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The Effects of Airline Acquisitions in the Canadian Airline Industry

Introduction

Since airline deregulation in 1988, several acquisition announcements and mergers have occurred within the Canadian airline industry. Critics of airline deregulation argue airline consolidations result in anti-competitive activity in the form of higher fares and reduced quality of service. If this proposition is valid, the financial market would expect monopoly gains from airline consolidation. Furthermore, there should be positive intra-industry valuation effects in response to these acquisition bids. That is, share prices of listed carriers should be positively related to expected increases in concentration.

Alternatively, proponents of deregulation argue airline consolidations have no effect on prices and service quality; hence, consolidation does not create market power. The absence of market power supports either the contestability theory or the Bertrand game concept. If this is the case, financial market efficiency implies that share prices of the airlines involved in an acquisition are not related to changes in the concentration of the industry.

Airlines argue that consolidations allow them to produce more efficiently by realizing cost advantages through economies of density, scope, and scale. If this argument is valid, there should be positive valuation effects for the airlines involved in response to acquisition bids. It is ambiguous whether prices increase, decrease or stay the same. Critics argue that the price increases while proponents argue price will not increase if the airline industry is contestable or in a Bertrand game. A priori, the appropriate models to describe the airline industry are outlined in section I. With the appropriate model, the effects of consolidation are theoretically analyzed in section II and empirically analyzed in section III.

I Contestability Verses Bertrand

As defined by Baumol, Panzar, and Willig (1982) a perfectly contestable market is one that is accessible to potential entrants and satisfies the following properties: First, the potential entrants can serve the same market demands and use the same productive techniques as those available to the incumbent firms. Second, the potential entrants evaluate the profitability of entry at the incumbent firms' pre-entry prices. That is, the entrants assume that if they undercut the incumbents' prices they can sell as much of the corresponding good as demanded at their own prices.

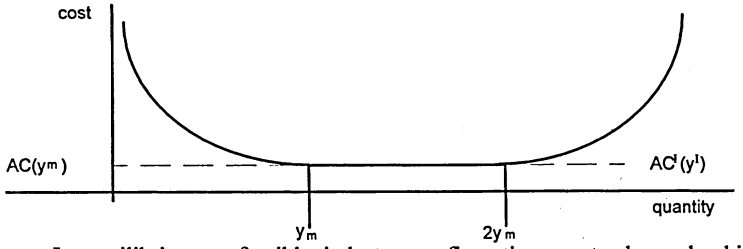
The first property ensures the ease of entry and implicitly ensures the ease of exit. It implies entrants and incumbent's have the same cost function; hence, there is no cost disadvantage for the entrant. To evaluate the costs of entering, firms must distinguish between fixed costs and sunk costs. Fixed costs are not reduced in the long run but they can be eliminated by total cessation of operation. For each period of operation fixed costs represent an opportunity cost for both the incumbents and the entrants; thus, they do not constitute barriers to entry. Whereas, sunk costs cannot be eliminated by total cessation of operation. Once committed, sunk costs are no longer a portion of the opportunity cost of production. However, they are an opportunity cost for a potential entrant; hence, constituting an entry barrier. Entry barriers are anything that requires an expenditure by a new entrant but imposes no equivalent cost upon an incumbent, thereby creating a cost disadvantage for the entrant. If no entry barriers exist, entry and exit are costless and the first property of contestability holds.

The second property holds if the price adjustment lag faced by the incumbent exceeds the entry and exit lag of the potential entrant or the price adjustment costs are substantial. Brock (1983) points out that if the second property is not satisfied, contestability still holds as long as there is a period where the new entrant earns positive profits.

The optimal structure of an industry is determined by the unique point of average cost minimization which establishes the efficient size of a firm as given by y_m in figure 1. To ensure that a sustainable equilibrium exists, Baumol et al. assume that the average cost curve (AC(y)) is flat within the interval $[y_m, 2y_m]$.[1] If all firms incur the same average cost $AC(y_m)$, the structure of the industry can be determined. If the industry output y^I is less than y_m, only one firm exists. When y^I is greater than y_m, at least m firms exist where $m \geq y^I/2y_m$ and at most M firms exist where $M \leq y^I/y_m$.

[1]The assumption that the average cost curve is flat-bottomed is consistent with empirical evidence accumulated over the last 40 years.

Figure 1



In equilibrium, a feasible industry configuration meets demand while covering costs: $\sum y_i=Q(p)$ and $py_i-C(y_i)\geq 0$. Within the context of contestable markets, this equilibrium is sustainable if there are no opportunities for profitable entry. This implies that $p^e y^e \leq C(y^e)$ $\forall$ $p^e \leq p$ and $y^e \leq Q(p^e)$ for all entrants. Also, the equilibrium is sustainable when industry output is produced at the minimum total cost. This ensures no alternative number of firms, size distribution of firms, quantity of output, or productive techniques can provide industry's output at a lower total cost. Otherwise, any industry inefficiencies will make the industry vulnerable to entry.

With the threat of potential entry only one sustainable equilibrium emerges. An industry with two or more firms must price such that price equals marginal cost; thus, $py_i=C(y_i)$ and profits are zero. Hence, the industry achieves a first best pareto optimum consistent with the outcome of perfect competition. An industry that consists of a natural monopoly must price according to second best pareto optimum rules (p=AC) and profits are zero. Therefore, the ability to contest a market eliminates production inefficiencies, excessive prices, and maximizes consumer welfare.

Alternatively, the airline industry may be within the setting of an infinitely repeated Bertrand game. Using one city-pair to illustrate the game, the theory can realistically be applied to all city-pairs consisting of two or more airlines. Canadian Airlines International Ltd. (CAIL) and Air Canada (AirC) both provide scheduled services on the Vancouver-Toronto route. The product CAIL and AirC offer is non differentiated except for price. Charter airlines also provide services along this route, however their services are differentiated from those provided by CAIL and AirC in the sense that they do not operate as frequently

and they are often delayed. For this reason it is assumed that CAIL and AirC split the market.[2]

In an infinitely repeated Bertrand game any price between marginal cost and the monopoly price can potentially be supported as a subgame perfect equilibrium. If both airlines price according to the monopoly price each time period, AirC and CAIL receive profits

$$\frac{k\prod(p^m)}{1-\delta} \quad \text{and} \quad \frac{(1-k)\prod(p^m)}{1-\delta}$$

respectively, where k represents the proportion of the market provided by AirC, $\Pi(p^m)$ is the total monopoly profits, and δ represents the firms' discount factors. When a firm deviates the punishment involves marginal cost pricing forever (Trigger Strategies). Price = p^m is a subgame perfect equilibrium if the following conditions are met:

$$\prod(p^m) \le \frac{k\prod(p^m)}{1-\delta} \quad \text{and} \quad \prod(p^m) \le \frac{(1-k)\prod(p^m)}{1-\delta}$$

When these conditions are met, neither firm has an incentive to deviate by under cutting p^m and gaining the entire market because the gain from deviating is less than the loss. Theoretically, the discount factor is directly related to the frequency of interaction between the two airlines. As the airlines interact on a daily basis, the discount factor δ should be close to one, implying that future profits are as important as current profits. This should be sufficient to make $p=p^m$ a sustainable equilibrium. Also, if one firm has a small proportion of the market, they have more incentive to deviate. In this case, k is approximately .5 which minimizes the incentive to deviate. It is also essential that an airline is able to monitor all past prices so they can easily detect a deviation.

However, in practice there is frequently one airline who practices price cutting behaviour which is emulated by its competitor shortly after. According to travel agents, reactions to price cutting actions are implemented within 4 days to 1 week of the initial price cut. Since there seem to be few potential entrants on this route, the price cutting behaviour is probably in response to a fluctuating demand. As the demand for airplane seats is dependent on price and the state of the economy, among other things, the price must adjust accordingly to attract more passengers rather than flying with empty seats.

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[2]In 1991, chartered airlines served 20% of the traffic on this route and CAIL and AirC served 80%. If chartered airlines are considered in the analysis, the results still remain valid.

An alternative explanation involves a series of finite Bertrand games. In this context, punishment for deviation from p^m involves marginal cost pricing for a finite period. At the end of this period, the firms return to p^m and play the game again. The unique subgame perfect equilibrium of this type of Bertrand game is also p=MC.

In either type of Bertrand game, mergers will not affect this outcome provided there are always two competing airlines on each route. In this case, the results are consistent with the results of the contestability theory. Contestability and the Bertrand game will prevent larger carriers from realizing an increase in profits from anti-competitive behaviour. However, if a merger creates a monopoly on a given route, the results of a Bertrand game and those of a perfectly contestable market diverge. As described in the context of contestable markets, airlines will price according to the second best pareto optimum because of the constant threat of potential entrants. Thus, consolidation has no negative impacts on consumer welfare. In the Bertrand setting, airlines on a monopoly route will price according to profit maximization ($p=p^m$) and consumer welfare declines.

II Qualitative Analysis of the Effects of Mergers

Consolidation Since Deregulation

In May 1984, the Ministry of Transport proposed a New Canadian Aviation Policy. It divided the country into two unequal parts labeled north and south. The airline market in the north was termed the designated area and required economic regulation. The airline market in the south was considered mature and ready for liberalization. Liberalization entailed government deregulation; thereby allowing free entry and egress of any domestic route. In 1986, the National Transportation Agency drafted the National Transportation Act (NTA) and fully implemented it on January 1, 1988.

Since full scale deregulation was implemented, there has been a trend of consolidations and mergers within the airline industry. Seven major carriers (AirC, CP Air, EPA, Nordair, Quebecair, PWA, Transair) merged into three level I carriers (AirC, CAIL, Wardair) by 1989. CAIL purchased Wardair Inc. in 1989 and acquired the remaining 54% of Time Air Corporation and the remaining 53% of Ontario Express Ltd. in 1991. AirC purchased Air Toronto and the remaining 51% interest in Air Nova in 1990. This year AirC purchased 29% equity interest in Continental and made formal merger offers to CAIL which were subsequently rejected. Meanwhile, CAIL is negotiating an equity alliance with American Airlines. Currently, there are two level I carriers (AirC, CAIL), four charter

airlines (3000 Airlines, Nationair, Bradley Air Services, Air Transat), twenty-three level II carriers, and 78 level III carriers.[3]

Characteristics of the Canadian Market

According to Statistics Canada, between the years 1989 and 1991, the domestic city-pairs served by one carrier had a lower proportion of discounted traffic than city pairs served by two or more carriers. Specifically, in 1991, 57.1% of passengers on monopoly routes traveled on a discounted ticket, 68.6% on duopolistic routes, and 58.7% on oligopolistic routes. There are conflicting explanations for the observed differentials: One, the market is contestable and the airlines on the monopoly routes are pricing according to the second best pareto optimum for a given demand. Two, the market is consistent with a Bertrand game and the airlines on monopoly routes are pricing to maximize profits given the demand. A qualitative analysis of the Canadian airline industry determines whether the industry fits into the contestability theory or the Bertrand model.

The NTA requires that any air carrier operating anywhere in Canada give public notice 120 days prior to a proposed discontinuance of domestic service or a reduction in the frequency of a domestic service to less than one flight a week. The NTA also allows carriers to implement new fares, rates or charges immediately. This requirement significantly hinders such actions as "hit-and-runs" involved in the contestability theory. Thus the entrant is required to compete at lower prices for at least 120 days. The profits generated through a low priced entry may not exceed the often negative profits generated through price wars, particularly if the incumbent follows a price cut immediately.

The validity of the contestability theory with respect to airlines has been argued by economists since its onset. Brenner (1988) notes that incumbents will normally match the lower fare immediately with a negligible time lag. Thereafter, the new carrier has the challenge of achieving a viable market share,

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[3]Level I carriers include every Canadian air carrier, that in each of the 2 calendar years immediately proceeding the report year, transported at least 1000 000 revenue passengers or at least 200 000 tonnes of revenue goods. Level II carriers include every Canadian air carrier that are not level I carriers and transported at least 50 000 revenue passengers or at least 10 000 tonnes of revenue goods. Level III air carriers include every Canadian air carrier that are not level I-II carriers and transported at least 5 000 revenue passengers or at least 1 000 tonnes of revenue goods.

against an equally-priced incumbent who has market advantages such as established market identity, working relationships with local travel agents, and local residents enrolled in its frequent flyer club. Brenner argues "hit-and-run" strategies are not typical and not credible threats.

Another requirement for the contestability theory to hold is sunk costs must be negligible, thereby making potential entry a credible threat to incumbents. Proponents of the contestability theory argue that the airline industry is typical of having low sunk costs, as those required to operate are borne by the government. The costs associated with the airline industry are airplanes, runways, ground facilities, and air navigational aids. Airplanes are easily sold or rented in alternative markets, thus not a sunk cost. The costs of runways, ground facilities and air navigational aids are generally incurred by governments and not airlines.

However, this argument may not be justified because entry barriers do exist. The most significant barrier to entry is the computer reservation system (CRS). Travel agents distribute 70% of airline tickets sold in Canada and 90% of the travel agents are connected to a CRS. There are two types of CRS, Gemini and Sabre. Gemini is owned in equal parts by AirC, CAIL, and Covia (the United Airlines CRS). Gemini accounts for 84% of the CRS market and Sabre accounts for the remaining 16%. For an entrant to be profitable they must have access to a CRS which is costly, effectively limiting the number of potential entrants. Another barrier to entry involves advertising costs but notably, airport time slots are not. In Canada, time slots are considered a public good; hence, all airlines are given access to slots through negotiations.

Likely Potential Entrants

The contestability theory requires all firms to incur the same average cost $AC(y_m)$. Much empirical work has validated that there are cost differentials with respect to size of airlines. In Canada, we have level I, II, and III carriers which, by definition, implies that the size of airlines differs considerably. Viton (1986) found that economies of scale exist. Caves, Christensen, and Trethway (1984) rejected the hypothesis of economies of scale but found there were sizable economies of density, particularly with smaller airlines. Roy and Crofsky (1985) also rejected the hypothesis of economies of scale. However, Caves et al. found that consolidations which create hubs reduce non stop service, allowing carriers to combine passengers with different origins and destinations, thus increasing load factor and reducing operating costs. These actions allow a carrier to seize economies of scale in aircraft. Although these results are not definitive, they do imply that a cost differential exists on the basis of carrier size.

Alternatively, Bailey, Graham, and Kaplan (1985) argue that smaller carriers have lower operating costs on the basis of significant wage differentials. According to the Aviation Statistics Centre the average wage for pilots and co-pilots is $103 386 and $80 864 for level I carriers and level II-III carriers respectively; the average wage for general management and administration is $49 790 and $40 160; and the total average wage for all employees is $44 145 and $42 225.[4] A differential of $1920 is not significant and the gap minimizes if the smaller carriers expand. Typically the expansion of a carrier is coupled with the growth of union power and wage demands.

It is apparent that larger airlines that have seized available economies of scale and density have lower costs than smaller airlines. It is assumed that level I carriers incur symmetric costs and level II-III carriers also incur symmetric costs but higher than those level I carriers incur. This cost differential violates the assumption that all firms incur the same average cost. However, small airlines act as commuter airlines for either AirC or CAIL and incur lower costs because they can free ride on AirC's or CAIL's advertising and CRS system as long as they remain commuters. If small airlines could not free ride, they would incur significantly higher costs. As a result, the market has settled into a system where smaller airlines generally serve traffic on short-haul routes (distances under 800km). They compete against each other and also make up the list of candidates for potential entrants on short-haul routes they do not already serve.

When Hurdle, Johnson, Joskow, Werden, William (1989) analyzed the contestability hypothesis in the American market, they identified likely potential entrants for a city-pair market on the basis of combined enplanement at the two endpoints. Non incumbent carriers with combined enplanement at the two endpoints of at least half the average enplanements of incumbents are considered likely potential entrants. Using this definition, the city-pair of Ottawa-London is analyzed to determine the number of likely potential entrants. Air Ontario has a monopoly on the non-stop route London-Ottawa offering 80 seats weekly. The candidates for likely potential entrants include Canadian Regional Airlines at the London endpoint and Canadian Frontier, Ontario Express, Skycraft and Pem Airlines at the Ottawa endpoint. American airlines operating out of the London and Ottawa airports are disqualified as potential entrants as they are American owned and cabotage does not exist in Canada.

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[4]All employees include: pilots, co-pilots, other flight personal, general management, administration, maintenance labour, aircraft and trafficking service, and other personal.

On the long-haul routes (distances over 800km) AirC and CAIL offer approximately 80% of the flights and charter airlines service the remaining 20% of the traffic. Again foreign airlines are disqualified as likely potential entrants because of the absence of cabotage. Also, smaller airlines are not credible as potential entrants because they all act as commuters for either AirC or CAIL. If a commuter attempts to compete on long-haul routes they lose their commuter status and all the cost advantages associated with being a commuter. Incumbents make competition difficult by lowering fares and eventually debilitate the entrant in price wars. This is illustrated by the fate of Time Air and Intair in their attempt of expansion (Canadian now owns Time Air and Intair went bankrupt). Thus the number of likely potential entrants on long-haul routes is zero.

Qualitative Results

In the short-haul market the notion of contestability is not rejected. There are no CRS expenses nor advertising costs that restrict entry and, as established, likely potential entrants exist. Although there is a minimal price adjustment lag and an exit lag of 120 days, entrants still can make positive profits when the opportunity arises, if only in the shortrun. Thus, consolidation should have no impact on consumer welfare as long as there remains at least one likely entrant on monopoly routes.

The qualitative evidence seems to reject the notion of contestability within the Canadian airline industry and support the Bertrand game for long-haul markets. In combination, the expense of the CRS and advertising costs implies that barriers to entry exist. Also the minimal price adjustment lag period and an exit lag of 120 days violate the requirements for contestable markets. It seems infeasible that the "hit-and-run" strategy is a credible threat since there are zero potential entrants. If the airline industry is within the Bertrand setting as hypothesized for the long-haul market, consolidation should not have a negative impact on consumer welfare as long as at least two competing airlines remain on a given route. If consolidation creates monopoly routes, consumer welfare may decline.

However, the National Transportation Agency has a policy that prevents airlines flying monopoly routes from charging profit maximizing prices. Consumers are able to complain to the Agency if it is felt a carrier operating a domestic service has imposed an unreasonable basic fare increase. The complaint must be in respect to a domestic service operating where there is no other alternative, effective, adequate and competitive transportation service. If the Agency finds the basic fare increase to be unreasonable, it can disallow the increase or direct the carrier to reduce the level of the basic fare by such amounts

and for such periods as the Agency finds reasonable and, when practicable, order the carrier to provide refunds as specified.

III Empirical Analysis of the Effects of Mergers

Sample and Method

A consolidation of airlines potentially has two effects: One, the remaining airlines engage in anti-competitive behaviour to increase their profits by increasing fares or lowering service quality. Second, the remaining airlines experience no change in profits. In the context of an infinitely repeated Bertrand game, the first effect proposes that the market shares for the remaining airlines are sufficiently high to support the strategy of price = p^m (the profit maximizing price) as a subgame perfect equilibrium generating positive profits. It also implies that the National Transportation Agency is not effective at monitoring unreasonable fares. The second effect proposes that the strategy of price = p^m is not an equilibrium because airlines will deviate by cutting prices. Thus in each game period, the Nash equilibrium of price = marginal cost is the outcome. It also implies that the National Transportation Agency is effective in monitoring unreasonable fares.

In the context of contestability, the second effect proposes that the strategy of price = p^m on any route is not sustainable because it presents an opportunity for an entrant to make positive profits. The only sustainable equilibrium is marginal cost pricing on routes flown by two or more airlines and average cost pricing on monopoly routes.

Consistent with these hypotheses, financial market efficiency implies that share prices of the airlines involved are positively related to increased concentrations of the airline industry if consolidation generates increased profits. Alternatively, share prices have no relation to changes in concentration if airlines are not expected to have a change in profits. Slovin, Sushka, and Hudson (1991) analyzed share price reactions to announcements of acquisitions in the United States. They found there were no positive effects on share prices in relation to increases in industry concentration. Their results support the hypothesis that consolidation does not change the remaining airlines' profits. It is not definitive whether these results rely on the contestable markets theory or the outcomes of a Bertrand game.

My intention is to perform a similar test using Canadian data. Since deregulation there has been one major acquisition; PWA (i.e. CAIL) bought Wardair for $248 000 000 in April 1989. The announcement of this acquisition occurred on January 19, 1988 and is subsequently labeled "event 1". During

1992 there was potential of a merger between CAIL and AirC. On January 8, 1992 it was announced that AirC and CAIL were negotiating a merger. On March 20, 1992 CAIL rejected AirC's offer. AirC and CAIL renewed negotiations on July 27, 1992 which disintegrated on August 17, 1992. On September 2, 1992 there was an announcement of further merger negotiations between AirC and CAIL which were terminated on November 3, 1992. This series of announcements is labeled "event 2".[5]

It is assumed that airlines involved in consolidation do not realize any cost advantages. Consistent with the assumptions in section I, all airlines involved in events 1 and 2 are level I carriers and have fully extracted any potential cost advantages associated with size. Therefore, any increase in profits resulting from a consolidation are attributed to anti-competitive behaviour.

I provide empirical evidence for the hypothesis of monopoly profits using time series regressions to examine the impact changes in concentration associated with proposed consolidations have on excess returns to carriers. Using stock returns from the Toronto Stock Exchange, I calculate the average prediction errors (APE) for portfolios of targets and bidders. The APE (excess returns) are daily stock returns adjusted for movements in the Toronto Stock Exchange daily market index (TSE). For event 1, the average returns are estimated over the pre-event period, t = -200 to -100, where t = 0 is the date of the first published bid announcement. These are subsequently used for the market adjustment of the APE from t = -100 to 100. For event 2, the average returns are estimated over the pre-event period t = -200 to -100 and t = 0, t = 141, and t = 167 are the dates of the published bid announcements. The bids were rejected at t = 52, t = 155, and t = 209. The average returns are used for the market adjustment of the APE from t = -100 to 248 (t = 248 is the last day of available data). Daily share prices and excess returns for CAIL, AirC, and Wardair for the relevant event periods are graphed in the Appendix A and B respectively.

Concentration is measured with the Herfindahl-Hirschman Index (HHI) for scheduled airlines using year-end data obtained from Statistics Canada . Market share is calculated as the ratio of an airline's domestic passenger kilometres to the industry's domestic passenger kilometres. The HHI is the sum of the squares of each airline's market share. The highest value for the index 1(1x1) applies to a market consisting of a single monopoly producer; a large number of carriers with small market shares drives the index toward zero. A market in which the index is between .1 and .18 is considered moderately

[5]These dates were obtained from the Globe and Mail Index and Financial Post Newscards.

concentrated, and highly concentrated at values over .18. The Canadian Airline Industry concentration has generally increased since deregulation, putting it in the highly concentrated range. The HHI, airline market share, and HHI adjusted for expected change in concentration resulting from an acquisition announcement are reported in Table 1.

Table 1

Market Shares of Level I-III Carriers and HHI before and after Acquisition Announcements for Events 1 and 2

Event 1	Before Announcement:				HHI
		Market Share			
		Level I		Level II-III	
	AirC	CAIL	Wardair		
	0.3919	0.3138	0.1418	0.1525	0.2722
After:	0.3919	0.4556	-	0.1525	0.3612
Event 2	Before Announcement:				HHI
		Market Share			
		Level I		Level II-III	
	AirC	CAIL			
	0.3798	0.3470		0.2712	0.2647
After:	0.7268	-		0.2712	0.5282

A time series regression is performed over the event period t = -100 to 100 for event 1 and t= -100 to 248 for event 2, where HHI and (time) are the independent variables and APE is the dependent variable. A second time series regression is performed over the same time periods where HHI, (time), and $(time)^2$ are the independent variables.

Empirical Results

I estimate time series regressions in which excess returns for targets and bidders are each specified as a function of a variable reflecting changes in concentration associated with bids and variables accounting for time. I use the change in the HHI based on carrier market shares to measure expected changes in industry concentration. The anti-competitive hypothesis implies fares will increase or service quality will fall relative to increases in industry concentration implied by horizontal merger bids. Excess returns to carriers should be positive functions of associated changes in concentration. This hypothesis implicitly implies that the National Transportation Agency does not prevent profit maximizing pricing. In contrast, if the airline is contestable or the Bertrand game

still applies after mergers, airlines cannot exercise monopoly power or earn supranormal profits regardless of the change in concentration. In this case, excess returns should not be a positive function of changes in concentration. This also indicates that the National Transportation Agency is successful in preventing monopoly pricing on monopoly routes.

Separate regressions are estimated for each event using the Cochrane-Orcutt iterative technique to correct for serial correlation. Given the nature of the hypothesis, I use one-tailed tests of statistical significance for the coefficient of HHI. The first set of cross-sectional regressions include (time) as another independent variable. The coefficient of (time) represents the trend of each particular airlines' stock relative to time. This coefficient can be positive, zero, or negative depending on whether the stock is improving, not changing, or declining in value over time. Thus, I use two-tailed tests of statistical significance for the coefficient of (time).

This set of regression results is reported in table E.1. For event 1 and event 2, the change in concentration has no systematic positive effect on excess returns to the target or bidder carriers; the estimated coefficients of the HHI are not significant and the R^2's are low. There is no evidence of gains from anti-competitiveness to carriers party to consolidations; thus, supporting the contestability or Bertrand hypothesis and implicitly supporting the effectiveness of the National Transportation Agency at monitoring unreasonable fares. In event 1, the coefficients of (time) are not significant indicating that the value of the stock is not changing over this time period. In event 2, the coefficients of (time) are statistically significant and illustrate that there is a negative effect of time on excess returns. That is, excess returns for the listed carriers are declining over time. Also, for both events serial correlation is rejected.

Table E.1

Cross-sectional regression results for airline industry concentration effects on targets and bidders, estimated as APE $= \alpha + \beta_1 HHI + \beta_2(time) + u$ over the relevant interval, where u is the random error term. The estimated coefficients β_1 and β_2 are reported with t-statistics in parentheses.[A] The Durbin Watson Statistics (d) are listed for each regression; the rejection of serial correlation is denoted by *.

Event 1	Target	Bidder
	Wardair	CAIL
β_1 (t-Statistic)	-0.4555 (-1.2283)	-0.0991 (-0.0530)
β_2 (t-Statistic)	-0.0013 (-.2355)	-0.0035 (-1.5689)
R^2	0.012	0.020
d.	2.162*	1.819*

Event 2	Target	Bidder
	CAIL	Air Canada
β_1 (t-Statistic)	-0.1321 (-1.1583)	-0.0106 (-0.0271)
β_2 (t-Statistic)	-0.0761 (-3.2980)***	-0.0385 (-8.8336)***
R^2	0.034	0.185
d.	2.087*	1.999*

A. The level of statistical significance of β_1 is assessed using a one-tailed test and β_2 is assessed using a two-tailed test. Statistical significance is denoted as : * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

The second set of regressions includes HHI, (time), and $(time)^2$ as independent variables. The $(time)^2$ variable is used for trend elimination and I use a two-tailed test of statistical significance for its coefficient. These regression results are reported in table E.2. For both events 1 and 2, the results are similar to the first regressions. The change in concentration has no significant positive effects on excess returns to the target and bidder carriers, thereby supporting the notion that there is no change in expected profits to carriers party to the consolidation. This reinforces the contestability/Bertrand hypothesis and implicitly supports the hypothesis that the National Transportation Agency is effective at monitoring unreasonable fares.

Table E.2

Cross-sectional regression results for airline industry concentration effects on targets and bidders, estimated as APE $= \alpha + \beta_1 HHI + \beta_2(time) + \beta_3(time)^2 + u$ over the relevant interval, where u is the random error term. The estimated coefficients β_1, β_2, and β_3 are reported with t-statistics in parentheses.[A] The Durbin Watson Statistics (d) are listed for each regression; the rejection of serial correlation is denoted by *.

Event 1	Target	Bidder
	Wardair	CAIL
β_1 (t-Statistic)	-0.3128 (-0.9520)	-0.0213 (-0.1134)
β_2 (t-Statistic)	-0.0490 (-4.8012)***	0.0012 (0.1350)
β_3 (t-Statistic)	0.0002 (4.7371)***	0.0001 (-0.5932)
R^2	0.139	0.022
d.	2.052*	1.820*
Event 2	Target	Bidder
	CAIL	Air Canada
β_1 (t-Statistic)	-0.1427 (-1.2739)	-0.0416 (-0.1080)
β_2 (t-Statistic)	0.3408 (6.7270)***	0.0830 (5.3130)***
β_3 (t-Statistic)	-0.0004 (-6.8258)***	-0.0001 (-5.5438)***
R^2	0.291	0.612
d.	2.045*	1.943*

A. The level of statistical significance of β_1 is assessed using a one-tailed test; β_2 and β_3 are assessed using a two-tailed test. Statistical significance is denoted as: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

For Wardair in event 1, the coefficient of (time) is significantly negative and the coefficient of $(time)^2$ is significantly positive. For CAIL in event 1, neither of the coefficients on (time) nor $(time)^2$ are significant. For event 2, the coefficients of (time) are significantly positive and the coefficients of $(time)^2$ are significantly negative. Serial correlation was rejected for all regressions.

To choose which regression is superior an F-test must be performed. The first regression is restricted and the second is unrestricted. The computed F values are 22.44 and 0.35 for event 1, Wardair and CAIL, respectfully; 30.73 and 46.59 for event 2, AirC and CAIL, respectfully. In all cases except for CAIL in event 1, the computed F value exceeds the critical F value at a 5% level of significance; thus rejecting the restricted regression. Therefore, it is assumed that the results of the second set of regressions are valid for all events except for CAIL in event 1 where the first set of regressions are used. These regressions support the hypothesis that mergers do not result in anti-competitive behaviour for either event.

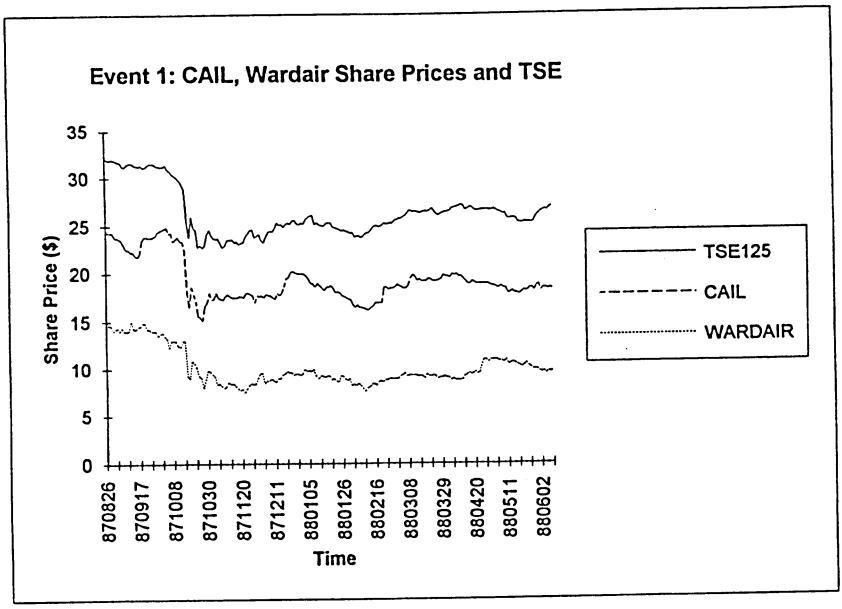
It is particularly surprising that the potential merger between CAIL and AirC produces no positive intra-industry valuation effects. As this merger would create a highly concentrated industry with the merged CAIL-AirC serving approximately 80% of the domestic traffic, one would expect positive profits. It was previously established that the long-haul market did not meet the conditions for contestability but seemed to be in the context of a Bertrand game. Given that many long-haul routes would be served by this one airline, the infinite Bertrand game would unquestionably support the profit maximizing price as an equilibrium. However, this equilibrium may not be sustainable for three reasons: One, the National Transportation Agency effectively prevents profit maximizing pricing. Two, charter airlines may be sufficient competition to ensure the Bertrand outcome, price = marginal cost. Three, the high level of concentration in the Canadian industry may galvanize the government to further liberalize international air treaties to include cabotage. However, cabotage does not seem to be an option at the moment, so this explanation is eliminated.

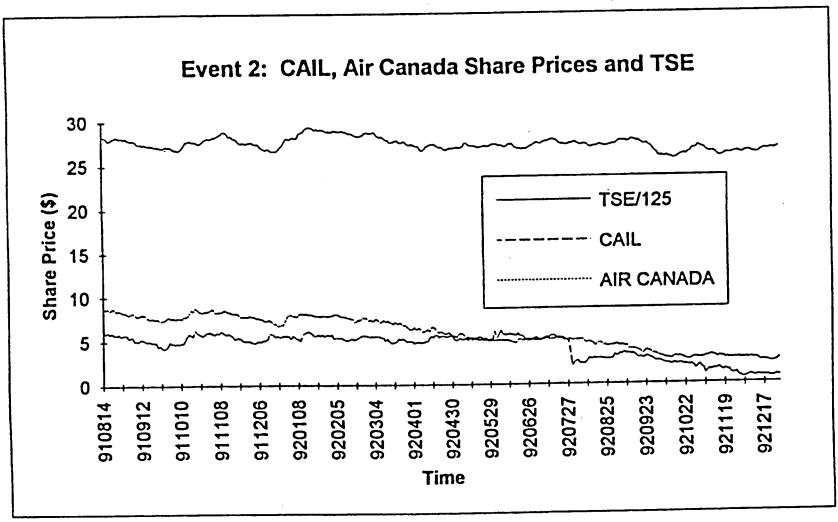
Conclusion

A qualitative analysis illustrates that the contestable markets theory is appropriate for the short-haul market and the Bertrand theory is more appropriate for the long-haul market. The empirical results show that increasing the concentration has no positive effect on excess returns to the target and bidder carriers; hence, there are no positive gains from anti-competitiveness. This evidence supports the theories of both contestability and Bertrand. In the context of Bertrand, it suggests that the National Transportation Agency prevents

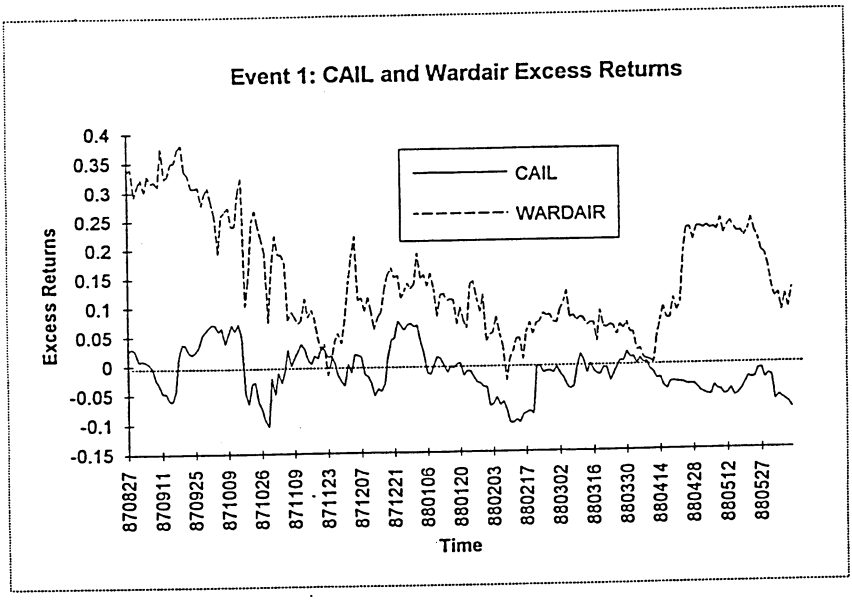
excessive fares and the remaining carriers have incentives to price cut. These results imply that consolidation has no negative impact on fares, service quality, or consumer welfare. If these results seem reasonable, they indicate that the current structure of the Canadian airline industry maximizes consumer welfare. With the assumption that there are no further cost advantages to creating larger airlines, there is no need to further liberalize international air treaties with respect to improving consumer welfare.

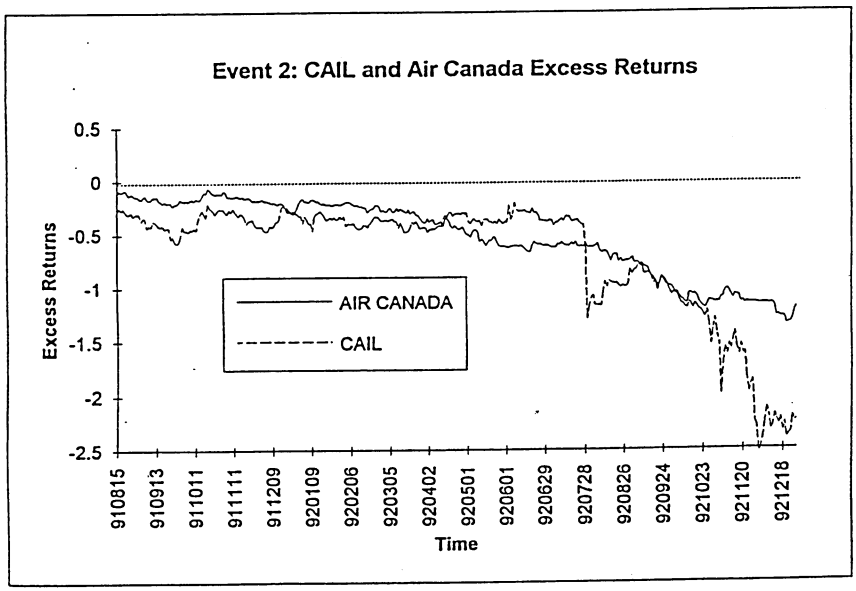
APPENDIX A


Event 1: CAIL, Wardair Share Prices and TSE
Share Price ($)
35
30
25
20
15
10
5
0
870826
870917
871008
871030
871120
871211
880105
880126
880216
880308
880329
880420
880511
880602
Time
TSE125
CAIL
WARDAIR


Event 2: CAIL, Air Canada Share Prices and TSE
Share Price ($)
30
25
20
15
10
5
0
910814
910912
911010
911108
911206
920108
920205
920304
920401
920430
920529
920626
920727
920825
920923
921022
921119
921217
Time
TSE/125
CAIL
AIR CANADA

APPENDIX B


Event 1: CAIL and Wardair Excess Returns
Excess Returns
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
CAIL
WARDAIR
870827
870911
870925
871009
871026
871109
871123
871207
871221
880106
880120
880203
880217
880302
880316
880330
880414
880428
880512
880527
Time


Event 2: CAIL and Air Canada Excess Returns
Excess Returns
0.5
0
-0.5
-1
-1.5
-2
-2.5
AIR CANADA
CAIL
910815
910913
911011
911111
911209
920109
920206
920305
920402
920501
920601
920629
920728
920826
920924
921023
921120
921218
Time

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