Carlton, often referred to as a Structure-Conduct-Performance (S-C-P) analysis, makes such inferences.

The major criticism of the S-C-P methodology is that market structure is not assigned randomly. There is a reason why many firms are present in some markets but few are present in

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others. Profit opportunities drive firms to enter markets and losses drive them to exit markets. A high price often indicates a profit opportunity and attracts entrants. The greater degree of competition post-entry tends to drive the price back down. A low price may indicate losses and leads to firms exiting the market. The resulting diminished degree of competition could lead to higher prices. Consequently, the degree of competition can be inferred from the relationship between market structure and price levels only if firms cannot respond to profit opportunities through entry and exit. However, Carlton's affidavit claims that entry is easy. The ease of entry claim and the price analysis cannot both be valid.

The ability of firms to enter and exit markets, even imperfectly, could undermine the methodology. Even if entry were difficult, it is likely to occur over a long time horizon. For example, without entry, a relatively concentrated market would lead to high profits for years to come. Even for positive entry costs, the prospects of obtaining this stream of future profits could, in the long run, be sufficient to over come the entry costs. If so, at any point in time, price-cost margins should be low enough that it is not profitable for another firm to enter the market. This is true regardless of the current market structure. That is, to a first approximation, the profits from entering a market with two firms or ten firms should be identical. To be sure, changes in market conditions, such as an increase in demand, may give rise to higher prices and profits for incumbent firms, but only until they attract new entrants. Over this transition phase, we could observe prices being positively associated with market concentration.

A possible alternative explanation for higher prices in more concentrated markets is that they reflect higher underlying costs, not profit opportunities. Each geographic market has its own idiosyncrasies that can lead to differences in operation and costs. Higher costs will lead

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firms to charge higher prices and serve fewer customers and, in so doing, reduce profits. The lower profits in higher cost markets will cause some firms to exit. If so, higher cost markets tend to have both higher prices and more concentrated market structures. However, the association between prices and concentration is not an indication of a lack of competition. Rather, they are both caused by unmeasured cost differences. Unless these cost differences are known to not be present, it is possible to incorrectly infer a competitive effect from an S-C-P analysis.

3.   The S-C-P Methodology Allows a Variety of Specifications

Suppose that firms were unable to enter or exit markets when profits rose or fell and that all cost differences between markets were identified so that the S-C-P methodology was valid. The firms currently producing substitutes in a market are likely to exert competitive pressure on each other. However, the S-C-P methodology provides little guidance as to how best to detect this pressure. That is, does the mere presence of competitors constrain prices? Does the third or fourth competitor exert the same pressure as the first competitor? Are prices constrained in proportion to the size of competitors? Is the constraining effect of competitor size the same for a single large competitor as it is for many small competitors? Answers to these and similar questions can lead to markedly different empirical specifications.

We might be able to answer these questions with the help of economic theory. For example, theory predicts that a collusive oligopoly is more likely to occur when there are a smaller number of competitors. In this case, one might prefer to relate price levels to a measure that accounts for the number of independent competitors rather than simply using the sum of all their shares. Specifications that only examine the combined share of independents, rather than

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accounting for the composition of this share, will not capture these effects.

The choice of specification also entails making assumptions regarding the ability of firms to expand production. Competitors may be able to increase production at the same unit cost as they incur for existing production. If so, supply curves are flat and small firms will be easily able to expand production in reaction to a price increase. In this case, the mere presence of a firm, regardless of size, represents competitive pressure. Now suppose competitors are only able to expand production a small amount before additional expenses are incurred, which raises the unit costs. If so, supply curves slope upward and firms may find it difficult to expand production in reaction to a price increase. In this case, the competitive pressure a firm exerts may be proportional to its capacity and, implicitly, to its market share.

Economic theory might also suggest whether the competitive pressure of each additional competitor, or additions to market share, was increasing or decreasing with the number of competitors, or their share. It could be the case that the competitive pressure in a market with three or four firms is sufficient to keep prices quite close to long-run costs. If so, firms in markets with one, two and three competitors should have progressively lower prices, but prices effects from additional firms may be slight. Similarly, the competitive pressure from independents jointly holding fifteen percent share could be sufficient to make a market relatively competitive. If so, prices could be incrementally higher in markets in which they have only five or ten percent share, but may not be any lower in markets in which they have twenty or twenty-five percent share. Generally, we expect the marginal effect of additional competitors, or their share, to diminish for ever higher values.

In order to claim that a firm has no competitive effect on another, one must reject all

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plausible alternative specifications. The finding that ICG having 15%, 20% or 25% share does not lead to lower Superior prices suggests no competitive impact only under a particular specification. This finding does not test for whether ICG exerts a competitive impact at different, perhaps lower, market share levels. Nor does it test for whether the mere presence of ICG exerts pressure on Superior's prices.

4.　　The Specifications Presented Raise Questions

　　The actual implementation of the tests raises some questions.

　　a.　　Are the twelve monthly observations statistically independent? The data include observations for each branch and each month for either 1997 or 1998. However, the market share values are estimated only once for each branch, and therefore only vary in the cross-section of branches, not over time. If the market share data refer to the average for a branch, it is appropriate to relate them to the average price for the year. Doing so will tend to reduce the statistical significance of reported coefficients.

　　b.　　Why were thresholds of 15%, 20% and 25% used for market shares rather than 10% or 5%? The above discussion suggests that larger price effects should exist for smaller thresholds.

　　c.　　Similarly, why did the tests not account for the number of competitors? It is possible that markets with more competitors, holding their total size constant, are more competitive.

　　d.　　Are the cost and alternative fuel price data detailed enough for this analysis?

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Across 768 observations in the 1998 data, the driver salary data take on only

seven distinct values, and the electricity prices take on only 15 and 22 distinct

values. It is likely that, for a typical branch and month, these variables include

more measurement error than useful information. If so, they may tend to bias

results more than they contribute to the specification. Otherwise, a branch is

assumed to have the same costs and face the same prices as all other branches in

the province and as it does in all other months.

e.   What do province dummy variables capture? Market share data only differ across

branches. These dummy variables could be masking much of the variation and its

relationship with prices.

f. .   Why is Toronto treated differently? These two branches have their own dummy

variable.

g.   Why include only bimonthly dummy variables? Considerable seasonal variation

in the demand for propane is reflected in their prices. While the winter months

differ from summer months, there is still considerable variation within seasons.

Monthly dummy variables would have accounted for this variation.

h.   Why was the effect of the degree of competition on ICG's price not investigated?

It may be possible to detect a competitive effect from Superior in ICG's prices

even if competition from ICG cannot be detected in Superior's prices.

5.   Attempts to Correct the Methodology

I attempted to slightly alter Prof. Carlton's S-C-P specifications to accommodate both the

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alternative measures of the degree of competition and the non-random market structure

criticisms. For ease of comparison, I made only nominal changes to the specification presented

in Prof. Carlton's affidavit. I have also estimated my preferred specification that addresses most

of the concerns raised in section 4 above. My preferred specification uses only annual average

values and relates margins to market structure variables and the product distribution measures. I

was unable to investigate the effects of the degree of competition on ICG's margins or prices due

to lack of suitable data.

Different measures of the degree of competition might be more appropriate and may yield

different inferences. I examine three different measures of the market structure: the number of

firms, the C4 and the HI of the market. Attached is an appendix containing data on the number

of competitors and each of their market shares for the branches identified in the data used by

Prof. Carlton. I understand that these data were developed by Douglas West and were based on

Superior's undertaking response 63. From these data, I was able to construct for each of

Superior's branches, the four-firm concentration ratio and an Herfendahl Index as the sum of the

squares of the market shares of all firms in the market. The four-firm concentration ratio (C4) is

commonly used in antitrust analyses because it has been widely available. The Herfendahl Index

(HI) is a measure commonly used in antitrust analyses because it combines both the presence and

size of competitors into one measure. The HI varies from zero to one and tends to take on higher

values in markets that are more concentrated, either because there are fewer firms or because a

few firms account for a large fraction of sales.

As stated above, since the relationship between market structure and performance could

be caused by unmeasured cost differences, one must control for how the market structure came

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about. One way to do this is to identify markets in which more competition would naturally occur, and then see if margins are lower in these markets. One possible way to identify these markets is to look at their size. Markets with a large demand will usually support more firms. In markets with smaller demand, a high price may not attract entrants because each firm generates smaller sales. Thus, we can expect an association between margins and that part of market concentration that is due to market size. This estimation strategy purges the market structure measures of their possible association with cost differences.

In the propane markets, measures of market size are associated with the number of firms. A measure of market size available from the data used by Prof. Carlton is total market sales calculated as Superior's own branch sales divided by its market share. Average market sales in 1998 vary from about $0.5 million to $21 million. Branches with less than $2 million in average market sales have an average of 4.2 firms. Branches with more than $2 million but less than $5 million in average market sales have an average of 5.6 firms. Branches with more than $5 million in average market sales have an average of 8.7 firms. The correlations between branch sales and the number of firms, C4 and HI are 0.63, -0.49, -0.42 which are all statistically significantly different from zero. It appears that market sales can identify systematic differences in market structure across markets.

In Table 1, I report regression results that examine the effect of different measures of the degree of competition on Superior's margins. I also attempt to identify market structure using market sales and the square of market sales. The first column represents regression results from standard Ordinary Least Squares (OLS) regressions that do not attempt to identify the market structure. The only difference in the specification between the OLS specifications in column one

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and those in Prof. Carlton's affidavit are that I have replaced his two market structure variables

with one alternative measure. The third column represents regression results from Two Staged

Least Squares (2SLS) regressions that attempt to identify the market structure. Columns two and

four report OLS and 2SLS coefficients from my preferred specification. These specifications

yield similar results but diminished statistical significance, likely due to the reduction of

observations from 768 to 65.

Table 1
Altering the S-C-P Methodology
1998 Sample

	OLS		2SLS	
	Carlton Specification	Preferred Specification	Carlton Specification	Preferred Specification
Number of Firms	-0.124*	-0.183[+]	-0.294*	-0.388[+]
	(0.038)	(0.094)	(0.077)	(0.162)
C4	0.086*	0.088[+]	0.133*	0.186[+]
	(0.014)	(0.038)	(0.031)	(0.084)
HI	5.354*	4.822	10.820*	10.535[+]
	(1.190)	(2.964)	(2.595)	(5.312)

This table reports coefficients, and their standard errors, of alternative measures of competition
against Superior's margin. Asterisks and plus signs denote statistical significance at the 1%
and 10% levels. Each entry represents a value from a separate regression. To retain
comparability with results from Prof. Carlton's Affidavit, regressions in columns labeled
Carlton Specification also included the variables, percagri, percauto, perccomm, perccons,
percfork, percind, percres, bc, alberta, manitoba, sask, quebec, ontario, toronto, decjan,
marapr, mayjun, augsep, octnov, driver1, driver2, urban, logcall2, regunld, diesel, homeho,
elcommlo and elcommhi.

For all specifications, Superior's margins are lower in markets that tend to have more

firms, higher in markets with a higher four firm concentration ratio and higher in markets with a

higher HI. Moreover, the estimated magnitudes of these effects are larger for the 2SLS

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estimates, suggesting that identifying market structure is important. These results suggest that reducing the number of competing firms or increasing the concentration of a market will decrease the amount of competition that Superior faces. They also highlight the importance of identifying why markets are structured the way they are.

It may be possible to use these estimates to simulate the effects of a merger between Superior and ICG. From these data, I calculated the average changes in these measures of the degree of competition in the overlap markets that would occur due to the proposed merger as a decrease of one for the number of firms, an increase 3.06% for the C4, and 1911 for the HI. If the coefficient estimates in Table 1 represent structural relationships between the measures of competition and Superior's margins, then the products of the changes in the structural measure and the coefficient values yield estimates of the effect of the merger on Superior's margins. These calculations assume no other changes in market structure, e.g. entry, supply side substitution, or efficiencies.

Table 2 reports these estimated changes in Superior's margins in cents per liter. All estimates lead to larger margins with a range of 0.29 to 2.07 for the 2SLS estimates. Since average margins and prices in the sample were 15.7 and 28.1 cents per liter, the 2SLS values represent an increase in margins of 1.8% to 13.1% and an increase in prices of 1.0% to 7.4%. Prof. Carlton's specification, altered only to accommodate alternative measures of competition, could imply price increases due to the merger.

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Table 2
Simulation of the Average Change in Superior's Margins Due to the Merger

	OLS		2SLS	
	Carlton Specification	Preferred Specification	Carlton Specification	Preferred Specification
Number of Firms	0.12	0.18	0.29	0.39
C4	0.26	0.27	0.41	0.57
HI	1.02	0.92	2.07	2.01

This table reports estimates of the average change in Superior's margins under alternative specifications of the affect of market structure on prices. The table assumes that average HI increases by 1911, average C4 increases by 3.06% and the average number of firms falls by one.

6.   Conclusion

My evaluation of Prof. Carlton's price analysis leads me to two major criticisms. First, the methodology employed is flawed because firm entry and exit and unmeasured cost differences could be causing the estimated relationships. Second, even if the methodology is accepted, it admits of many different measures of market structure, of which, only one class of measures was investigated. Finally, I adapted Prof. Carlton's specifications in light of these criticisms. If these new estimates represent structural relationships, they imply that the merger could raise Superior's margins.

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