MARKET CONTESTABILITY THEORY AND THE DEREGULATION OF CANADIAN AIR TRANSPORT

by

Witold B. Jankowski

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ABSTRACT

The theory of contestable markets states that even highly concentrated industries may be deregulated if their markets are contestable. The specific objectives of this thesis are: to evaluate market contestability as a theory and its usefulness in policy analysis; to examine whether airline markets, in general, and Canadian markets, in particular, are contestable; to examine the applicability of market contestability as a welfare standard for the Canadian air transport; to examine policies to enhance market contestability in Canadian airline markets and their limitations; and to evaluate the proposals to deregulate Canadian air transport.

The analysis is both theoretical and empirical. The theory is evaluated, on the basis of its assumptions and analytical logic, as an industry model and as a welfare standard. Airline economics are then systematically reviewed in terms of contestability theory and the applicability of the theory as a welfare standard for the industry is discussed. The analysis is extended to examination of specific evidence from deregulation of the U.S. airline industry. The specific conditions of Canadian air transport are then related to the issues of contestability and proposals to deregulate the industry are critically examined.

The assumptions of the contestability theory are found to be very restrictive and the theory is generally inconsistent with the charac-

teristics of airline markets. Canadian airline markets reveal low contestability - making the theory inappropriate as a model of Canadian air transport. As a welfare standard, the theory has limited acceptability for southern routes but is inappropriate in the north. However, market power of the carriers is a serious problem and proposals to relax rate-setting regulation are found to be inappropriate.

The theory is found to be of limited use in public policy analysis and this limitation is apparent in the context of Canadian air transport. Public policies towards Canadian airlines should not be based on the assumption that the industry is, or can be made, contestable.

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INTRODUCTION

1.1 STATEMENT OF THE PROBLEM

The Canadian air transportation industry is undergoing regulatory reform. This reform is part of a broader reassessment of objectives and instruments of public policy towards the transportation sector in general. In the document 'Freedom to Move'(Mazankowski,1985), the Minister of Transport, the Honorable Don Mazankowski has stated:

> (a) Less regulation, leading to less government interference, will encourage innovation and enterprise;
>
> (b) Greater reliance on competition and market forces will result in lower unit costs, more competitive prices, and wider range of services to shippers and the public.

The proposed regulatory reform, therefore, aimes to reduce the degree of public intervention, which is expected to result in improved performance by the industry. The expectations of improved performance, however, are not clearly related to the industry's economics and market structure. In the traditional structure-conduct-performance paradigm of industrial organization, market power, associated with high concentration, has been considered an important determinant of industry conduct and performance. In this paradigm, the basic conditions(such as technology, costs, location, product differentiation, demand elasticity, substitutes) relate to market structure (number of

firms, barriers to entry and exit, number of buyers, information, vertical integration, degree of conglomerateness, etc.), which in turn relates to conduct (pricing, product strategy, advertising, research and development and internal organization) and performance (allocative and x-efficiency, technological progress, equity and employment). The relationship within the paradigm should not be construed as one of directional causality. Feedbacks and interactions between the model's variables are allowed. Within this paradigm, high levels of concentration (monopoly,oligopoly) are considered to be potential sources of market failure leading to inefficient pricing and non-optimal resource allocation. The possiblity of this inefficiency, in turn, has provided a rationale for public intervention. The two basic tools of public intervention have been antitrust legislation and regulation. The principal task of antitrust legislation has been to prevent high concentration in industries which are not characterized by economies of scale and to prevent anticompetitve conduct(Breyer, 1982). Regulation, on the other hand, deals with situations where high concentration has been justified by the presence of economies of scale (Kahn, 1971).

One recent attempt to weaken the rationale for regulation is the theory of contestable markets (Baumol, Willig and Panzer, 1982).[1] Baumol et al.(1982) define market contestability by the conditions of free entry and exit and the impossibility of predatory conduct and strategic entry deterrence. When entry and exit are free, the threat of entry may discipline the existing firms and prevent monopolistic/

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[1] Referred to hereafter as (Baumol et al., 1982).

oligopolistic pricing. Thus, contestable markets may exhibit many of the desirable characteristics, usually associated with perfect competition, even though the industry is highly concentrated. The theory claims to provide a static (partial equilibrium) theory of industry structure, conduct and performance, more generally applicable than it was before (Baumol et al.,1982,p.361). This is obtained by providing a new welfare standard which can be used to evaluate the performance of the industries.

> We offer the concept of perfect contestable markets as a new widely applicable benchmark that both encompasses and transcends the concept of perfectly competitive markets. In particular, unlike perfect competition, perfect contestability can provide a standard for the performance of markets in which concentration is inevitable because of the production technology(Baumol et al.,1982,p.13).

In addition to providing a new welfare standard, market contestability can be used as a descriptive model for industries characterized by freedom of entry and exit (Baumol et al.,1986.p.361). In such industries the theory questions the need for regulation and antitrust intervention. On the other hand, industries which are not currently contestable should be brought to the contestability ideal by a means of public policies. However, it should be emphasized that according to the authors of the theory, there are cases where regulation and antitrust intervention are justified.

> Contestability theory was never intended as an excuse for wholesale deregulation or immunity from the antitrust authorities...It is, therefore, simply not legitimate to proceed without empirical evidence about some particular industry in reality, to claim that it can do no wrong because the new theory(allegedly) claims that market forces will constrain firms adequately no matter how small their numbers may be... Where markets are characterized neither by a large number of incumbents nor by ease of entry, public sector intervention may be required to prevent the exercise of monopoly power (Baumol,1985,p.13).

Therefore, in designing public policies towards an industry it is essential to examine first whether the industry is contestable and how close it can be brought to the contestability ideal. If the industry cannot be brought sufficiently close to the contestability ideal, then regulation and antitrust intervention may be required to improve the industry performance.

As an example of contestable markets, Baumol et al.(1982,p.7), often make use of the airline industry: "it is highly plausible that air travel provides real examples of contestable markets". The theory of contestable markets has already had an impact on the shape and scope of deregulation of the American airline industry.[2] It has also found favorable reception among some Canadian economists (Reschenthaler and Stanbury, 1983). The influence of the theory can also be found in the document 'Freedom to Move'(Mazankowski,1985,p.28): "Freedom of entry and exit in the domestic markets and the attendant increase in competition would eliminate the need for continued tariff regulation". Given the high levels of concentration within the Canadian airline industry, the issue of contestability is of fundamental importance when designing public policies towards this industry.

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[2] In the introduction to Baumol et al.(1982), Elizabeth Bailey has stated: "During the summer of 1977, I became a Commissioner at the Civil Aeronautic Board...I was fascinated by the notion of idealized economic markets that are open to entry by entrepreneurs who face no disadvantages vis-a-vis incumbent firms...It struck me that the theory of perfectly contestable markets had direct relevance for policy".

1.2 OBJECTIVES OF THE STUDY

The general objective of this thesis is to examine whether market contestability can be used as a theoretical framework for making policies towards the Canadian airline industry. The specific objectives are as follows:

1. To evaluate market contestablity as a theory and its usefulness for public policy analysis.
2. To examine whether airline markets, in general, and the Canadian airline markets, in particular, are contestable.
3. To examine whether market contestability is an appropriate welfare standard for the Canadian airline industry.
4. To examine policies which can be used to enhance market contestability in the Canadian airline markets, and to identify their limitations.
5. Based on the proceeding analysis, to evaluate the proposals in the document 'Freedom to Move' which deal with entry and pricing.

1.3 METHOD OF THE STUDY

This method concentrates on identifying essential characteristics of contestable markets and comparing them with the characteristics of the airline industry. There will be a theoretical discussion of market contestability as an industry model and a welfare standard, which is intended to identify the limitations of the theory. In order to

evaluate market contestability as a model and a welfare standard for airlines, it is necessary to relate the theory to the economics of the industry. The analysis of airline economics will be both at the theoretical and empirical levels. Empirical analysis will involve the examination of airline costs, asset structure as well as other relevant characteristics, and the evidence from the American deregulation of airlines. This includes data on types of entry and the performance of new entrants, competitive responses of the established carriers and concentration trends. Some additional inferences will be drawn from studies conducted by other authors.

The analysis will then be extended to evaluate the particular conditions of the Canadian industry. This will be primarily an empirical analysis and will involve a discussion on concentration ratios, shares and the importance of international traffic and other relevant characteristics. The results of this analysis will be used to make inferences about contestability of the Canadian airline markets and desirability of enhancing contestability in the industry.

The finding of the preceding analysis will then be used to evaluate the concrete proposals to deregulate the Canadian airlines. However, before such an evaluation can be made, it will be necessary to restate the basic arguments for air transport regulation and to review the history of airline regulation in Canada.

1.4 LIMITATIONS OF THE STUDY

Market contestability, as a theory, is still incomplete and is considered by its authors as "work in progress, rather than completed body of doctrine"(Baumol et al.,1982,p.483), which identifies the first limitation of the study; the theoretical analysis of market contestability cannot be complete and will be constrained by the policy orientation and by the stated objectives of this thesis.

The analysis of market contestability should ideally be supplemented by a test in which the industry performance is compared with the predictions of the theory. Unfortunately, such a test cannot be applied to the Canadian markets because airline fares have been controlled and set by the regulatory agency, rather than by the airlines. The process of gradual deregulation has not yet been completed and it will be some time before this test can be performed in Canada.

As far as the American experience is concerned, a number of performance tests have been conducted for the American industry (e.g. Graham, Kaplan and Sibley(1983) and Call and Keleer(1985)) and the findings of these tests will be referred to in this study. The limitation of inferences drawn form the results of these tests are that these test were performed in the period of industry's transition to the deregulated environment. It is not clear that the adjustment process in the U.S. has ended and until the industry adjusts fully to the deregulated environment, the performance tests may yield biased results.

1.5 ORGANIZATION OF THE STUDY

The thesis will proceed in the following manner:

1. Chapter 2 will introduce the theory of contestable markets and relate it to the historical development of the field of industrial organization. It will indicate to what degree market contestability is a continuation of past research in industrial organization and to what degree it constitutes a deviation from the established structure-conduct-performance paradigm. The assumptions of theory will be identified and related issues, such as multiproduct cost concepts and sustainability will be discussed. Welfare characteristics of contestable markets and proposed public policies will then be examined.
2. Chapter 3 will evaluate market contestability as an industry model and a welfare standard. The conditions for 'hit-and-run' entry and their limitations will be identified. Limitations of market contestability as a welfare standard will also be presented including cases of innovation, 'lemon' type market failure, first move advantages and commitments, and unsustainability.
3. Chapter 4 will relate market contestability to the economics of the airline industry, including demand and supply conditions, economies of scale and scope, network economies, barriers to entry and a possibility of strategic behavior. There will be a discussion and evaluation of market contestability as a welfare standard for the industry.

4. Chapter 5 will compare behavioral assumptions and predictions of the theory with the empirical evidence from deregulation of the U.S. airline industry. Special emphasis will be given to the particular conditions of the American airline industry at the time of deregulation, the experience of the new jet entrants and competitive responses of the established carriers. There will also be a discussion of the related issues such as destructive competition, concentration trends and safety.
5. Chapter 6 will review the the traditional rationale for regulation of transportation industries and will relate the proposals to deregulate the Canadian airline industry to the history of airline regulation in Canada. The question of contestability of the Canadian airline industry will then be addressed. There will be presentation and discussion of the sources of deviations from contestability and the the desirability of enhancing market contestability, and an examination of public policies to enhance contestability. 'Freedom to Move' proposals dealing with pricing and entry will then be evaluated.
6. Chapter 7 will present summary and conclusions.

Chapter II

THEORETICAL OVERVIEW

This chapter relates market contestability hypothesis to the historical development of industrial organization. It also introduces basic assumptions of the theory and its welfare and policy implications.

2.1 HISTORICAL INTRODUCTION

The development of the field of industrial organization can probably be traced, as can anything else in the economic theory, to Adam Smith and his theory of price, the organization of firm and the nature of competition. Competition was viewed by Smith as the rivalry of the firms rather than the number of firms in the market. The analysis of competitive rivalry was subsequently refined by Jevons(1871) and Edgeberth(1925). Competitive rivalry was identified as the mechanism bringing equality of prices and costs. However, it was Cournot(1838), who first identified the monopoly problem as related to the downward sloping demand curve. This led to the profit maximizing price/output combination defined by MR = MC. The theory of monopoly was subsequently refined by Marshal(1925), who related monopoly to decreasing average costs and competition to increasing average costs. Following the work of Knight(1921), competition was defined not so much as the ri-

valry, but as the market structure with many identical firms operating at minimum average cost. Thus, the research in the field of industrial organization concentrated on two polar cases: monopoly and competition. The shortcomings of this approach were soon identified and new cases of monopolistic competition(Chamberlin,1935) and oligopoly(Robinson,1934) were introduced. Interactions between oligopolists became an important area of study(Hall and Hitch,1939; and Sweezy,1939). Development and application of game theory to the problems of economics by John von Neumann and Oscar Morgenstern (1944) added an important theoretical tool that helped in formalizing of models of strategic interactions between firms. Following the work of Mason(1939) and Bain(1958), the industrial organization studies became organized around the paradigm of basic conditions-structure-conduct-performance. Soon two basic approaches became recognizable. One, identified with Bain, stressed the structure- performance link, the other, best described in Scherer(1970), emphasized the full structure -conduct-performance relationship, with possible feedbacks among the model's variables.

The development of the paradigm was instrumental in the growth of the empirical studies that followed. These studies, conducted by numerous authors, concentrated primarily on issues of scale economies, concentration ratios and profitability and issues of technological progress and market structure. Industrial organization, both as a part of economic theory and as an empirical field, was understood primarily as dealing with the internal conditions of the industry. The internal conditions, or actual competition, were given by the number

of firms, product differentiation, types of rivalry and collusion and other relevant factors.

Traditionally, industrial organization theory played a very important role in providing the theoretical framework for the design and implementation of public policies towards industries (especially antitrust and regulation). The industrial organization research helped to identify the crucial elements of structure and conduct such as concentration ratios, product differentiation, pricing strategies, etc., and link them with industry performance. This in turn allowed public authorities to formulate policies and organize the collection of relevant data.

The role of potential competition or external conditions was first identified by Clark(1901,p.13):

> When prices are unduly high, owing to the grasping policy of some trust, what happens? New competition usually appears in the field. Capital is seeking outlets, but it has become hard to find them. Readily, and sometimes almost recklessly, does it build new mills and begin to compete with trusts, when these consolidated companies do not know enough to proceed on a conservative plan.

However, it was Bain(1956,p.3), who formally recognized barriers to entry as an important determinant of market structure. He defined barriers to entry as "the extent to which in the long run, the established firms can elevate their selling prices above the minimal average cost of production and distribution.....without inducing potential entrants to enter the industry". He specified three sources of entry barriers:

1. absolute cost advantages of incumbent firms

2. economies of scale and
3. product differentiation advantages.

The problem of whether scale economies can be treated as a source of barriers to entry divided industrial organization theorists into two groups. The first one, following Bain(1956), and subsequent refinements by Sylos-Labini(1956) and Modgiliani(1958), recognized economies of scale as a a legitimate barrier to entry with both structural and behavioral dimensions. The structural element was defined by the shape of average cost curve, and the behavioral element by the so called - Sylos Postulate (entrant's belief that the incumbent firm/ firms will not reduce pre-entry level of output if the entry takes place). The monopolist, faced with the threat of entry, had two basic choices:

1. Set the price at the monopolistic level. The problem here was that the entry at the suboptimal scale may become profitable.
2. The alternative strategy was to set a price, at a lower than monopolistic level in such a way that no entry at suboptimal scale (satisfying the residual demand) could take place. The demand curve facing the potential entrant was just tangent to the entrant's ATC curve(Modgiliani,1958).

The second option was called a 'limit price' strategy. It is important to note, however, that for this strategy to work the entrant has to believe that the incumbent will behave consistently with the Sylos Postulate.(The problem of the credibility of this strategy will be referred to in Chapter 3.)

The second approach, identified with the new Chicago School, rejected economies of scale as a source of barriers to entry as long as entrants have access to the same technology as the incumbent firms. Thus, the meaning of barriers to entry was different then that of Bain: "a barrier to entry may be defined as a cost of producing(at some or every rate of output) which must be borne by a firm which seeks to enter an industry but is not borne by firms already in the industry"(Stigler,1968,p.67). Writing in this spirit Demsetz(1968), suggested that a natural monopoly based on economies of scale need not require monopolistic prices. There will be no monopolistic prices if the whole market can be challenged. Thus, the competition is not <u>within</u> the market but <u>for</u> the market. However, for this competition to be a real disciplining force, the entrant has to face the same costs as the incumbent. The presence of sunk costs will violate this condition, since the sunk costs are already bygone for the incumbent, while for the entrant they are still a part of the opportunity cost. Thus, barriers to entry are related to the <u>sunk costs</u>.

This line of reasoning, in a different theoretical framework, was continued by Eaton and Lipsey(1981). Their study is related to the analysis of Schelling(1960) on the credibility of threats. The limit price strategy to deter entry cannot be successful if Sylos Postulate is not the best strategy of monopolist, when the entry does take place. Thus, the monopolist has to commit himself to the market, for example, by investing in product specific equipment.

Baumol et al.(1982,p.280), define barriers to entry following Stigler's and Damsetz's approach, hence, their preoccupation with sunk

costs as being synonymous with barriers to entry. Fixed cost if they are not sunk are consistent with free entry and exit. Since terminology is important here, it is necessary to define fixed and sunk costs more precisely.

> Def: Long-run fixed cost is the magnitude F(w) in the long-run total cost function C(y,w):
>
> $$C(y,w) = b*F(w) + V(y,w) \quad ; \quad b=0 \text{ if } y=0 \; ; \; b=1 \text{ if } y>0$$
>
> where $\lim_{y \to 0} V(y,w) = V(0,w) = 0$,
>
> V(.) is nondecreasing in all arguments, and y and w are, respectively, the vectors of output quantities and input prices (Baumol et al.,1982,p.280).

Thus, long run fixed costs are those that cannot be reduced by decreases in output but which can be eliminated by total cessation of production. Sunk costs on the other hand, are those that cannot be eliminated (in some defined period) even by total cessation of production.

> Def: Let C (y,w,s) represent the short-run cost function, applicable to plans for the flow of production, that occurs s units of time in the future. Then, K (w,s) is the sunk cost for at least s years, if :
>
> $$C(y,w,s) = K(w,s) + G(y,w,s)$$
>
> $$G(0,w,s) = 0$$
>
> $$\lim_{s \to \infty} K(w,s)=0$$
>
> as in the long run no costs are sunk.

The complete theory of contestable markets is based on the following assumptions:

1. all firms have access to the same technology

2. there is full and symmetric information
3. there are no externalities
4. entry and exit is absolutely free and costless
5. 'hit-and-run' entry is possible.

The assumption of a possibility of 'hit-and-run' entry is of crucial significance here. It means that the new firm can enter the market, undercut the incumbent and exit the market before the incumbent firm can react. This assumption, therefore, eliminates the possibility of strategic entry deterrence. Given these assumptions, two important concepts of feasibility and sustainability are introduced.

> Def.: An industry configuration of 'm' firms is feasible if a given vector of prices and outputs allows each firm to break even and if the production is sufficient to meet demand.

> Def.: An industry structure is sustainable if it is feasible and if no potential competitor can make positive profits by supplying quantities that do not exceed total market demand(Baumol et al.,1986,p.341).

A possibility of 'hit-and-run' entry implies that "even a very transient profit opportunity need not be neglected by a potential entrant, for he can go in, and, before prices change, collect his gains and then depart without cost, should the climate grow hostile"(Baumol,1982,p.4), which in turn, implies that to prevent entry, incumbents must produce efficiently and earn zero economic profits. No market structure, in which firms earn positive economic profits or are inefficient can be sustainable. It is not important whether the industry is a natural monopoly or oligopoly, the threat of entry forces the incumbent firms only to break even.

> Monopolists and oligopolists who populate such markets are sheep in 'wolves' clothing, for under this arrangement po-

> tential rivals can be as effective as actual competitors in forcing pro social behavior upon incumbents, whether or not such behavior is attractive to them(Baumol et al.,1982,p.350).

The power of potential competition in contestable markets is sufficient to compensate for the lack of competition in the market.

The theory of contestable markets developed so far has been organized along four major issues:

1. contestability
2. cost concepts applicable to multiproduct cases
3. determination of industry structure and sustainability
4. welfare characteristic of contestable markets and policy implications.

2.2 MULTIPRODUCT COST CONCEPTS

One of the normative aspects of the theory is to determine the most efficient industry structure for a given state of technology. In order to do this the relevant cost functions need to be examined. In the economic literature, the production process was usually discussed within a framework of a single product cost function, even though most of the firms produce more than one output. Baumol et al., have developed some new cost concepts that can be used to study a multiproduct firm. The basic phenomena that distinguishes the multiproduct case from that of the single product is defined as economies of scope.

For example, in the two product case economies of scope can be described by the following:

$C(y_1,y_2) \leq C(y_1,0) + C(0,y_2)$.

This means that two, or more products can be produced cheaper together than separately. Economies of scope can be also described using another cost concept trans-ray convexity. Trans-ray convexity relates to any cross section of the cost hypersurface which connects points on the output axes. It requires that the production cost of a weighted average of a pair of output bundles, y_1 and y_2, be greater then the weighted average of the costs of producing each of them in isolation(Figure 1).

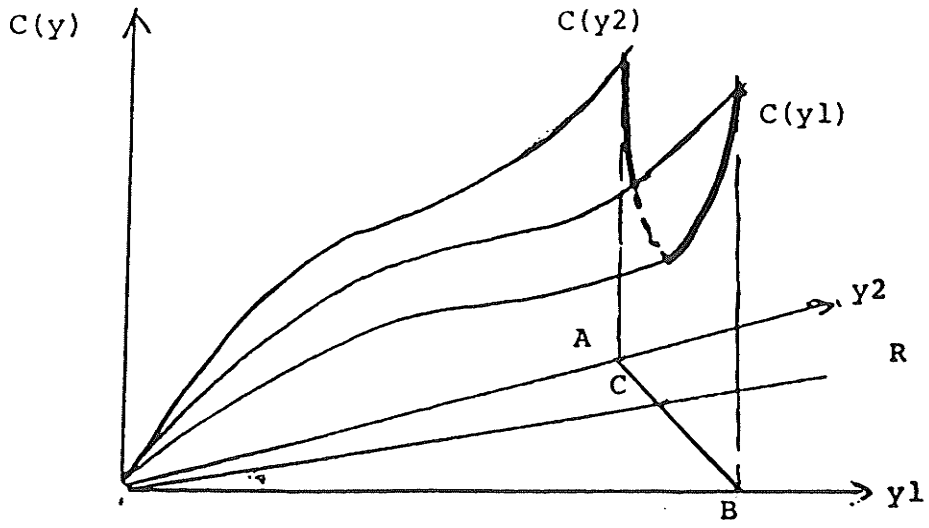

Figure 1: Trans-Ray Convexity

Economies of scope are important in both normative and positive analysis as they provide a necessary condition for the existance of multiproduct firms in perfectly contestable markets. In addition to economies of scope and trans-ray convexity, Baumol et al(1982) define the concepts of incremental cost and subadditivity.

Def.: The incremental cost of product 'i', is the addition to the firm's total cost resulting the given output of product 'i'. It is the firm's total cost with a given vector of outputs, minus what that total cost would be if production of good 'i' were abandoned, all other output quantities remaining unchanged.

Def.: A cost function is subadditive for a particular output vector, when y can be produced more cheaply by a single firm, than by any combination of smaller firms.

Subadditivity of costs is of special importance here as it defines the case of 'natural' monopoly. In a single product case the following propositions hold:

1. The cost function is strictly subadditive if either of the following is true:
   a) C has economies of scale for all outputs q
   b) C is strictly concave for all q and $C(0) > 0$
2. Neither scale economies nor concavity are necessary for subadditivity of a cost function. Subadditivity is consistent with increasing marginal cost at all levels of output, and with increasing average cost at some(but not all) levels of output. This, in turn, implies that the presence of economies of scale provides a sufficient but not a necessary condition for natural monopoly(Sharkey,1982).

Subadditivity in a multiproduct case is more complex than single output subadditivity. For example, multiproduct economies of scale are neither necessary nor sufficient for subadditivity. Global strict concavity of the cost function is not sufficient for subadditivity. Subadditivity is not an easy matter to test, as it involves knowledge of the cost functions of different firms, which may be difficult to

obtain. It would be desirable to identify subadditivity without complete information on the cost functions. The following two propositions have been proved to hold in a multiproduct case:

1. Cost complementarity is sufficient for subadditivity(cost complementarity occurs if an increase in the output of one product, tends to reduce the incremental cost of producing other outputs).
2. Either trans-ray convexity or quasiconvexity in combination with economies of scale is sufficient for subadditivity(Sharkey,1982).

Both trans-ray convexity and cost complementarity reflect the economies of joint production, which may be due to technological aspects of production within a single plant, organizational advantages of producing different products within one firm, marketing advantages and pecuniary economies.

The discussed cost concepts have both normative and positive implications. Normative in a sense that the properties of the firm's cost function reveal the most efficient industry structure. Positive in a sense that when technology and cost functions change, the changes in the industry structure can be predicted.

2.3 DETERMINATION OF INDUSTRY STRUCTURE AND SUSTAINABILITY

The cost functions identify the most efficient market structure of an industry. However, market forces will not necessarily lead the industry towards this structure and the optimal market structure may be unsustainable. As an illustration of this, consider the following example(Figure 2).

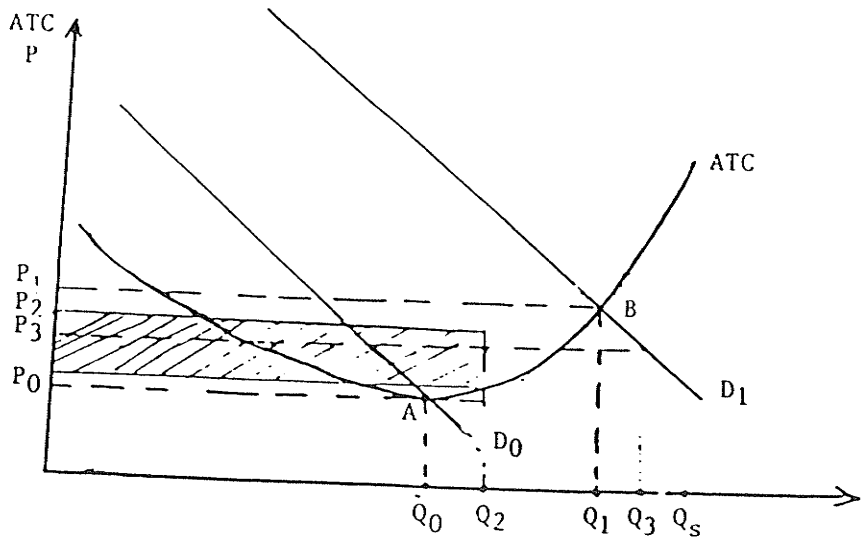

Figure 2: Unsustainability of Natural Monopoly

Suppose that the demand curve D_0 intersects the average cost curve(ATC) at a point A. At this point, ATC is declining and therefore this is the case of natural monopoly. When the incumbent firm sets its price at P_0 it breaks even and satisfies all market demand at this price. Thus, the industry structure is feasible. In addition to this,

no entrant can come in and offer a lower price than that of the incumbent firm. Thus, the industry structure is sustainable. Suppose now that the relevant demand curve is D_1 . This is still a natural monopoly when the range of cost subadditivity extends to Qs. The distinction between subadditivity and declining average cost has important implications for the stability of natural monopoly in a contestable market. Unsustainability will result if the natural monopolist cannot find a price at which the total market demand is satisfied, revenues cover costs and no entry is profitable. From Figure 2, it is clear that the monopolist cannot charge a price lower than P_1 , satisfy market demand and at least break even. For example, consider a price equal to P_3 for which a quantity demanded is Q_3 . If the incumbent supplies Q_3 at P_3 it has to incur losses since P_3 is below average total cost at Q_3 . If the incumbent sets a price greater or equal to P_1 which will satisfy the condition of feasibility, a new entrant can come in, offer the lower price and make positive economic profits. For example, the new entrant may offer price P_2 and make economic profits by supplying Q_2 . Thus, there is no stationary price which will allow the incumbent firm to prevent entry and break even at the same time. The optimal market structure - the natural monopoly will break down. For the single output case the decreasing average cost provides a sufficient condition for sustainability(Sharkey,1982). Unsustainability will be less likely if average cost curves has flat bottom portions as illustrated in Figure 3. The natural monopoly will be sustainable for outputs between Q=0 and Q_3 .

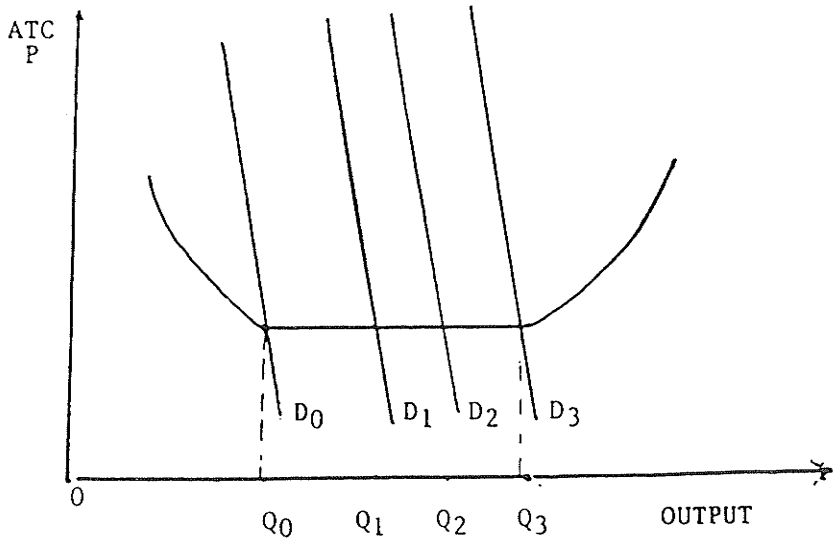

Figure 3: Flat Bottomed Average Cost Curve

For a multiple product firm the following proposition provides the sufficient condition for sustainability:

> If the cost function of a natural monopoly is trans-ray convex and exhibits economies of scale, Ramsey prices are sustainable(Sharkey,1982,p.101).[3]

Baumol et al.(1982), avoid using a game theoretical approach in discussing unsustainability on the grounds that the characteristic function of the game, which describes benefits of any coalition acting on its own, leaves unspecified the market mechanism through which these payoffs are obtained. Even with this limitation, game theory can provide some important insights about sustainability.

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[3] Ramsey prices are given by the solution to: max Profit = Total Revenue - Total Cost subject to a constraint that a firm has to break even.

There are two ways in which sustainability can be discussed using game theoretical tools. First, unsustainability can be viewed as a noncooperative game in which one firm, the natural monopoly, is required to make the first move by announcing a price. A single competitor can respond by staying out of the market or by entering at some price lower then the monopolist's. Firms are assumed to be active players, while consumers are treated as passive agents whose behavior is specified, via their demand functions, in the rules of the game. The second approach assumes consumers to be active players, while firms are passive. Each player in the game represents a single consumer, or group of similar consumers whose objective is to convert their own resources into a vector of outputs. If the production process exhibits subadditivity, they will find it advantageous to form coalitions. Firms may be identified with the set of possible coalitions of buyers. Active firms will correspond to the coalitions that actually form at the conclusion of the game, whereas the inactive but potentially competitive firms will correspond to the unsuccessful coalition(s). Sustainable natural monopoly results if the conditions of individual rationality, group rationality and Pareto optimality are simultaneously satisfied or that the core of the game is not empty. As an example of this approach consider a so called 'cost sharing 'game using a case given by Faulhaber(1975). This example involves the problem of supplying water to a residential community. Let N=[1,2....n] denote the set of all buyers and S represent a subset of N. There are many production arrangements by which water can be supplied. Each neighborhood can have its own well, storage tank and pumps; groups of neighborhoods can have common facilities; or the entire

community can use a common facility. If the utility is a natural monopoly, then C is subadditive. That is:

1. $C(S) + C(T) \geq C(S \cup T)$, when $S \cap T = \emptyset$
2. $\sum_{i \in S} p \leq C(S)$ for all $S \subset N$.
3. $\sum_{i=1}^{N} p = C(N)$

The prices must be high enough so that revenues are equal to total cost, and coalitions of buyers acting on their own cannot be better off breaking away form the 'grand' coalition. Prices that satisfy (1) to (3) define the core of the game. Suppose that the contestability conditions are satisfied, that is all firms in the industry have access to the same technology and that entry and exit is free. For simplicity, assume only three neighbors in the community, and that the cost of supplying water is:

1. C(1)=C(2)=C(3)=300, when each neighborhood obtains services separately.
2. C(1,2)=C(1,3)=C(2,3)=400, when two neighborhoods enter coalition.
3. C(1,2,3)=630, when water is supplied to all neighborhoods by a common facility.

Clearly, the cheapest way from the social point of view is to use a common facility, with cost=630. Unfortunately, this arrangement is not stable, since any two neighborhoods have an incentive to break from the grand coalition and produce on their own. The cost to society is then:

[C(1,2)=400 + C(3)=300] =700

More formally, the conditions for the existence of the core of the game require that the following be satisfied simultaneously:

1. $p_1 \leq 300$
2. $p_2 \leq 300$
3. $p_3 \leq 300$
4. $p_1 + p_2 \leq 400$
5. $p_2 + p_3 \leq 400$
6. $p_1 + p_3 \leq 400$
7. $p_1 + p_2 + p_3 = 630$

From (4), (5) and (6) it follows that: $p_1 + p_2 + p_3 \leq 600$, but the lowest total cost to the community is 630 (by (7)). Thus, the core of the game is empty and the natural monopoly is not sustainable.

The situation becomes more complicated when demand is added to the analysis. Suppose now, that each buyer has a maximum price that he is willing to pay (tastes are heterogeneous), which is denoted by vector Y=(y(1),y(2)....y(n)). No buyer can be asked to pay more than the maximum he is willing to pay. Therefore, in addition to the usual core conditions, prices must also satisfy :

$p(i) \leq y(i)$, for i = 1.....n.

Thus, the non-empty core may be necessary but not a sufficient condition for sustainability. A subsidy might be necessary to attract some customers into the joint coalition.[4]

[4] The subsidies may involve the products or the consumers. In the above examples, the commodities and groups of commodities coincided so that this distinction was not necessary. In general, consumer

When strategic interaction and bargaining are allowed, it is possible that some arrangement which preserves social optimality in production will be found. In the above example, the grand coalition breaks down to a coalition of two and one of the players is faced with higher cost(C=300). It would be rational for one player to approach the other players and to suggest that they allow it to join the coalition. It can guarantee that they will be as well off with a coalition as without it. For example in a grand coalition the cost can be divided : (200, 200, 250). The actual allocation of cost will depend on bargaining skills and strategies. One possible solution could be based on the Shapley Value Concept.[5]

Municipalities considering building a common irrigation system (other examples can come from transportation or telecommunication) will be an example where the consumers are true active players. Thus,

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groups do not have to be defined over the commodities. Traditionally, the term cross-subsidy referred to subsidies among and between goods, and anonymous equity described the absence of consumer subsidies. Willig(1979) and Faulhaber and Levinson(1981), described the relationship between commodity-free prices(no cross- subsidy) and consumer-subsidy free prices(anonymous equity). This relationship is based on the differences in demand patterns across consumer groups. Thus, when consumers have identical demand patterns, then all prices are anonymously equitable, even in the presence of cross-subsidies. However, when consumer's demands are heterogeneous in that consumers choose different bundles of goods, cross-subsidy may lead to prices involving consumer's subsidies. The absence of consumer subsidy, however, does not mean that the prices are 'just' or 'equitable' in any broad sense. What is considered just and equitable depends on value systems which will differ in different societies.

[5] The Shapley Value Concept can be described in the following way: when player 'i' joins coalition S to form coalition (S + 'i'), it seems justified to allocate a share to him which is in proportion to what he allows the coalition to gain as a result of his entry. Shapley now makes two hypotheses. On the one hand, he imputes the total of his marginal contributions to player 'i' and on the other hand, he consideres that a coalition of n players may form itself in all

the bargaining to reach the optimal solution despite the empty core, may take place. When there are many consumers they cannot be truly 'active'. The truly active players are firms entering the market and offering a better deal to the group of customers. However, firms are usually precluded from dividing markets and establishing side payments, which might be necessary to obtain the jointly optimal solution when the core is empty. In situations like this, the condition of non empty core will be necessary for sustainability.

The unsustainability that has been discussed so far, could be defined as a market failure which prevents the socially optimal solution to emerge or remain. In contestable markets, with free entry and exit, the distinction between ex-ante and ex-post unsustainability is of little relevance. When sunk costs and other imperfections are present this distinction may be important.

To illustrate the difference between ex-ante and ex-post unsustainability, suppose that in the 'cost sharing' example of Section 2.3, technology exhibits some sunk cost SC= 30, which is independent of the scale of operation. Ex-ante, no costs are sunk, so an empty core may preclude the socially optimal solution. However, if the solution is reached, due to bargaining or government intervention, the joint solution will be ex-post sustainable. (C(1,2,3) = 600, and the core given by the price vector (200,200,200) is no longer empty.) Thus, public intervention is no longer necessary.

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possible orders. The payoff distribution according to the average of these various formation orders is then called the Shapley Value(Shapley,1964).

Another factor enhancing ex-post sustainability is the presence of transaction costs. When the coalition cannot be formed without cost, the ex-post characteristic function of the players will have to include the value of transaction costs. Thus, suppose that there are transaction costs of forming a coalition, TRC= 20. The conditions for the core are now given by:

1. $C(i) \leq 300 + 20$

2. $C(1,2) \leq 400 + 20$

   $C(2,3) \leq 400 + 20$

   $C(1,3) \leq 400 + 20$

3. $C(1,2,3) = 630$

which results in a stable and unique solution given by the price vector: (210,210,210).[6]

While transaction costs are sunk in nature, they warrant treatment as a separate category because of their policy implications. Typically, technology related sunk costs cannot be legislated away by public authorities and are therefore unlikely to be used as policy instruments. Transaction costs, on the other hand can be easily legislated(e.g. entry licences).

Public policies designed to deal with the unsustainablity problem should consider the nature of the problem. Ex-ante and ex-post unsustainability may require a continuous entry regulation. Ex-ante unsus-

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[6] In general, the existence of the core does not imply that the solution is unique. More than one price vector can be in the core.

tainability with ex-post sustainability may require only a temporary intervention designed to establish the optimal market structure.

2.4 WELFARE AND POLICY IMPLICATIONS OF CONTESTABLE MARKETS

Baumol et al.'s analysis of the welfare characteristics of contestable markets is static in nature and does not go beyond the notions of consumer's and producer's surpluses. If the assumptions of the contestability hypothesis are met, a list of the industry's welfare characteristics will be as follows:

1. A contestable market never offers more then a normal rate of return, irrespective of market structure. Positive profits always induce entry ; an entrant by setting a slightly lower price can still earn positive profit. For contestable market to be sustainable, profits have to be equal to zero.
2. The second characteristic of a contestable market is the lack of any sort of inefficiency. If a firm were to earn non-negative profits while producing at higher cost than necessary, an entrant could undercut the firm's prices and earn a positive profit by operating more efficiently.
3. The industry configuration has to be most efficient. If it is not, some rearrangement of output could reduce total cost. An entrant whose size corresponds to that rearrangement can earn positive profits at prices below those held previously.
4. No cross-subsidies are possible in perfectly contestable markets. If any product or set of products of the incumbent firms do not yield incremental net revenues as great as its incremen-

tal net costs, then an entrant can cut prices and earn more than the incumbent previously did. The entrant will not produce money losing products, concentrating only on a profitable set.

Given the above welfare characteristics of contestable markets, if the industry is structurally contestable and has sustainable configurations available to it, than it is suggested that "the industry is best left to its own devices with no government interference, even if it is composed of a very small number of firms" (Baumol et al.,1982,p.466). Monopolies need not be regulated and mergers leading to monopolies need not be prevented. Market contestability, therefore, can be used to design a new set of policy guidelines for regulators and antitrust authorities. These guidelines can be used to identify cases where no public intervention is necessary and cases where some form of public intervention may be needed.

Given that the prime source of barriers to entry is the presence of sunk cost, public policies should work towards reducing sunk costs in the industry. Technologically determined sunk costs usually cannot be 'legislated away', thus, separation of sunk costs from the industry seems as the only policy option. The problem, then, is to what degree these facilities are separable from the rest of the industry. While highways, airports may be examples of separable facilities, there may be cases where separability is difficult if not impossible.

When separability is possible, public authorities should ensure that the access to these facilities is equal for both the incumbent firms and the potential entrants. This may be difficult in cases of

growing demand and lumpiness in the construction and expansion of the facilities. Thus, in times of insufficient capacity, a system of capacity allocation has to be designed. This system should eliminate any disadvantages that the entrants may have in getting access to the limited capacity.

When markets are sustainable, barriers to entry, such as licences (other than those dictated for reasons of safety and consumer's protection), should be eliminated. Since barriers to exit may become a barrier to entry, exit impediments should be eliminated as well.

With an exception of predatory pricing, other competition policy issues have not been addressed within the contestability framework. It is not surprising given that in contestable markets, the basic conditions of demand and technology, but not firms' conduct determine the industry performance. As far as predatory pricing is concerned, Baumol et al.(1982,P.482) claim that it is unlikely in contestable markets.

> If entry is really free and exit really costless, predation can have no payoff. By most definitions, a predatory act is one that is not in the firm's normal business interest, and so it must incur at least an opportunity cost for the enterprise that undertakes it. But where the entrant can run away costlessly, there is little to be gained by using costly predatory measures to drive him out.

In markets that are not perfectly contestable, Baumol et al.(1982,p.475) suggest a rather simple rule which they call ' Quasi-permanence of Price Reductions '. According to this rule, the established firm is allowed to lower prices in response to entry, but is not permitted to raise these prices if the entrant is forced out of the market. Baumol et al. claim that this rule should force the existing firms to adopt a permanent 'limit pricing' strategy, which is

very close to pricing in contestable markets. In practice this rule may be very difficult to implement. Changes in input prices, productivity rates and inflation rates, all have effect on prices. Thus, the public authority would have to monitor the costs in the industry to be able to identify these changes and allow the firms to change prices accordingly. Otherwise, the 'quasipermanence' rule would hamper optimal resource allocation. The data collection requirements and the necessity to monitor all variables that may effect cost, suggest that this proposition will amount to little less then price regulation, something that does not quite agree with the spirit of their approach.

When, despite intervention, markets are still far from contestability ideal, regulation or antitrust intervention might be justified.

> In fields, where technological conditions impose heavy sunk costs and other obstacles to exit and entry, markets will not be contestable and the market mechanism cannot always be trusted to produce benign results. In such circumstances, one may, for example still not wish to preclude single-firm production in an industry that is clearly a natural monopoly. But this monopoly will be a legitimate candidate for regulation or antitrust scrutiny(Baumol et al., 1982,p.478).

However, in situations like this, the cost of public intervention has to be compared with the inefficiency existing in the industry.

The above policy prescriptions involve the case of sustainable market structures. In cases of unsustainability, Baumol et al.(1982,p.473), suggest a complete reversal of policies.

> First, it may be considered appropriate to adopt programs that inhibit entry into the affected markets. Second, it may be desirable to revise received attitudes toward such entry-deterring measures as strategic pricing - the use of the threat of responsive prices. Rather than constituting an instrument of predation, such strategic behavior may be the only means open to the market mechanism to maintain any sort of order and any approximation to equilibrium.

These propositions are paradoxical. The first one is the opposite of the general approach towards entry barriers, and the second relies on predatory pricing,which was found impossible in contestable markets in the first place(!).

In the multiproduct case, the unsustainability of the optimal market organization may arise when the economies of scope are weak, while the economies in the provision of some product are significant. Also, a new substitute product may disrupt a currently optimal structure. Baumol et al.(1982,p.475), quote the Post Office as an example:

> The U.S. Postal Service seems to provide a striking example of this problem, which may plague it increasingly in the future, as an electronic mail becomes increasingly inexpensive in comparison with the first class mail. The fact that the two are close substitutes may mean that firms specializing in electronic communication can draw large numbers of customers away from the U.S. Postal Service. The latter may find itself without any prices against such competition, even if the two types of mail do offer sufficient economies of scope to make it efficient for one enterprise to supply them both.

An intervention here could involve restriction of the substitute product or some sort of price discrimination within the current product mix to preserve the competitiveness of the product threatened with the new substitute. However, since the cost estimation, especially in the mutiproduct case is very difficult and its results often doubtful, one can never be sure if the benefits of economies of scope are greater than the benefits of new products. The problem of imperfect information and shortcomings of currently available estimation techniques applies to all types of unsustainability. Under these circumstances, the lack of perfect knowledge on by the public authorities, should favor entry, and the burden of proof against entry should be on the existing firms.

Given that sunk costs and other market imperfections are usually present in most industries, the unsustainability problem should be a rare phenomena. Since an investigation may be very difficult and the possible intervention may have detrimental side-effects, 'correcting' the unsustainability problem has to be done with extreme care. However, when the unsustainability of an industry may seriously affect other industries or society in general, the investigation of the problem and possible intervention seems justified.

This chapter has related market contestability to the historical development of industrial organization and has discussed the basic concepts and assumptions of the theory. Market contestability is a continuation of past research on barriers to entry and their effects on conduct and performance of industries. The traditional mainstream approach considers entry barriers as they interact with structure, conduct and performance of industries. In contestable markets, however, the external conditions dominate the internal conditions, and conduct and performance are independent from the industry structure. Contestable markets are defined by freedom of entry in the Stiglerian sense and by the possibility of 'hit-and-run' entry. These characteristics of contestable markets ensure that in the absence of unsustainability, the industry performance is consistent with Pareto optimality, even in monopoly.

> The incursion by entrants into the market, may effectively discipline the monopolist, even if entry is never successful. It can force the monopolist to curb his avarice and forgo profits he might otherwise have enjoyed. Indeed, in the absence of entry barriers, in perfectly contestable markets, it can force him to accept earnings no higher than those available under perfect competition(Baumol et al.,1982,p.224).

Market contestability may not ensure Pareto optimality if the most efficient market structure is not sustainable. Two type of unsustainability can be distinguished - ex-ante and ex-post unsustainability. Ex-ante unsustainability does not allow the optimal market structure to emerge. It is possible, however, that if the industry is protected from the opportunistic entry in the development stage, the optimal market structure will be ex-post sustainable. The presence of sunk and transaction costs has been found as a factor enhancing market sustainability.

Despite the claims that market contestability "provides the building block of a new theory of industrial organization which will transform the field and make it more applicable to real world"(Baumol et al.,1982,p.XIII), market contestability cannot be considered as an alternative to structure-conduct-performance paradigm of industrial organization. In the Presidential Address delivered to the meeting of American Economics Association, Baumol(1982,p.1) has stated: "I must resist the temptation to describe the analysis I will report here as anything like revolution. Perhaps terms, such as 'rebellion' or 'uprising' are more apt". Also in the discussion of contestable oligopolies, Baumol et al.,(1982,p.345) have pointed out that "in reality many oligopoly markets are far from contestable. For an analysis of these cases, one must turn to the standard oligopoly models. But the model of oligopoly in contestable markets provides a bench mark,...with which both theoretical and actual performance...can be usefully compared". Thus, the principal applications of the theory are that of a welfare standard for all industries and an industry mod-

el for industries characterized by freedom of entry and the possibility of 'hit-and-run' entry.

Chapter III

CONTESTABILITY AS AN INDUSTRY MODEL AND A WELFARE STANDARD

This chapter examines the limitations of market contestability as an industry model and a welfare standard. There is a discussion of conditions necessary for 'hit-and-run' entry, strategic entry deterrence and and first move advantages of established firms. Limitations of market contestability as a welfare standard will then be presented.

3.1 HIT-AND-RUN ENTRY

The welfare characteristics of contestable markets have been obtained by Baumol et al., when 'hit-and-run' entry has provided the disciplining mechanism. The importance of 'hit-and-run' entry in the contestability theory necessitates a closer examination of conditions under which such entry is possible. Baumol et al.(1982,p.11) provide the following list:

> 1. Antitrust or regulatory policy which actually inhibits price changes by incumbents in response to entry.
>
> 2. Bertrand-Nash expectations on the part of potential entrants that they will assume that incumbents will not change prices in response to entry...Here, paradoxically, it is the

> entrant's belief that incumbents' prices will not change which may make such price changes inevitable.
>
> 3. If an entrant's output is 'small' relative to that of the industry, the magnitude of these required adjustments may also be 'small', and hence it may be justifiable for the entrant to ignore them.
>
> 4. If an entrant can quickly take advantage of a profit opportunity offered by current prices and can withdraw quickly without exit cost if prices are adjusted to eliminate the profit opportunity, incumbents will not be able to protect themselves from the potential-entry pressures by threatening strategic price responses.

Responding to the criticism of contestability theory by Reynolds and Schwartz(1983), Baumol et al.(1983,p.493) added one more possibility:

> All we require is that before making his investment in the market, the potential entrant be able to enter contracts to supply potential customers for a nontrivial interval of time.

The first condition involves either regulation or antitrust. It applies to cases when incumbents, but not entrants, are subject to price regulation and/or when antitrust constraints price adjustments by incumbents. The case of regulation involves an inconsistency. If the regulatory system is in place, why wouldn't the regulatory agency set prices at the optimal level, in the first place? In addition to this, regulation typically involves all firms in the industry. The new entrant becames an incumbent once it enters the market. This rule therefore implies that firms would be treated differently depending on the time of their entry into the industry. Antitrust constraint may involve a case of a freeze of the incumbent's prices or a form of 'quasipermanence of price reduction'. As indicated in Section 2.4 such intervention may lead to allocative inefficiency and be a form of disguised regulation.

The second case involves entrant's belief of no price response of the incumbent. The question is what is the basis for this belief. If the incumbent is not constrained by public policies and there are no informational problems, strategic responses may be in its best interest. This, condition, therefore, assumes that the entrant has irrational beliefs.

The third case involves a 'small' entry. This, however, results in a contradiction. First, if there are economies of scale present, a small entrant has to experience a cost disadvantage versus the established firm. This, in turn, results in a barrier to entry in the Stiglerian sense, which violates the crucial assumption of the contestability theory. Secondly, if a small entrant does not experience a cost disadvantage, then the industry is naturally competitive. The case of contestability degenerates into the case of perfect competition. Small scale entry also opens a possibility of deterring the financially constrained entrant when the bigger established firm has access to greater financial resources. An example of such a strategy, in a game theoretic framework, has been recently given by Benoit(1984).

The next case involves a situation when a price response lag of the incumbent exceeds an entry and exit lags of the entrant. While theoretically possible, it is a very special case, the relevance of which has to established empirically. Reynolds and Schwartz(1983), have demonstrated that a violation of this condition may, under some circumstances, lead to a paradoxical result of monopolistic price always prevailing in contestable markets.[7]

[7] Consider a case when there are no sunk costs, there is no entry lag

The last condition involves a possibility of ex-ante contracting between potential entrants and customers. In many markets such contracting may not be possible, especially in markets where the number of customers is large and they are not organized. Also, customers may refrain form entering the contracts if transaction costs are present and there is uncertainty about future demand, costs, availability of substitutes and other relevant factors.[8] When the number of customers is large and they are unorganized, a new entrant has to resort to some form of public advertising to inform the customers about its prices. Public advertising, however, implies that the incumbent firms will be informed as well. This, in turn, will enhance the established firms' ability to react strategically. In addition to this, public advertising typically reaches customers gradually. This may preclude the ability of an entrant to take over the whole market. The gradual entry, however, will result in a barrier to entry before the minimum efficient scale is reached by the entrant.

---

and the exit lag is identical for the incumbent and the entrant. (Market contestability implies a symmetry between incumbents and entrants.) If the incumbent sets prices at a competitive level naturally no entry follows. Suppose however, that the incumbent sets his preentry prices at a monopoly level. Positive profits will attract entry but as there are no sunk costs for both entrant and incumbent alike, the incumbent may exit the market having earned positive profits. Now, the entrant is in a position of a monopolist and the same reasoning will apply to him. Thus, the only rational choice will be to set a monopoly price. In this almost perfectly contestable market only monopolistic price will prevail, with sequential entry and exit - result completely opposite to the predictions of the theory.

[8] Williamson(1985) provides an extensive discussion of conditions facilitating and inhabiting contractual arrangements between buyers and sellers.

Finally, 'hit and run' entry implies buying and selling capital goods following entry and exit. In the market economy, buying and selling productive equipment always involves transaction costs and risks. The prices of assets may drop at the time of exit, and the entrant will face a possible capital loss. Transaction costs and risks (similarly as sunk costs) will impose an additional entry barrier.

It appears that the conditions required for 'hit-and-run' entry are very restrictive. This has both positive and normative implications. They are positive in the sense that the industry has to be examined if any of the above conditions apply to it before the contestability theory can be used as a model of this industry, and normative in the sense that the industries free of sunk costs and other barriers to entry may deviate from the contestability ideal if 'hit-end-run' entry is not possible. The impossibility of 'hit-and-run' entry is of special relevance for the issue of allocative efficiency. If prices can be adjusted quickly, there is no reason to set them in the anticipation of entry. It may be more profitable to set prices at the monopolistic level and adjust them if entry takes place.

3.2 FIRST MOVE ADVANTAGES, INFORMATION AND CONTESTABILITY

When neither of the conditions defining 'hit-and-run' entry is fulfilled, there is a possibility of predatory behavior. Strategic entry deterrence can be modeled using a simple two agent game given by Dix-

it(1982). Consider a two-stage game between an established firm and a prospective entrant (Figure 4). The first stage is the entrant's decision. If he decides to stay out, the incumbent payoff is equal to monopoly profits, M. If entry occurs, the established firm decides whether to fight a price war with payoffs W to each, or to share the market with profits S to each duopolist. Is is assumed that M>S>0>W, which means that duopoly is still profitable, while price war is mutu-

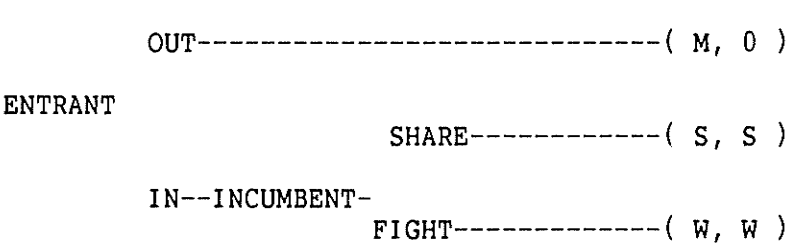

Figure 4: Entry Deterrence Game

ally destructive. The game is noncooperative, so the Nash-equilibrium seems to be a natural solution concept. It is easy to see that the strategy pair FIGHT IF ENTRY for the established firm and STAY OUT for the entrant constitutes such an equilibrium(as both incumbent and entrant have no incentive to change their strategies if the other party's strategy is given). This equilibrium is not unique - the game has a second Nash equilibrium given by strategies SHARE IF ENTRY for the incumbent and IN for the entrant. In the first equilibrium entrant is better off staying out if the incumbent strategy is always fight. The incumbent,in this case, feels free to plan a price war knowing that it is never going to occur. This does not seem very realistic. In treat-

ing the established strategy as given, the potential entrant is giving credibility to a threat which the incumbent has no ex-post incentive to fulfill. (If entry occurs even by mistake, the incumbent has no incentive to fight as he is clearly better off by sharing, S>W). To deal with such counter- intuitive equilibria, Selten(1976) introduced the concept of perfect equilibrium. Perfect equilibrium requires that each of the strategies starting from any point of the game tree should be optimal. This excludes equilibria that are based on expectations by one player of another's behavior that would not be rational for the latter to carry out if called upon to do so. Thus, the strategy FIGHT IF ENTRY will not be a perfect equilibrium, as the entrant knows that the optimal response to entry is sharing. The game has one perfect equilibrium, which is IN and SHARE IF ENTRY. In order to make a credible threat, the incumbent would have to be better off by choosing to fight when entry occurs rather than by sharing.

Market contestability model assumes that the sunk costs are exogenously determined. In many industries, however, firms have a choice between technologies characterized by different levels of sunk costs. By choosing high sunk cost technologies, firms may commit themselves to entry deterring strategies. Commitment may also be increased by incurring extra expenditures, such as increased advertising. An example of such a case is given in Figure 5. Using this game, commitment can be described as incurring cost 'C' by the established firms in readiness to fight a price war. The cost C does not change his payoff if a war occurs, but lowers it by C otherwise. The established firm will find it optimal to fight in the event of entry if W > (S-C).

The established firm will bear cost C when M - C exceeds the payoff of S, that is making no commitment and sharing. From this, we have M-S > C > S-W, which establishes the condition for credible entry deterrence.

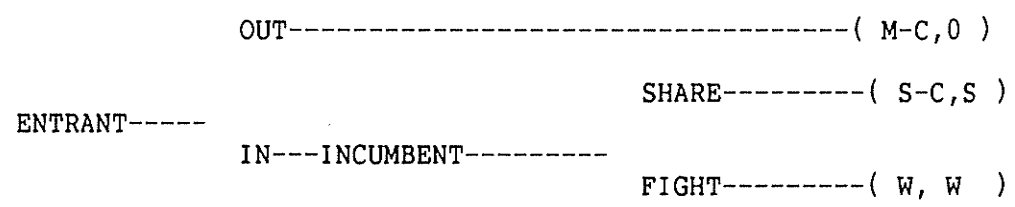

Figure 5: Credible Entry Deterrence

Consider now an extension of the above game. The incumbent is not committed, it is the entrant who makes the commitment. This game is given in Figure 6.

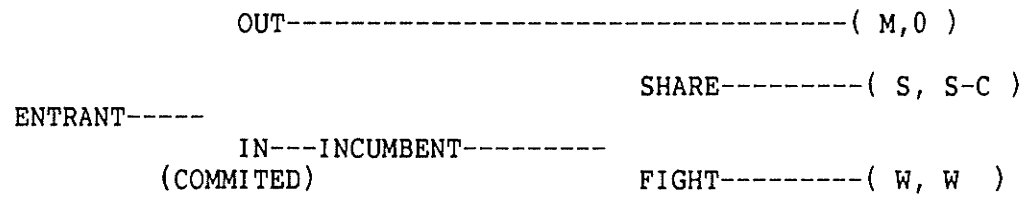

Figure 6: Credible Strategies of an Entrant

The game has a unique Nash-equilibrium with the entrant entering and the incumbent sharing the market as long as (S-C) > 0 > W for the entrant, and S > W for the incumbent. Thus, sunk costs may enhance entry rather than deter it, if it is the entrant who has the first move advantage. Sunk costs, therefore, result in barriers to entry only in combination with the first move advantage by the incumbent firm. Given that by definition, the incumbent is in the market first, it should have an incentive to create barriers to entry, not only to make its entry deterring strategy credible, but also to prevent entrants from commiting themselves.[9]

Another type of the first move advantage of the incumbent firm results from product differentiation. In the book Barriers to New Competition Bain(1956,p.116) stated:

> In general product differentiation may lead to significant buyer preferences between established products and the products of new entrant firms. There is a good a priori possibility, moreover that most buyers will on balance prefer established and known products to new and unknown ones... This general tendency of buyers to prefer established to new products may place potential entrants to a differentiated product industry at a disadvantage as compared to firms already established in the industry.

Product differentiation involves both the characteristics mix(Lancaster,1981), and its perception by the consumers. As long as firms can duplicate the characteristics mix of the product it should

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[9] Appelbaum and Chin Lim(1985) present a model in which a firm, entering a market for a new product, faces a trade-off between the informational advantage of later commitments and the production efficiency of early commitments. The high degree of uncertainty will cause the incumbents to choose more flexible technologies(with lower sunk costs) of production resulting in higher market contestability. Thus, the degree of precommitment will depend simultaneously on the degree of uncertainty, costs of adjustment and ex-ante efficiency of production.

not be a source of barriers to entry in the Stiglerian sense. It is, therefore, the consumer's preference for established brands which results in barriers to entry.

The consumer's preference for known, established brands has been defined as a good will phenomenon(Weizsacker,1980). Good will can be defined as the phenomenon whereby consumers, through experience or other kind of information(advertising, for instance) form a good opinion about the quality of the product(s) of a supplier(Weizsacker,1980). This can be of special importance in markets, where it is not easy for consumers to assess the quality of a product(service), before they actally purchase it. The involved uncertainty results in:

1. Risk of purchasing a good/service of lower than expected quality.
2. Information costs of making the quality assessment before the purchase.

One of the most effective mechanisms for the reduction of information gathering costs is the extrapolation principle. Using the extrapolation principle, consumers guess the unknown quality of the good/service based on its past performance and on the behavior of other consumers. This increases the incentive to offer good quality products even when consumers have imperfect information.(Failure of this mechanism has been known as the 'lemon' principle - it will be referred to later.) The extrapolation principle reduces the depreciation rate of the stock of relevant information and provides the incentive for producers to live up to these expectations. It can also

result in a barrier to entry. To see this, imagine the supplier of a new product entering the market. At this point, consumers do not have a choice between competing brands. Some of the consumers will buy the product and if they are satisfied, will likely continue to buy it in the future. Others can observe the degree of satisfaction of those who have purchased the product and can then form their opinion about the product quality. Consider now a potential entrant offering exactly the same product in terms of a vector of its characteristics. In addition to incurring a sunk cost of informing the consumers about the product, the entrant has to overcome the consumer's inertia resulting from the extrapolation principle. To do that, the entrant has to encourage(bribe) the consumers to try his product by offering free samples, price discounts, coupons, etc. The cost of these incentives is sunk and results in a barrier to entry. Since the established firm can react strategically by offering similar discounts, coupons, increasing advertising expenditures, the cost of entry and risk involved may be even higher. In addition to this, firms may also try to impose switching costs on consumers, which do not arise from imperfect information and extrapolation principle. An example here may be computer makers. Personnel, programs, and data are often specialized to a computer manufacturer. The extent of the established firm's advantage depends upon how similar machines of a new firm are to the existing machines, and how specialized the user's applications are. The leading firms may try to make their equipment incompatible with that of the potential entrants. The feasibility of this strategy will depend on the particular characteristics of different industries. The good will related barriers to entry can be 'innocent', in a sense that they

arise from being first in the market, and strategic if firms use brand proliferation to fill all the possible market niches.

The good will related advantage of the incumbent firm has to do with informational imperfections on the consumer's side of the market. Imperfect information may also involve potential entrants' knowledge about an incumbent firm's commitment. Suppose that the entrant does not know for sure whether the incumbent is committed or not.[10] He assigns a probability P that the incumbent is committed, leaving the probability (1-P) that the incumbent is bluffing. The probability P is of a subjective nature and reflects the beliefs of the entrant. What is the condition of successful entry deterrence now? The entrant knows that a committed incumbent always fights and that the uncommitted one always shares, therefore the expected value of entering the market(E(entry)) is:

(1) $E(entry)= P*(W) + (1-P)*(S).$

The entry will not take place if E(entry) is less than zero. From this it follows that:

(2) $E(entry)= P*(W) + (1-P)*(S) < 0$ or $P*W - P*S + S < 0$;

so that

(3) $P*S - P*W - S > 0$ or $P(S-W) > S$

and

(4) $P > [S / (S-W)]$

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[10] In general, the uncertainty may be two sided, that is the incumbent may be uncertain about the entrants commitment, as well.

Thus, the entrant will stay out if the probability that the incumbent is committed is greater than S / (S- W). The term in the denominator (S-W) suggests that the greater the loss associated with war, the smaller the subjective probability of the incumbent being committed has to be for successful entry deterrence.[11]

In the above games, the incumbent planned to engage in predatory practices directed against a single entrant. The incumbent may also exhibit predatory practices to 'signal' toughness to other potential entrants. This situation was first described by Selten(1978). Selten considered a model in which there is one chain-store with branches in N towns. If another firm enters one of the markets, it is possible for both of them to survive but the profits being much lower than before the entry. In each town, there is one potential entrant. Sequentially, the entrants must decide whether to enter the corresponding markets. If entry takes place at a given stage, the incumbent has to decide whether to fight or share the market. Allowing the entrants to observe the moves in the early stages would build a reputation effect. The incumbent firm may choose to fight in early stages of the game to persuade later entrants to stay out. Only near the end of the game would the incumbent be willing to share the market. However, this can be contradicted using backward induction. Consider period N, after which the game ends. There are no future entrants and therefore there is no need to build a reputation of being though. Thus, the incumbent will likely share the market in the last period and therefore, the op-

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[11] W<0,otherwise entry deterring is impossible, but this implies that the term in the denominator has to be positive and increase as the loss associated with the 'war' increases.

timal strategy for the entrant is to move in. Now consider the period N-1; the monopolist has no reason to fight as fighting is costly in the short run and it cannot deter the last entrant anyway. But if that is the case, the same reasoning applies to periods N-2, N-3, etc. The induction clearly dominates and establishes the perfect equilibrium with the entry and acquiescence of the monopolist. This has been called a chain-store paradox since the game theoretic reasoning brings a counter-intuitive solution. One way to resolve the paradox is to assume the infinite horizon of the game. As Milgrom and Roberts(1982) demonstrate, this can establish an equilibrium with predatory pricing and successful entry deterrence. However, one may have doubts of whether the infinite horizon is a rational assumption. 1000, 10000, 100000 are still well before infinity but how many firms are planning that far ahead? There has to be an upper bound on N, the number of periods considered. It seems that it can be determined partly by the stability of demand, the speed of technological progress and other exogenous factors, and partly by the firm's commitment to a particular market. Since both exogenous and endogenous factors determine the optimal N, there will be a great deal of uncertainty on the part of potential entrants about the planning horizon of the incumbent. However, when N is <u>not known</u> the potential entrants cannot determine which period is the last one, and therefore, inductive reasoning cannot be applied in an easy way. The potential entrants could assign subjective probabilities about N, but the incumbent firm has an informational advantage,since he knows what is his true planning horizon. The information asymmetry may have a significant impact on the incumbents ability to deter entry.

The type of games where one of the players is better informed than the other can be analyzed using Harsanyi's (1967) approach. He suggested treating the incomplete information game as one of imperfect information in which nature moves first in picking the game to be played. One of the players(the incumbent in our case) is informed of nature's move, while the other assigns probabilities p and 1-p to the possible states of nature. Milgrom and Roberts(1982), and Kreps and Wilson(1982), applied the Harsanyi approach to the chain-store game with asymmetric information. Both demonstrate that the reputation effect predominates the outcome of the game, establishing the possibility of entry deterrence by signalling 'toughness' to potential entrants.

As long as firms are not identical in terms of the time when they enter the market, the symmetry assumption of market contestability will not hold. The firms which appear first in the market will typically have an advantage over the future entrants, which results from the ability to make commitments and build good will capital.

The first move advantages of established firms may pose a difficult dilemma for the policy makers. If the policy objective is to bring the industries as close as possible to the contestability ideal, the ability of firms to make commitments might have to be restricted. Such policies, however, would imply extending the government intervention to the areas traditionally considered a management prerogative and, given the lack of perfect knowledge on the side of public authorities, such an intervention may easily cause more harm than good. As far as the good will advantage is concerned, there is typically little

that the public policies can do about it. In fact, policies aimed at eliminating this advantage of the established firms may be counter-productive, if the high quality producers cannot receive a return from their quality performance(this problem will be referred to in Section 3.4). In a positive analysis first move advantages have to be considered when market contestability is being used as an industry model.

Finally, consumer behavior has received little attention in the contestability literature, the consumer being considered passive and always accepting the lowest price supplier. Such behavior, however, may not be in the best interest of the consumer. Consider a monopolistic firm, setting prices at the monopolistic level most of the time, and reducing them when faced with a new entry. Suppose, however, that the consumers behave strategically, that is, they choose a more expensive, new supplier if they think that the new entrant will not set monopolistic prices in the future. The possibility of such behavior will impose a constraint on the monopolistic firm, even if 'hit-and-run' entry is not possible. However, there are two important limitations for the feasibility of strategic behavior of the consumers:

1. Uncertainty about the future behavior of the new entrant(the new entrant may set monopolistic prices after he takes over the market).
2. Coordination problem - when there are many independent consumers, they may not be able to coordinate their behavior. Uncertainty about other consumers' behavior may force individual consumers to choose the cheapest supplier at the time in a man-

ner similar to the behavior of the players in the prisoner's dilemma game.

3.3 SUNK COSTS, BARRIERS TO ENTRY AND WELFARE

Perfect competition has been used as a welfare standard because in the absence of externalities, informational imperfections and economies of scale, it is consistent with the first best Pareto optimal allocation of resources(Varian,1984). One of the limitation of perfect competition as a welfare standard is its incompatibility with the economies of scale, which has led economists to search for an alternative performance standard. Clark(1940) has proposed a concept of 'workable competition' which has been refined by a number of economists. Sosnick(1958), has outlined the most important criteria for workable competition. Using the standard structure-conduct-performance model, these criteria included:

I. Structural Norms

1. Artificial inhibitions on entry and mobility do not exist.
2. There are moderate and price sensitive quality differentials in the products offered.
3. The number of traders is as large as scale economies allow.

II. Conduct Criteria

1. Firms do not collude.
2. Firms use no exclusionary, predatory, or coercive tactics.
3. Some uncertainty as to whether a price reduction will be met.
4. Sales promotion should not be misleading.

III. Performance Criteria

1. Operations should be efficient.
2. Promotion expenses should not be excessive.
3. Profits should be sufficient to reward investment and to encourage innovation.
4. Cyclical instability should not be intensified by price changes.
5. Qualities and outputs should respond to changes in consumer demand.

The above performance criteria could be used as signals, indicating whether the industry performance is socially optimal, while conduct and structure criteria could provide a guide for the competition policy.

The concept of workable competition has received its share of criticism, which was primarily directed at the subjectivity of the evaluation process and a difficulty in the translating of workable competition into a set of operational rules(Hay and Morris,1979). Market contestability has been designed to provide the universal benchmark, applicable to all market structures, which is more general than per-

fect competition and more operational then workable competition. As it has already been stated, in the contestability framework the principal source of deviations from optimal allocation of resources is the presence of barriers to entry. This raises two questions:

1. Do barriers to entry always result in inefficient allocation of resources?
2. Is there a continuous improvement in welfare as barriers to entry are reduced in the industry?

As far as the first question is concerned, Section 2.3 indicated that market sustainability would be enhanced by the presence of sunk costs and other barriers to entry, which identifies the first case where sunk costs may improve welfare. Another case when welfare may be improved involves innovation. Weizcaker(1980) has offered a methodology which can be used to evaluate welfare implications of barriers to entry. In Weizcaker's theoretical framework, three levels of activities and competition can be defined. The first level consists of those activities which do not increase the total quantities of goods available. These activities are either the consumption of available goods or their redistribution by exchange, gifts, theft, extortion, etc. Level I competition is therefore identified with anarchic free access to goods.

The second level of economic activity is the production of goods. Continuing undisturbed consumption or the first level of economic activity can be possible only if production replenishes the supplies of available goods. Without suppressing the first level competition, the

second level of economic activity cannot function properly. If goods can be obtained 'free' by theft, for example, the production cannot recover the incurred costs. The usual way in suppressing level I competition is by the establishment of property rights which are enforced by armies, governments and the legal system. Economic activities which characterize the level II are those that increase the supplies of known goods and this level may be identified with the free access to the available processes of production.

The third level of economic activity involves the production of new knowledge or innovation. It consists of activities leading to technological progress in production or designing new goods and services. If the production of new knowledge is to be profitable, the suppression of level II and level I competition is necessary. The producer of new knowledge needs some property rights to his invention if the profit motive is to govern that level of activity. Given that any protection is costly, it is not true that society always prefers more of a higher and less of a lower level of competition. For example, the total suppression of the first level competition (making theft, robbery impossible) would require a police state. The total restriction on free access to new inventions would not allow for diffusion of knowledge and would then not allow society to capture all the possible benefits of the new knowledge.

Thus, the mix of <u>competition</u> and its <u>restrictions</u> is necessary at each level of economic activity. To the degree that new entry constitutes additional competition, the entry level may be socially suboptimal either when entry is insufficient or when it is excessive (af-

fecting technological innovation). The production of new knowledge is essential for the long term dynamic performance of the economy. Innovation, however, requires that firms incur costs in in R&D, which cannot be recovered if the activity is not protected from imitation. The degree of necessary protection will depend, in turn, on the possibility of imitation and its ease. Some industries, like drugs and chemical products sink the R&D effort into a product which can be easily copied. If entry is not restricted, a new firm can come into the market, copy the product, and since it did not have to incur the costs of development it may offer the product below the break even point of the firm which originally developed the product. The possibility of this will make the innovation unprofitable and the rate of technological progress in the industry may be much lower than is socially optimal. Thus, the necessity to sink costs into the innovative activity together with an ease of imitative entry may result in a market failure. In some industries, the product of the innovative activity cannot be easily or costlessly copied, e.g. funds have to be committed to the copying effort, production processes have to be altered, labor retrained, product specific asset have to be purchased, which implies incurring sunk costs. These sunk costs, however, may play a <u>positive</u> role if their presence protects innovation. Industries will differ in the 'natural' protection of the innovative activity offered in terms of the difficulty and the cost of imitation. When the protection is insufficient, it may be necessary for governments to restrict entry in the industry in such a way that the discounted sum of benefits due to innovation exceeds the discounted loss due to monopolistic pricing. Thus, the arguments for an elimination of barriers to entry may not be valid in a dynamic context.

The presence of sunk costs may also be welfare improving in the context of so called ' lemon principle'. The 'lemon principle' was first discussed by Akerlof(1970). It arises when asymmetric information about product quality results in market failure (insufficient supply of high quality goods or even the breakdown of the market). The necessary conditions for this to happen are:

1. sales are independent of the product quality - for instance, the supplier appears only once in the market. Hence, there is no incentive to built a reputation.
2. higher quality can be only achieved at cost.
3. potential consumers are imperfectly informed about the product quality but suppliers know the true quality.

With these conditions present, two phenomena may arise:

1. moral hazard - producers will maximize their profits by supplying only low cost and low quality products
2. adverse selection- suppliers offering high quality goods will be driven out of business.

With no reputation present, the good will mechanism cannot work. However, when the possibility of repeated buying is introduced, suppliers may try to build an image of high quality. The image may be important when the imperfectly informed consumers use the extrapolation principle in their future transactions. Suppliers face a dilemma: they can continue to supply high quality products or they may try to reduce the quality and make extra profits by cheating the consumers whose behavior is characterized by some inertia. Consumers have an idea about the

average quality which is based on their past experience. When they are faced with a lower than average quality product they may not know if they were just unlucky in buying a product from the lower tail of the quality probability distribution, or whether the quality of the product decreased. The only way they can find the true product quality is to continue their purchases until they can revise their subjective quality probability distribution in a Bayesian manner. In this context, the presence of sunk costs may effectively prevent the producers from reducing quality, since when the consumers are finally convinced that the supplier is cheating them, they can refuse to purchase from the firm in question. Thus, sunk costs may play a role of ensuring a commitment to high quality.

Sunk costs may be technologically determined but may also be self-imposed by suppliers as a means of communicating their commitment to the quality of their products(Klein and Laffler(1981) and Ungern-Sternberg and Weizacker(1985)). Firms may use advertising expenditures which constitute sunk costs as a way of ensuring the buyers that the quality of their products will not be decreased. Thus, the policies aimed at reducing sunk costs may cause a welfare loss if they result in a ' lemon' type market failure.

The first move advantage of established firms may also result in a case when potential competition reduces welfare. This case can be illustrated by referring to the game given in Figure 5. In this game the ability to make commitments has allowed the incumbent firm to deter new entry. The problem arises when commitments have no positive social value(eg., excessive advertising). Potential competition may

not affect the price being charged by the monopolist and the output produced, but it will force the established firms to waste resources in the process of making commitments. Thus, potential competition may add to the monopoly induced inefficiencies, instead of elevating them. Public policies aimed at enhancing potential competition may reduce welfare in such a case. Unless the established firms' ability to make 'wasteful' commitments is constrained, the potential competition will result in a welfare loss, not a welfare gain.

Also, the presence of externalities may require restricting entry. Thus, the presence of externalities and methods of internalizing them has to be examined, as well.

In the industries where the optimal market structure is sustainable, technological progress is exogenous, or where firms' investment in technological progress is protected and where the 'lemon' type market failure is impossible, barriers to entry have a usual, detrimental effect on market performance. The question remains whether reductions in sunk costs and other barriers to entry will lead to continuous improvements in efficiency. This is important as public policies are not costless. The improvement in social welfare has to be compared with the cost of public policies implemented. Baumol(1986,p.351) provides a proof of continuity when individuals and firms can enter contracts. However, this has to be considered as a special, not a general case. Some support to the continuity of welfare improvements has been given by a series of laboratory experiments conducted by Coursey, Isaak, Luke and Smith(1984). The laboratory experiments, however, do not provide a decisive proof. The issue of continuity, therefore, has

not been satisfactory resolved by the theory and has to be considered as a factor limiting the usefulness of market contestability as a welfare standard.

A welfare standard can be used as a benchmark, against which an industry performance is evaluated, and as a policy guide, in a sense that public policies are used to bring the industry towards the stated ideal. As a policy guide, the usefulness of market contestability is restricted by its partial equilibrium, static perspective, which considers only the issues of allocative and cost efficiency. Public policy objectives towards industries may go beyond the narrowly defined economic efficiency and include national and strategic interests, equity and other relevant social and political objectives.

The analysis of this chapter has identified some important limitations of the theory of contestable markets. As a descriptive model, the theory relies on 'hit-and-run' entry, which has been found to be possible under a set of very restrictive assumptions. Low levels of sunk costs, alone, do not guarantee that an industry will behave in a way consistent with the contestability hypothesis. When 'hit-and-run' entry is not possible, firms' behavior matters, which has important welfare and policy implications. It requires that public policies aimed at bringing the industry closer to the market contestability ideal be instituted in conjunction with competition policies aimed at preventing predatory conduct and making 'wasteful' commitments, where such conduct is possible. Public policies designed to reduce sunk costs and other barriers to entry may have a negative effect on welfare if the optimal market structure is unsustainable, the 'lemon'

type market failure is possible, innovation needs protection from imitation, firms are able to make socially wasteful commitments, internalizing externalities requires restricting entry and where other social and political objectives require restricting contestability.

In evaluating the applicability of market contestability as an industry model the following conditions have to examined:

1. The feasibility of 'hit-and-run' entry.
2. The conditions of entry in the industry.
3. The nature of information dissemination in the market.

In order to assess the usefulness of market contestability as a welfare standard and a policy guide the following characteristics of the industry's economics need to be evaluated:

1. The nature of the technological progress in the industry.
2. The possibility of the 'lemon' type market failure.
3. Sustainability.
4. The possibility of making socially 'wasteful' commitments by firms.
5. The presence of externalities and methods of internalizing them.
6. Other economic and non-economic objectives relevant in the context of a given industry.

Chapter IV

AIRLINE ECONOMICS AND CONTESTABILITY

This chapter examines the basic economics of the airline industry and relates it to the assumptions of the contestability hypothesis. Demand and supply characteristics, economies of scale, economies of scope and network economies are related to the conditions of entry in the industry. Other potential sources of barriers to entry are also presented. The issue of sustainability is related to pricing behavior and conditions of entry in the industry. Finally, market contestability as a welfare standard for the industry is evaluated.

4.1 DEMAND FOR AIRLINE SERVICES

Demand for air travel is derived from the consumer's want to move from one point to another. This need to move may be determined for different reasons. People may want to go on holidays, to visit relatives or to go on business. Thus, an expenditure on the trip may be a part of the consumption package or may be treated as a production expenditure, depending on the purpose of the trip. While different rea-

sons for travelling will result in different demand characteristics, the nature of the travel itself remains the same. In all cases, the trip has a time and distance element. The distance element involves a basic phenomenon that moving any object requires an energy expenditure, which is costly. The time spent during travel has an opportunity cost to the consumer, whose objective may be described as a minimization of the total travel cost. Since movement from one point to another can be achieved by different transportation modes, the price of available substitute modes will affect the demand for air transportation.[12] The demand function for the air travel can be described by the following function:

DAS = f(P, T, PS, I , Q, TRC , S , N)

where DAS - demand for air travel

P - price(fare)

T - time cost

PS- price of substitutes

I -income

Q - amenities (drinks,leg space,movies etc.)

TRC-consumers transaction costs(cost of making reservations, switching planes,switching an airline, etc.)

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[12] It is recognized that in the routes beyond 100 miles, air transportation is a dominant mode. However, on short routes road transportation will be a viable competitor.

S - safety

N - population size

and $dDAS/dP < 0$; $dDAS/dT < 0$; $dDAS/dPS > 0$; $dDAS/dI > 0$;

$dDAS/dQ > 0$; $dDAS/dS > 0$; $dDAS/dTRC < 0$; $dDAS/dN > 0$;

The time variable can be further divided into:

$T = T_1 + T_2 + T_3$

where

T_1 stands for time spent to arrive at the airport and from the airport to the point of destination.

T_2 is determined by the expected delay (the difference between the desired and actual time of departure).

T_3 is the time of the travel itself.

T_1 and T_3 are determined by the location of the airports and the distance between cities and are given by some constants. T_2 , then will become the prime variable affecting the changes in consumer's demand. T_2, in a given city par situation, will depend on frequency of offered flights. Thus, $dT_2/dF < 0$, where F stands for frequency.

Thus, we have : $T = (T_1 + T_2) + T_2 (F)$ which can be substituted into the demand equation to obtain:

$DAS = f (P, F, N, PS, I , Q , TRC , S)$, where

$dDAS/dP < 0$, $dDAS/dF > 0$, $dDAS/dN > 0$, $dDAS/dPS > 0$,

$dDAS/dQ > 0$, $dDAS/dTRC < 0$ and $dDAS/dS > 0$, $dDAS/dI > 0$.

Airline demand also exhibits cyclical fluctuations which are typically related to fluctuations in the overall level of economic activity and may be identified by estimating the semilog trends for revenue passenger miles(which are the indicators of airline output) and obtaining the residuals from the respective trends. A similar procedure may be applied to the time series of GNP. The residuals from the GNP and RPM trends can then be plotted and compared.[13] This is illustrated in Figure 7, for the U.S. and Figure 8, for Canada. The two series appear to be related, with greater conformity exhibited by the American series. RPM for both countries exhibits greater percentage fluctuations form the trend than GNP. Finally, there is some randomness in the demand for airline services. Unexpected business opportunity, death in the family, a convention, etc., are examples of situations giving rise to random fluctuations in demand.

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[13] The trends were estimated using the following functional form: ln RPM = A + b*t, and ln GNP = B + c*t (where 't' stands for time). Residuals from semilog trends are unit free and can be used for inter-country comparisons.

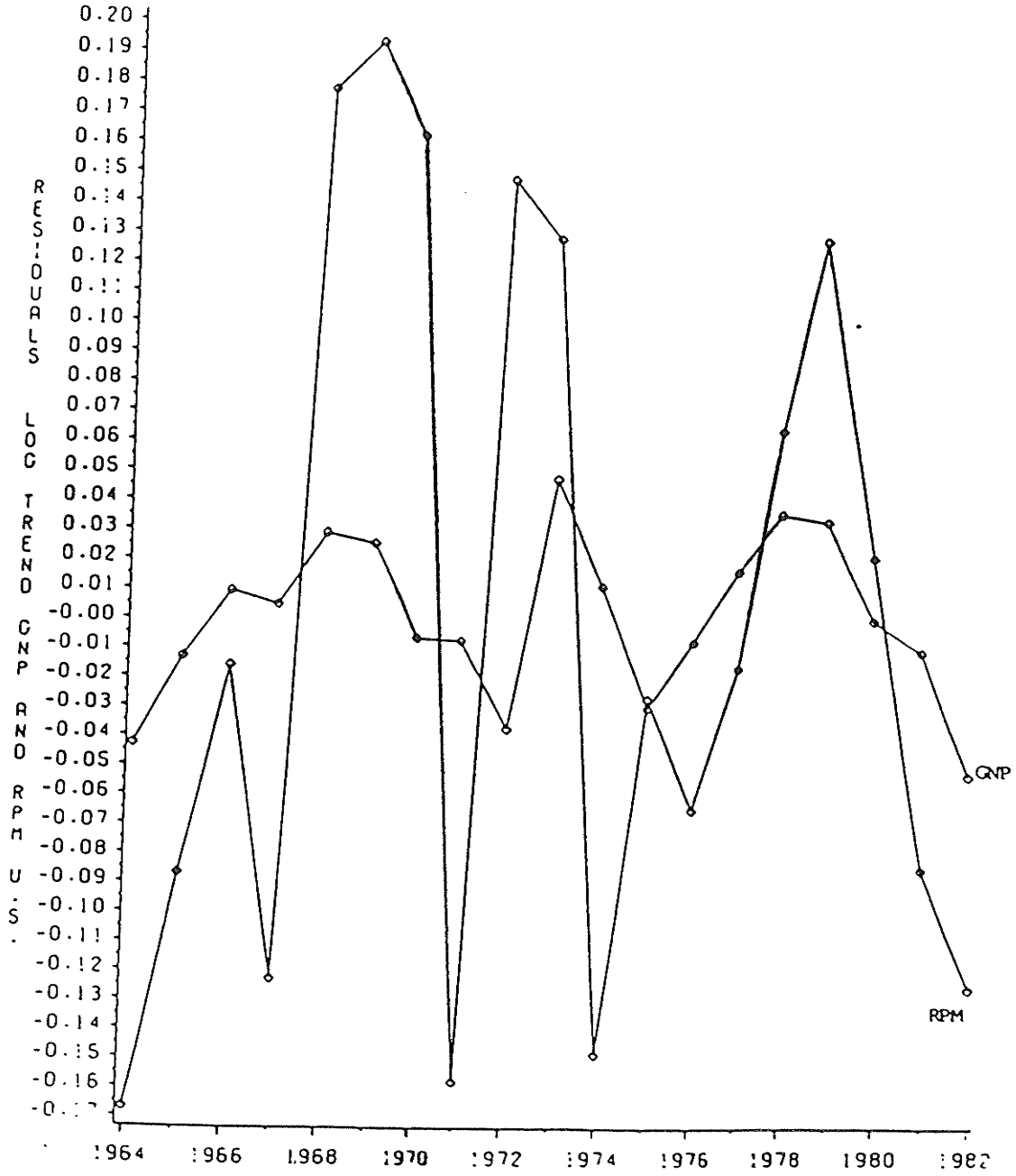

Figure 7: RPM and GNP Fluctuations - U.S.
Source: CAB(1983a)

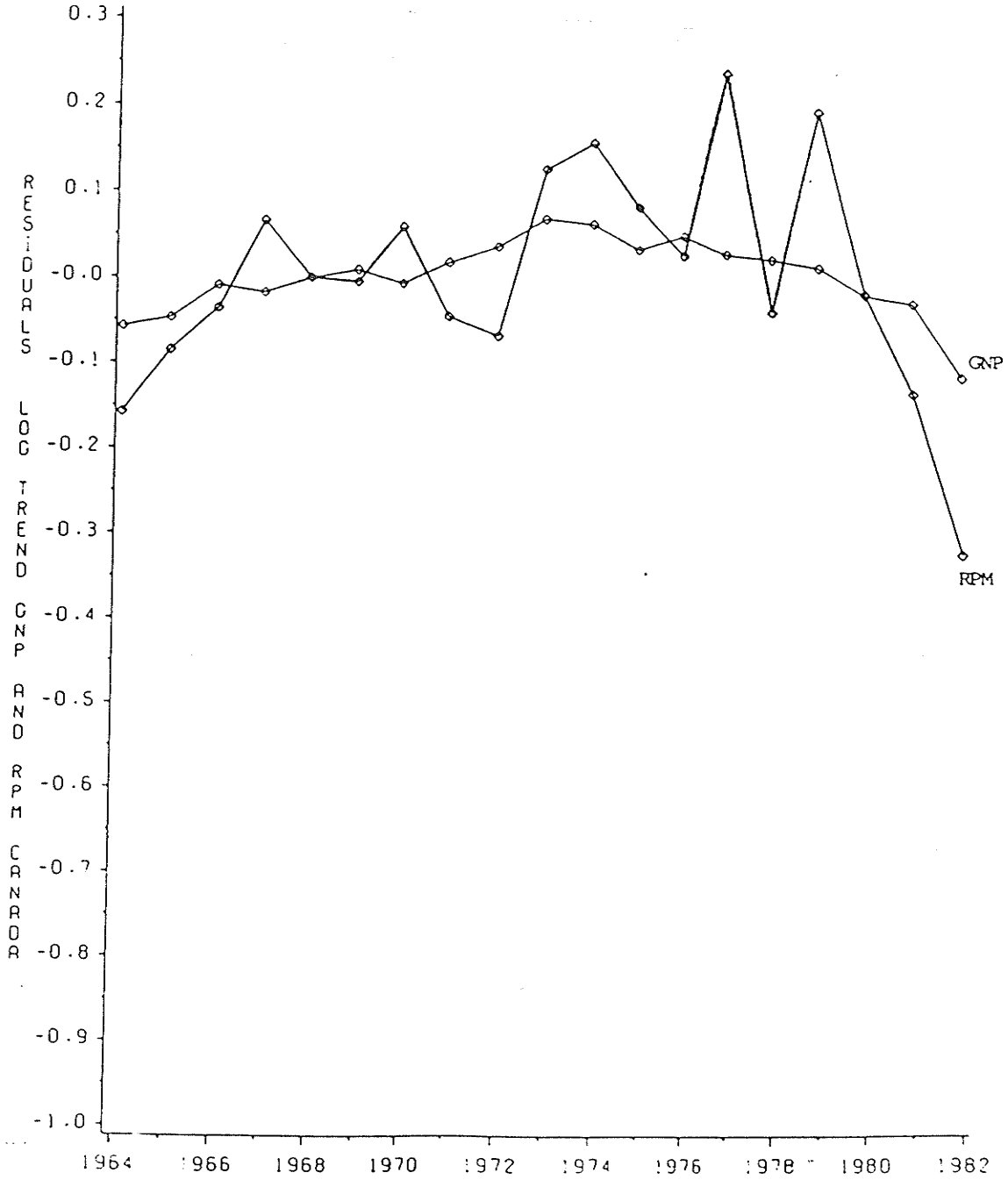

Figure 8: RPM and GNP Fluctuations - Canada.
Source: Statistics Canada(1984a).

4.2 AIRLINE COSTS AND THE OPTIMAL AIRLINE SIZE

The cost of supplying airline services can be divided into the following categories[14] (Table 1):

1. flight operating costs
2. ground operating costs
3. overhead

Based on the data from Table 1 for Canadian level I carriers(1981), about 84.4% of total costs can be considered as variable, while 15.6% as fixed costs. The figures presented are based on the cost structures of airlines operating integrated networks. The distribution of costs for individual airlines will differ, depending on their networks, service mix and types of customers they serve and will change over time as output changes. The percentage distribution of costs is also sensitive to exogenous changes such as input price changes, technological progress, etc. The above figures, therefore, can be considered only as a broad approximation of the airline cost structure. The airline costs in a given city par market can be described in the following function:

Cost/Seat(SC) = f{(C (aircraft size), SL (stage length), F(frequency), IP (input prices) }.

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[14] The analysis of airline costs(Table 1) and assets(Table 2) is based on 1981 data. Data for the later years is much less detailed due to the change in reporting requirements.

TABLE 1

Airline Costs - Level I Canadian Carriers

COST CATEGORY	$MLN.	PERCENT OF THE TOTAL
I. FLIGHT OPERATING COSTS		
1.1. Pilots and Copilots -	274	7.34
1.2. Other Flight Personnel	116	3.11
1.3. Passenger Servicing -	364	9.76
1.4. Aircraft Fuel and Oils -	1,044	28.03
1.5. Landing Fees	94	2.52
1.6. Insurance Fees-	41	1.09
1.7. Other Expenditures	41	1.09
1.8. Aircraft Servicing	167	4.47
1.9. Rentals	50	1.34
1.10. Maintenance-Flight Equipment	217	5.82
Sub Total	2409	64.61
II. GROUND OPERATING COSTS		
2.1. Reservation and sales	438	11.74
2.2. Traffic Servicing	279	7.48
2.3. Maintenance - Ground Equipment	216	0.56
Sub Total	738	19.79
III. OVERHEAD - SYSTEM OPERATING COSTS		
3.1. General Services and Administration	211	5.65
3.2. Servicing Administration	56	1.50
3.3. Labor Training	27	0.72
3.4. Advertising and Publicity	68	1.82
3.5. Depreciation and Amortization	219	5.87
Sub Total	581	15.58
Total	3728	100.00

Source: Derived from Statistics Canada(1981).

$dCS/dC < 0$, $dCS/dSL < 0$, $dCS/dF > 0$, $dCS/IP > 0$.

The cost per seat tends to be lower for bigger aircraft, which suggests that there are potential economies in the aircraft size. The stage length is a distance characteristic of the service in the market. Generally, as the stage length increases, the cost per seat tends to decrease(Laprade,1981). This is illustrated in Figure 9 and Figure 10. Over a short range the distance related economies are stronger. The reason for this is that at each stop (if service is not direct), there will a time and energy loss due to manoeuvring around the airport, landing, opening and closing the door, taxing and taking off, which all consumes additional fuel, and even when the aircraft is not in the air, there are operating labour costs.

The relationships presented in Figure 9 and Figure 10 were obtained on the assumption that the aircraft is used at full capacity. However, many markets do not offer sufficient traffic densities to allow for the big aircraft and high frequency at the same time. If this is the case, the costs per seat will increase if the market is offered more frequent service using a smaller plane ($dCS/dF > 0$). However, frequency affects consumers' costs and the consumers are willing to pay for more frequent service. Hence the airline will face the problem of optimally choosing the aircraft type and frequency in a given market.

The presence of necessary overhead, which may not increase proportionally with output, economies of aircraft size, and consumers' time savings determines the airlines' economies of scale in a given market and for one type of service.

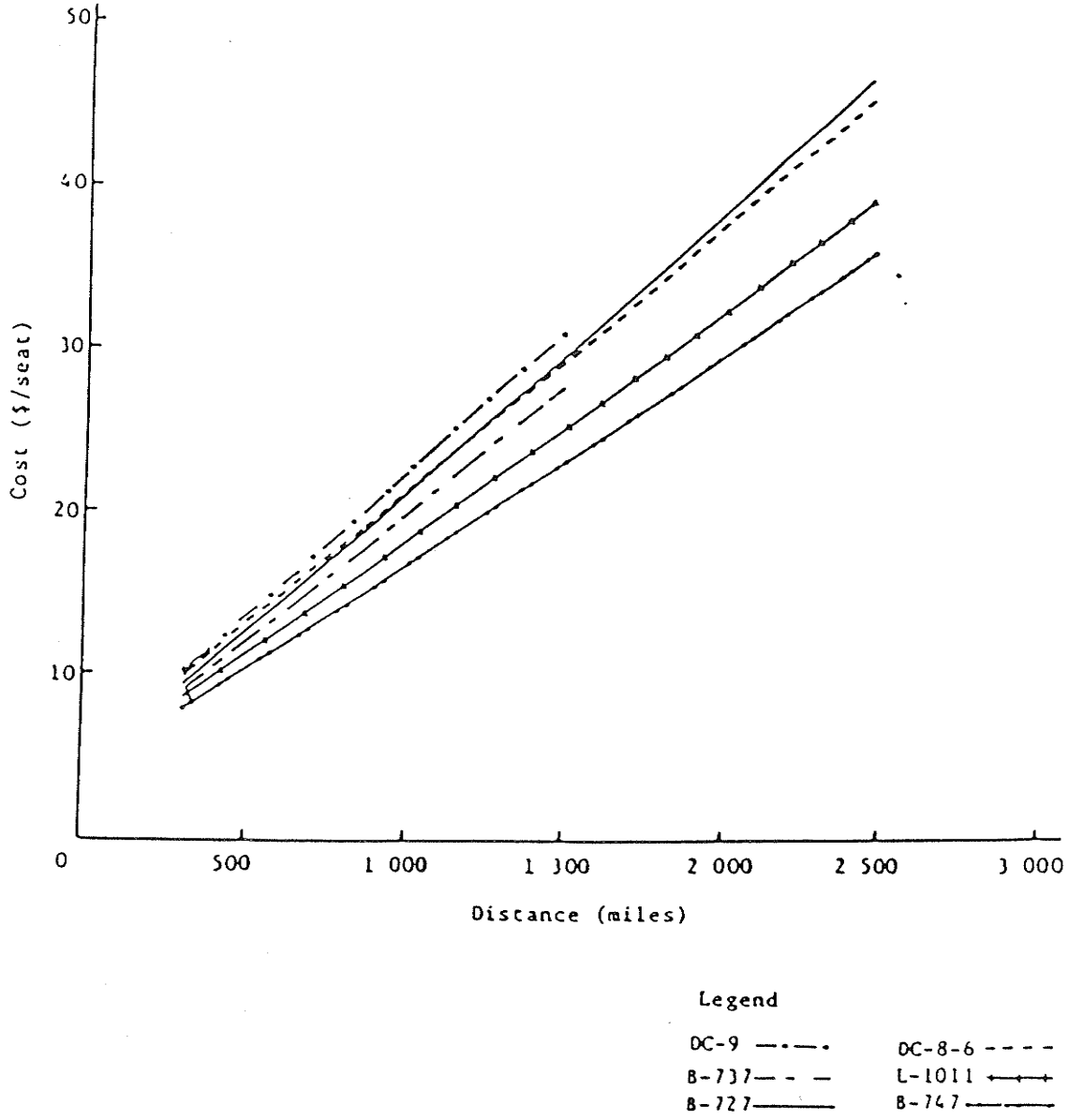

Figure 9: Airline Costs and Distance I.
Source: Laprade(1981,p.8).

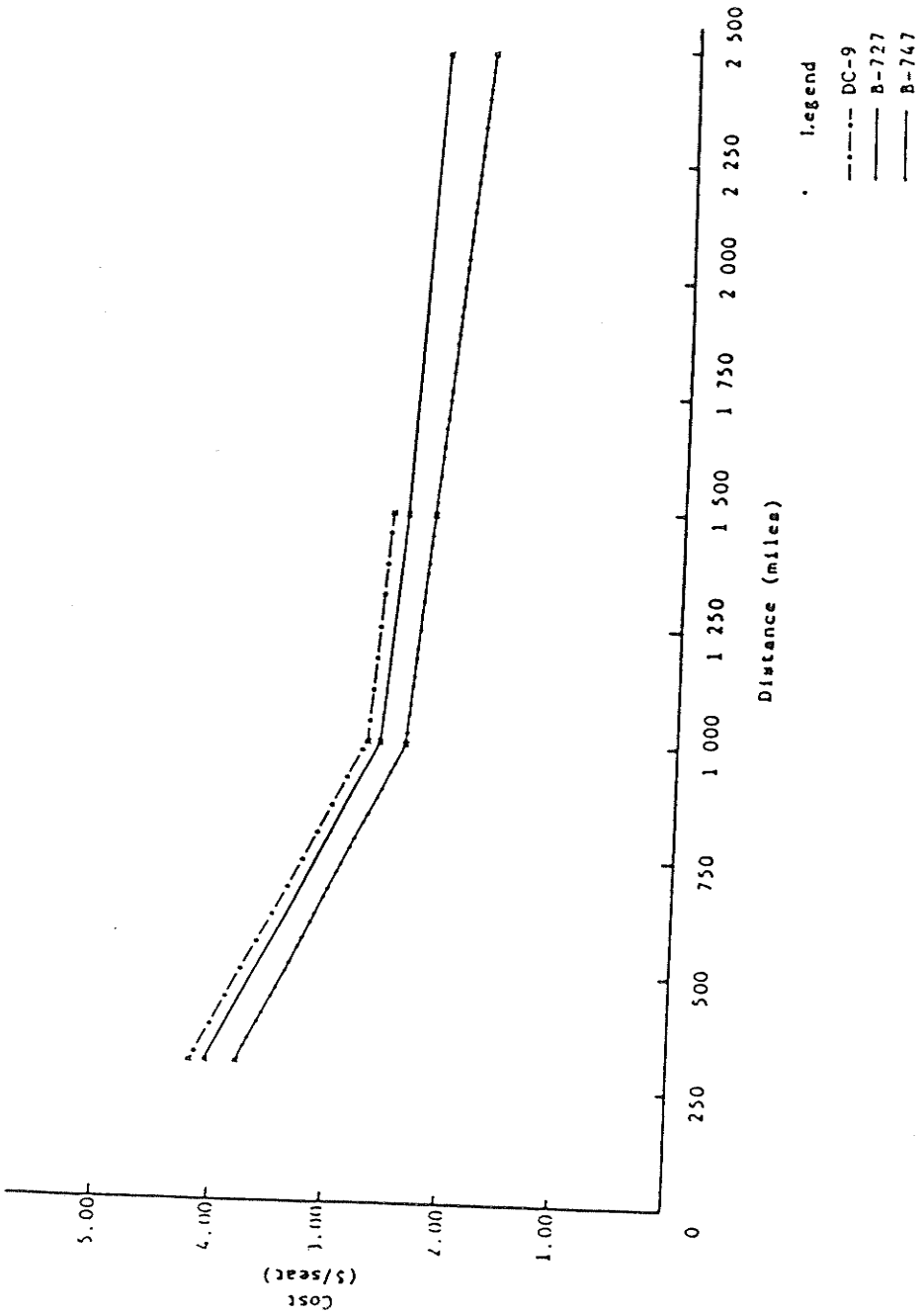

Figure 10: Airline Costs and Distance II.
Source: Laprade(1981,p.14).

The airlines serving only one city-pair market are very rare. Also, airlines usually supply more then one output. Thus, the presence of economies related to the number of markets served - network economies, and the number and types of services provided - economies of scope, may have a significant effect on the airline industry.

Airline customers may be divided into two broad classes: the time sensitive, requiring on demand service such as business customers, and the less time sensitive leisure, or tourist customers. Thus, the first two airline outputs involve discount/ charter service and regular, on demand service. Airlines may also carry cargo or mail, but given that this thesis is primarily concerned with the passenger service only the first two outputs will be considered here. These two outputs can be suplied either by specialized carriers or jointly by one carrier. If it is cheaper to supply them jointly, the economies of scope will be present.

The first source of possible economies of scope involves the presence of common overhead. Management does not have to double if two specialized carriers merge. The same goes for maintenance and ground facilities and savings can also be found in advertising and promotional expenditures. These are standard sources of scope economies are typical for many industries; the airline industry, however, offers additional savings from joint supply of outputs.

As indicated in section 4.1, demand for air travel at any given point of time is stochastic in nature. That is, in addition to systematic fluctuations which result in peak/off peak variations in demand,

a purely random component is also present. Because of random fluctuations, the supplied capacity has to systematically exceed the average demand (which can be estimated on the basis of its past probability distribution), if the time sensitive customers are not to be disappointed. This, however, implies that there will always be unfilled seats. Suppose now, that the service to the business and leisure customers is supplied separately. The leisure customers will fly at high load factors at low frequency, while the empty seats on the business segment remain unfilled. Since the marginal cost of accommodating passengers to fill these seats is virtually zero, there will be a strong incentive to offer them for sale. The business customers will not be affected in their ability to obtain the seat first, and the total cost will be reduced if the otherwise wasted capacity is put to a productive use.

Another source of economies of scope arises from the possible use of a bigger aircraft and/or increased frequency. Suppose, for example, that in a given city par market, there are 4k customers, 2k business and 2k leisure ones (inelastic demand is assumed for simplicity). Originally, there is a separate service offered to these two classes of consumers:

a) twice a day, there is a charter service for discretionary customers using a big aircraft of k passenger capacity.

b) four times a day, there is a regular service for business travellers using a 0.5k passenger capacity plane.

Suppose that a joint service is offered. The business travellers are served first and unfilled seats are sold to the leisure customers. The total number of passengers remains the same, yet there are potential savings to be had. For example, suppose that joint service is offered four times a day service using a k capacity plane. The frequency for the business travellers remains the same, while the tourists are offered more frequent service. Only k capacity planes are used now and the costs (due to economies of aircraft size) are reduced. If the lower system costs are at least partly passed to customers in form of lower prices, the new traffic may be generated, increasing the magnitude of gains. The joint provision of service to business and tourist travellers has become more popular in recent years. The declining market share of charter only operators is an additional indication of the presence of scope economies.

Network economies can be described as the cost savings achieved due to operating multipoint, integrated networks instead of separate carriers serving each city par market. Similarly, as in the case of economies of scale and scope, the common overhead, maintenance facilities and marketing offer potential cost savings. This cost jointness may be enough to ensure that:

C(1,2....N) < C(1) + C(2) +...+ C(N) (1...N are the cities served).

However, there are additional sources of savings. On the demand side, consumers tend to prefer airlines offering more destinations, because of the transaction cost savings to the customers. Lower transaction

costs will result from the reduced search time for appropriate connections and from convenience of online versus interline service. The evidence of such preference has been shown in an empirical study of the North Central and Southern merger (Carlton,Lanndes,Posner,1980). Operating an integrated network may also be instrumental in capturing the economies of aircraft size and/or increasing the offered frequency.

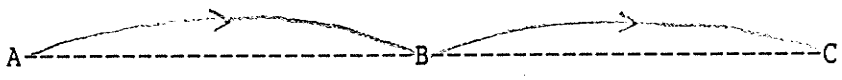

Figure 11: Hedge-Hop Network

To see this, consider a simple network situation(Figure 11). Theoretically, three cities (A,B,C) can be served by separate airlines offering direct service in each city par. Suppose, for simplicity, that there are k homogeneous passengers travelling between each city par (A to B, and B to A, A to C, and C to A, and B to C and C to B). As the airlines have to make the choice of aircraft type and frequency for each city par market it is not difficult to see that the maximum size aircraft must be of k/F capacity (F stands for frequency). Now, suppose that instead of direct flights, the airlines introduce a 'hedge-hop' operation, that is a plane starting from A flies to B and then from B to C. The total number of passengers flying from A on each flight will be 2*k/F (that is passengers A to B and A to C). At B, A to B k/F passengers will leave, but k/F B to C passengers will board

the plane. Thus, the number of passengers will remain 2*k/F. How does this compare with the situation of direct flights? When the service is direct the maximum capacity is k/F, but by introducing the hedge-hop operation, the aircraft size can be doubled reducing airline costs or frequency of the service can be doubled. The hedge-hop operation is not free of diseconomies. The first is the reduction of the stage-length on the A to C segment(the aircraft has to stop in B). The second involves time loss for A to C customers, who have to wait in B for B to C customers to come on board. However, A to B and B to C customers do not suffer any additional costs and the stage length on segments A to B and B to C is not affected. Thus, it seems that the cost savings should outweigh the cost diseconomies. Suppose now, that there are five cities located as in Figure 12.

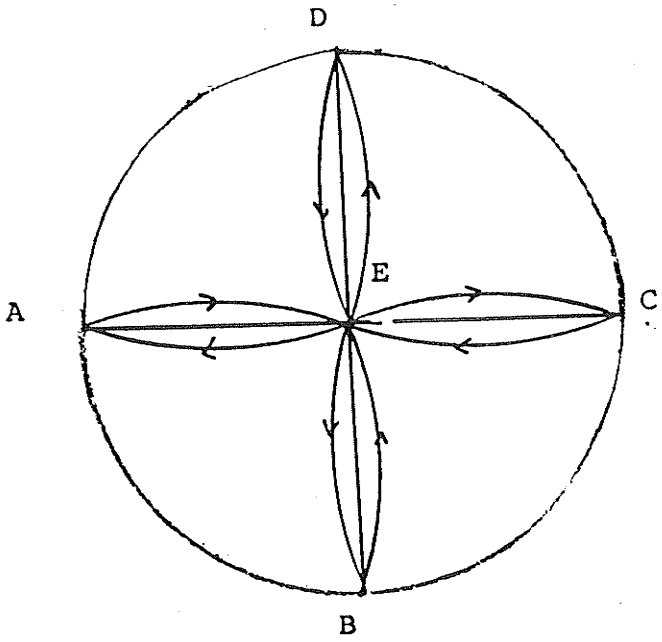

Figure 12: Network Economies - Hub and Spoke

Assuming, for simplicity, inelastic demand and homogeneous customers, there are k passengers in each market(A to B, B to A, A to C,C to A etc.). The number of city pars is (5!)/(2!*3!)=10. A separate direct service is a possibility and the size of the plane will be limited by the flight frequency, that is the maximum capacity will be equal to k/F. The first possibility of cost savings involves the introduction of the hedge-hop operation on A to E, E to C, and D to E, E to B segments. However, even greater savings are possible. E can be chosen as a 'hub' city and 'hub and spoke' system can be established. From each city we will have 4*k/F passengers on each flight:

A to E (A to E, A to D, A to C and A to B passengers)

B to E (B to E, B to D, B to C and B to A passengers)

C to E (C to E, C to B, C to D and C to A passengers)

D to E (D to E, D to C, D to B and D to A passengers).

Passengers flying from A to E, D to E, C to E and B to E will end their trips, while the remaining passengers will switch planes. The total number of passengers on board will not change, since the E to A, E to C, E to B and E to D passengers board the planes. For example, the A to E plane will continue flying to C with A to C, B to C, E to C and D to C passengers ; D to E plane will continue flying with D to B, E to B, A to B and D to B passengers on board. Thus, planes four times bigger can be used, frequency can be increased four times, or there is a possibility of a combination of both (an aircraft twice as big and twice the frequent service).

On the cost side, the stage length on the A to C, C to A , B to D and D to B is reduced when planes stop in E. The passengers on these flights will also suffer a possible time delay. When the indirect flight substitutes for a direct one, there is an additional cost/disutility to the customers, who have to switch planes. The necessity of precise synchronization of incoming and outcoming planes can cause additional problems of congestion and possible related delays.[15]

The 'hub and spoke' network can be further expanded to other hub cities and international routes. Long distance domestic and international routes could theoretically be operated by separate carriers. However, the consumer's preference of on-line versus interline service as well as economies in management,maintenance, advertising, reservation system and airport facilities make it more economical to operate the integrated network. The same arguments may cause the airline to look beyond a single hub to a multi-hub operation. The additional benefits of multi-hub operation may result if demands in different hub and spoke networks exhibit different patterns of seasonality. This could improve the utilization of equipment and reduce the impact of sudden, unexpected changes in the local markets. McShan(1986) has recently found a significant effect of hubbing on airline costs in the deregulated U.S. airline industry. Carriers operating 'hub-and-spoke' networks have had lower costs, higher load factors or have been able to charge higher fares than their competitors. This also suggests

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[15] The above analysis of 'hub-and-spoke' networks concentrates on the private costs and effects on barriers to entry. The issue of the social optimality of this particular types of networks is beyond the scope of this thesis. The preliminary evidence from the American deregulation of airlines reveals that the costs of delays related to congestion may be quite substential(Brenner et al.,1985).

that the carriers' ability to offer more destination through the 'hub' may result in a product differentiation advantage.

With these potential benefits present, what is the limit to the airline size and the optimal market concentration? Part of the answer will depend on the size and locational characteristics of the country, part will belong to the more general question of what is the limit to firm size, or as Williamson(1985) asks: "why can't a large firm do everything that a collection of small firms can do and more?" Constraints on the firms size can be related to the conditions of bounded rationality and organizational complexity(Knight,1921). Added layers of hierarchy may also be responsible for informational imperfections as transmitting information across levels of hierarchy leads to cumulative losses of accuracy of the sent massages. Williamson(1975) finds incentive loss when markets are substituted by hierarchies. The insulation of groups of workers from the market pressure leads to X-inefficiency and reduction of the innovative activity. These and other arguments apply to airlines, as to any industry. The exact point where the diseconomies start cannot be predicted, since idiosyncratic factors such as corporate culture, type and efficiency of management, the climate of labour relations may make the difference. When labour and management cooperate and there is a high degree of identification of the employees with the firm, the problems of opportunism, moral hazard and X-inefficiency may be reduced.

Most of the empirical studies of the industry largely ignored the problem of network economies and described the airlines as a constant

returns to scale industry.[16] These studies have been primarily based on the estimation of airline cost functions and airline profitability. The limitations of these approaches can be related to the quality and availability of data(Stigler,1968). In addition to this, airline costs may differ due to such factors as differing degree of managerial slack, state of labour relations, regulation, etc. Stigler(1968,p.73) has suggested an alternative method, a 'survivor' technique, based on the changing market shares of firms of different sizes in the industry.

> The survivor technique proceeds to solve the problem of determining the optimum size as follows: Classify the firms in an industry by size, and calculate the share of industry output coming from each class over time. If the share of a given class falls, it is relatively inefficient, and in general is more inefficient the more rapidly the share falls.

The recent deregulation of the U.S. airline industry has provided some empirical evidence supporting the claim of the presence of the economies of airline size (this evidence will be referred to in chapter 6).

The economies of airline size are important in evaluating the degree of market contestability in the industry. This is because they define the type of entry in a given city-pair market. When economies of airline size are small, there should be many independent carriers within the national airline network. Potential competition in a given city-pair market, therefore, can originate from the already established carriers. On the other hand, when the economies of airline size are significant and there are only a few carriers in the domestic market, there is a possibility of collusion between the carriers. In

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[16] For example, Caves(1962); Eads, Nerlove and Raduchel(1969); Jordan(1970); Reid and Mohrfeld(1973); Douglas and Miller(1974); Roy(1980).

this case and in the case of just one national carrier, potential competition will have to come from the new, start-up carriers. Baumol et al., and Bailey do not distinguish properly between the types of entry in the airline industry. For example, Bailey in the introduction to Baumol et al.(1982,p.XXI) says about her experience as a Commissioner at the Civil Aeronautic Board: "I was fascinated by the notion of idealized economic markets that are open to entry by entrepreneurs who face no disadvantage vis-a-vis incumbent firms". Similarly, Baumol et al.,(1982,p.7) have stated:

> Because airline equipment is so freely mobile, entry into the market can be fully reversible. In principle, faced with a profitable opportunity in such a market, an entrant need merely fly his airplane into the airport, undercut the incumbent's price, and fly his airplane away to take advantage of some other lucrative option - even if he only returns his rented aircraft or resells it in the well-functioning secondary aircraft market.

This would suggest entry of a new start-up carrier. Yet Bailey(Baumol et al.,1982,p.XXI) goes on to say: "even if a route is flown by a single carrier, other carriers who have stations at both end-point cities can readily enter if monopoly profits become evident", which suggests an entry of the carriers being already established in both cities of a given city-pair market. The two classes of entrants will likely face barriers to entry of different scope and magnitude. It is, therefore, important to identify which type of entry is relevant in the context of a given country. In order to examine to what degree airline markets are contestable it will be necessary to examine both the conditions of entry in the industry and the feasibility of 'hit-and-run' entry.

4.3 HIT-AND-RUN ENTRY AND AIRLINE ECONOMICS

Chapter 3 has identified conditions under which 'hit-and-run' entry is possible. These conditions include regulation and antitrust, expectations of no reaction of incumbents by entrants, small size of the entrants, incumbents' response lags being greater than entry and exit lags and a possibility of ex-ante contracts between entrants and consumers.

As indicated in Section 3.1 the cases of regulation and antitrust involve a number of inconsistencies, which apply to airlines as to any other industry.

The second case involves entrants expectations of incumbents non-reaction, even if they are irrational. There seems to be nothing in the economics of the industry which would suggest this type of expectations. In general, irrational behavior and simple mistakes cannot be excluded. There seems to be no reason, however, to build a model of the industry on the assumption of irrationality(the empirical evidence about entrants expectations will be referred to in chapter 5).

A small scale entry involves two cases. First, the incumbent may not react by reducing prices on its output when it is more profitable to accommodate the entrant. This case, however, does nothing to discipline the incumbent's pricing. Secondly, a small entry will result in an entrant cost disadvantage if the economies of scale are present. The contestability assumption of a symmetry between incumbents and entrants will be violated.

Baumol et al., suggest the last two cases to be relevant in the context of the industry.

> Should the incumbent respond with a sufficient price reduction, the entrepreneur need only to fly his plane away(Baumol et al.,1982,p.7).

and

> In terms of an airline scenario, 'hit-and-run' entry may be possible because the entrant can sell tickets conditionally, and before he flies his plane into the market. For example, before deregulation it was a common practice of charter airlines to make contracts(ticket sales) conditional on filling the plane(Baumol et al.,1983,p.493).

As far as the first case is concerned, the greater reaction lag would imply that it takes more time for an incumbent carrier to change its prices than it takes for the new entrant to inform the customers, fly-in the planes and then withdraw them from the market. In case of the start-up carriers an additional time will be required to set-up stations in a given city-pair market. Thus the entry and exit time will significantly increase. There seems to be nothing in the economics of the industry to justify this lag structure. Adjusting fares can be done quickly, especially by the carriers operating their own computer reservation systems. The possibility of 'hit-and-run' entry also depends on the informational characteristics of the market. In the airline industry travel agencies, connected to computer reservation systems, provide information about prices and schedules. Airlines also use public advertising to inform the customer. The computer reservation systems are typically owned by the major carriers. Thus, its most likely that the established carriers will be first to know about the entrants' plans. This will enhance their ability to react strategically. By using public advertising the potential entrants cannot

exclude the established carriers from access to their advertising. This will allow the incumbents to react. Also, advertising messages typically reach customers gradually. A 'total' entry is not possible when the customers cannot be reached instantenously and simultaneously.

While the second case is possible to some degree in a charter market, it is not possible in the more important scheduled market. In fact, the very nature of the scheduled airline service is its availability on demand. The growing trend of providing the scheduled and charter service jointly makes 'hit-and-run' unlikely, even in the charter market.

As indicated in Section 3.2, strategic behavior of consumers may put a constraint on the incumbent firms, even if 'hit-and-run' entry is impossible. Strategically behaving consumers are unlikely in airline markets because of the coordination problem. There are many consumers in the market and they behave independently, therefore, designing a coordinated strategy by the consumers is not feasible.

It appears that it is extremely unlikely for 'hit-and-run' entry to be possible in the airline industry. This has two implications. First, strategic reactions will matter in the industry, and secondly, the most likely type of entry will be a gradual not a 'total' entry. This, in turn, has important policy implications because public policies aimed at enhancing market contestability cannot concentrate on the structural characteristics of the industry alone. Firms' ability to use various predatory practices has to be constrained, as well, which implies a need for the appropriate competition policy.

4.4 BARRIERS TO ENTRY IN THE AIRLINE INDUSTRY

In the context of the airline industry, barriers to entry may originate from the following sources:

1. Asset related sunk costs.
2. Product differentiation and good will.
3. Information - computer reservation systems.
4. Absolute cost advantage.
5. Availability of essential inputs and airport access.
6. Network and scale economies(gradual entry).

Entry into a given city-pair market can originate from an entirely new carrier or from an already existing carrier. It is likely that the height of barriers to entry will differ for these two types of entrants.

SUNK COSTS

The magnitude of sunk costs can be inferred by examining airline assets(Table 2).

As indicated in Table 2, flight equipment is the most important asset and makes up about 76% of the assets, with the remaining 24% being in ground property and equipment. Since there is a well developed market for used flight equipment, these assets usually are not considered a source of sunk costs. However, we should remember that the ex-

TABLE 2

Airline Assets - Air Canada(1981)

ASSETS	$MLN	% OF THE TOTAL
FLIGHT EQUIPMENT		
1. Airframes	1,723	71
2. Aircraft engines	-	-
3. Aircraft propellers	-	-
4. Flight equipment spare parts and assemblies	139	5
Sub total	1,862	76
GROUND PROPERTY AND EQUIPMENT		
5. Ramp equipment	45	1.9
6. Communications and meteorological equipment	2	0.1
7. Maintenance and engeneering equipment	27	1.1
8. Surface and transport vehicles and equipment	1.5	0.06
9. Furniture, fixture and office equipment	2	0.1
10. Miscellaneous ground equipment	125	5
11. Buildings	247	10.2
12. Construction work in progress	99	4
Sub total	548.5	24
Total	2410.5	100

Source: Statistics Canada(1981).

istence of the secondary market does not guarantee that a seller of the aircraft can fully recover the purchase price. There are transaction costs involved, especially when a brokerage firm is used, and the equipment prices tend to fluctuate over time depending on the market conditions. Thus, there is a possibility of a loss when selling the aircraft, which will translate into a sunk cost. As far as the remaining assets are concerned, the degree of cost sunkness will likely be higher. The easiest to dispose of will be office buildings, while buildings located near the airport may be more difficult to sell. The rest of the assets can be sold only at a significant loss. Assuming conservatively that the transaction costs and the risk premium for the flight equipment amount to 5% of its value and that only 60% of the value of the remaining assets can be recovered, the magnitude of the sunk cost will amount to about 12.4 % of the total asset value. This is a hypothetical figure, which may change over time depending on market conditions. Nevertheless, the airline industry may be described as low sunk cost industry. However, even if sunk costs amount to only 10% of the total assets value, the resulting barrier to entry cannot be considered as negligible. Furthermore, sunk costs do not have to originate from the physical assets alone. Advertising expenditures are considered to be investment in good will and labour training expenditures are investments in human capital, that cannot be recovered if the carrier decides to exit the market. As Table 1 indicated, they amount to about 2.5% of all operating expenditures of the existing carriers. The magnitude of these expenditures will likely be higher for new entrants.

PRODUCT DIFFERENTIATION AND GOOD WILL

Airline service, in a given market, can be described by the following vector of characteristics:

V = { price ; frequency ; type of reservation ; type of plane ; comfort (leg space, seat width, etc.), amenities (food, drinks, free movies, etc.) ; baggage handling ; number of connections ; interlining/on line service ; car rentals and hotel reservations and respective discounts ; frequent flier program ; safety }.

Given many relevant characteristics and that the identical airline networks are virtually unknown, airline service is typically differentiated. Product differentiation can be defined as heterogeneity (both actual and perceived by consumers) of the characteristics vectors of the services offered by various carriers. These characteristics will have a different impact on airline competitiveness. One of the most important ones is frequency. There is some empirical evidence that consumers prefer the airline offering the most frequent service in a given city par market. The literature describes this preference as the S-curve phenomenon(Figure 13). An S-curve suggests that the airline offering the most frequencies will control more than proportionally high market share.

One of the possible explanations for the S-curve phenomenon is the fact fact that consumers can minimize their transaction costs of making reservations by contacting the dominant carrier first. In any case, the S-curve phenomenon will have competitive implications for a prospective entrant. In order to overcome the competitive disadvantage

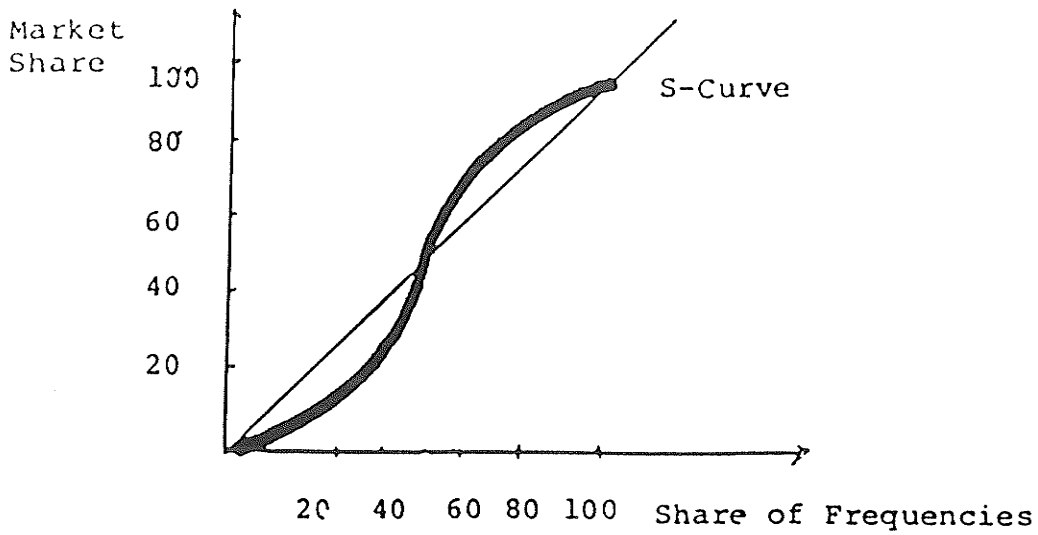

Figure 13: S- Curve

due to the S-curve, other things being equal, the entrant would have to offer the same number of frequencies as the incumbent carrier. Assuming that the airplane type/frequency choice is not affected in a given market, the total number of flights can be treated as given. If the dominant carrier currently serves more than 50% of the flights, only total entry or displacement of the incumbent carrier as the dominant carrier, can allow the entrant to overcome the S-curve disadvantage. When only gradual entry into the market is possible, the S-curve phenomenon will operate as a barrier to entry.

As far as other characteristics are concerned, such as amenities and comfort characteristics, can be easily copied. Others, such as number of connections are part of the larger decisions, which establish the airline network and cannot be copied easily. The ability of

a carrier to offer a large number of connections reduces the consumer transaction cost given the prefence for on-line versus inter-line service. On-line service is preferred by consumers as it typically results in a smaller loss of time between connecting flights, reduces the probability of baggage loss, etc. When the number of connections is relevant for consumers, airlines operating integrated 'hub-and-spoke' networks will experience an important competitive advantage over smaller carriers. Consider, for example, an airline having 20 stations connected through a 'hub'. The number of city-pair markets served will be: {20!/(20-2)!2!}=190. Now consider a smaller carrier being established in 5 cities. The maximum number of city-pair markets served by this carrier will be: { 5!/(5-2)!2!} = 10. Thus, the number of connections increases more than proportionally with the size of the network.

In addition to a characteristics mix, the consumers' perception of service quality differentiates an airline service. Airline travellers are typically repeat customers and the quality of service is difficult to assess before actually trying it. Thus, product characteristics responsible for good will are present in the industry.

A relatively new tool, enhancing the ability of the airlines to differentiate their service, is the frequent flier program. This program offers premiums to frequent fliers, which free flights, upgrading the economy class to first class, free hotel rooms, free car rentals, cruise trips and other awards. In addition to the airlines the program participants include car rentals, hotel chains and cruise operators. Typically, the value of awards increases more than proportion-

ally with the number of points accumulated. A frequent flier award can be considered as a form of 'in kind', rather than cash discounts. It is a well known result of elementary micro-theory that the consumer prefers cash transfers to equivalent in value 'in kind' transfers. Why then would frequent flier programs result in a barrier to entry, if the new entrants are able to offer an equivalent, in value, cash discount? Here are some reasons:

1. In many instances the price of the ticket is paid by the employer of the frequent flier member. The award, on the other hand, is received by the traveller himself. Thus, a more expensive ticket offering 'in kind' premium will be preferred to the cheaper ticket offered by the new entrant.
2. The big carriers are in a position to negotiate special deals with car rentals, hotels, cruise operators and other program participants. These savings may reflect the bargaining strength of the bigger carriers and also reduced transaction costs for other program participants. Frequent flier awards may be a mechanism to pass some of these savings to the consumer. A new entrant will not be able to negotiate similar deals because of its weaker bargaining position and higher transaction costs.
3. Frequent flier programs typically offer awards which increase progressively with the number of miles flown. If most of the business travellers are members of the programs administered by the existing carriers, the entrant may experience a competitive disadvantage. He would have to offer premiums at the high rates currently earned by the travellers. The new entrant

would miss the opportunity of giving proportionally smaller awards at the beginning of the program. This implies higher costs of offering a program as attractive as those offered by the established carriers.

COMPUTER RESERVATION SYSTEMS AND AIRLINE MARKETING

Information about fares and schedules can be obtained from the published Official Airline Guide. When fares and schedules change, using the guide becomes impractical for customers, who find it more convenient to rely on computer reservation systems which are connected to the travel agents' computer terminals. Computer reservation systems are very expensive and only the largest airlines can afford them.[17] The presence of scale economies in computer reservation systems may have important competitive implications. Although a new entrant may gain access to the system by way of user fees, in the deregulated environment, the owner of the system may charge the users monopolistic prices for this access. This will impose an extra cost on the entrants and be a source of extra revenues for the system owner; it will also result in a cost asymmetry equivalent to a barrier to entry. Perhaps even more important is the so called 'display bias', which occurs when the computer program, running the system, is designed to favor the sponsoring carrier's flights ("Reservations Systems Likely to be Disciplined", ATW, 9,1983).[18] This may have very significant implica-

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[17] In the U.S. the dominant systems are American's Sabre, United's Apollo and TWA's Pars. In Canada the dominant system Reservec is owned by Air Canada.

[18] Says Clark Onstad, VP-governmental affair for Continental Airlines: "the consumer is acting in reliance on information which has been consciously and deliberately biased for the sole purpose of influencing his decision in a manner contrary to the consumer's economic and other interests". Also R. Crandal, president of American Airlines has said: "the preferential display of our flights, and corresponding increase in market share is the competitive raison d'etre for having created the system in the first place" (ATW, 9,1983).

tions, since nearly 90%(!) of all travel agents' bookings are made from the first screen. Furthermore, as many as 50% of all bookings in the U.S. are made from the first line of the screen("Airline Dependence on Computers Growing", ATW, 9,1983). Other possible competitive abuses involve:

1. Charging other airlines wishing to participate in the system fees based on the degree of competition that the airline has with the host.
2. Denying or delaying action on the airline's request to become a co-host carrier (a status that rises the airlines placement in the CRS bias hierarchy.
3. Delaying the entry of competitors routes and fares, thus giving the host carrier time to adjust prices and routes.

The ownership and control of the computer reservation system gives an airline additional advantages arising from other uses of the system. Currently the computer reservation systems are known to perform the following additional functions for the host airlines:

1. Hotel reservations
2. Car rentals
3. Baggage trace
4. Scheduling
5. Crew management
6. Flight follow
7. Inventory management
8. Maintenance scheduling

9. Performance analysis
10. Financial analysis
11. Fuel management
12. Frequent Flyer Program administration (ATW, 9,1983).

In addition to all these benefits, the computer reservation system provides the host airline with a significant informational advantage over its competitors. The data generated by virtue of operating the system may allow the host carrier to identify the changes and shifts in the market, which may improve the planning process, since it would allow the airline to anticipate changes in demand much sooner then its competitors.

The sophisticated computer reservation system may also be instrumental in providing the opportunity of selling capacity-controlled discount fares. In addition to allowing for better utilization of equipment, the capacity controlled discount fares may be employed as a powerful competitive tool. For example, when faced with entry an airline may increase the number of available discount seats. Finally, computer reservation systems are very expensive. For example, the Sabre system cost American $90,000,000(1983 U.S $) for hardware, and another $30,000,000 for the software (ATW, 9,1983). While hardware can possibly be sold (probably at a loss, due to fast technological progress), the software has no alternative use, and expenditures on it amount to sunk costs. Sunk costs, in the usual way, will constitute a barrier to entry. The owner of the system will treat the expenditures on the system as at least partly sunk so that depreciation charges on the system are no longer economic costs. The other users of the system will have to pay the regular fees, which are economic costs to them.

Another source of entry barriers, on the marketing side of airline operations, may originate from airlines' dependence on travel agencies as the primary distributor of the air transportation product. This dependence has been growing in recent years, as indicated by Air Transport World's survey of 40 major international airlines. According to this survey about 67-70 percent of airline revenues are typically generated by travel agents ("Airline Dependence on Travel Agents Rising", ATW, October 1985). As already indicated, travel agents especially the busy ones, tend to prefer carriers appearing on the first two screens of the computer terminal. Other potential problems may arise from the fact that air transport is a service which is often paid in advance by the consumer. The problem of liability for the delivery of service, which cannot by stored, naturally arises. Without a middle-man, risk-averse consumers would tend to prefer known and established carriers. The reliance on travel agencies will likely reinforce this effect, as it is in the interest of travel agencies to avoid exposing their clients to the possibility of not receiving the service, especially given that the potential savings to the consumer of flying with the cheaper, less known carriers are not shared by the agents, who are paid their commissions by the airlines.

The established carriers' ability to deter entry strategically deter entry may also be increased when travel agents shift clients from the potentially bankrupt carriers as soon as such a possibility exists (Brenner et al.,1985).

Other potential abuses may involve deals between the established carriers and big travel agencies to discriminate against new entrants.

AVAILABILITY OF ESSENTIAL INPUTS AND AIRPORT ACCESS

The principal input of airlines is the aircraft itself. In times of rapid technological progress in aircraft manufacturing(such as the development of jet plane), the inability to obtain the newest plane may put an entrant in a position of disadvantage. (The type of the airplane affects the characteristic mix of service, and hence product differentiation). The inability of the entrants to obtain new planes arises from the fact that the aircraft manufacturers usually carry a backlog of orders for new planes and when the technological progress in aircraft manufacturing industry slows down, the inability to obtain the newest type of plane may not lead to a serious competitive disadvantage. The new entrants usually choose the used aircraft market, which offers an immediate delivery, but the availability of the used planes depends on the fleet decisions of the incumbent carriers. When the airline decides to purchase new planes, the old ones are usually put up for sale and thus the sellers of the used planes are mainly the existing carriers. Other sellers include brokers specializing in that business as well as airline manufacturers. The airline manufacturers are sometimes forced to accept old planes as 'trade-ins'. Following airline bankruptcies, banks and financial institutions may enter the market with used planes. In any case, the supply of used planes is not steady and may be affected by many exogenous events. For example, an increase in the price of fuel will make the new fuel efficient planes more attractive. The delivery of the new planes will release the old ones to the used market. On the other hand, a decrease of the

price of fuel may increase the attractiveness of the old planes to the carriers and may result in a decrease of the available supply of used planes. Thus, the availability of the planes will fluctuate and may result in a short-term barrier to entry. As far as labour is concerned, airline employees can be divided into the following categories:

1. Pilots
2. Other flying personnel
3. General management and administration
4. Maintenance labour.

Out of these categories two groups are candidates for short-term shortages - pilots and maintenance labour. This is because the necessary skills for these groups, are primarily obtained on the job.

The pilots are highly skilled, highly paid workers, whose skills are obtained over an extensive period of time. Historically, airlines found the major sources for their pilots in ex-military personnel, commuter and corporate pilots. Yet even for the most qualified, military pilot it takes a substantial amount of time to fully adjust to civilian airline equipment and operations, and the new carrier has therefore to train its pilots or attract pilots from existing carriers,[19] which may be difficult, since the pilots would have to forgo accumulated seniority benefits. In addition to this, airlines may try

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[19] Following the airline bankruptcies in the period of deregulation in the U.S., the new carriers had little difficulty in hiring qualified labour. The turmoil of the industry and airline bankruptcies were specific to that period and an exception rather than the rule in the industry.

to impose switching costs on pilots considering changing carriers. The airlines may be justified because of the high human-capital investment involved in pilot training.[20]

Specialized mechanics are usually more easily available, but in the short-run there is a possibility of shortage. Thus, the availability of essential inputs such as planes and qualified labour may be a short-term barrier to entry. Even when these shortages are short-lived and temporary, they are relevant to contestability since they may undermine the viability of 'hit and run' entry.

Airport access is of fundamental importance for any new carrier, since it is a necessary prerequisite in the operation of an airline. Without secured access to the airport facilities, there cannot be a successful entry. Practices, such as long term leases, majority-in-interest clauses(these clauses require consent of established carriers for any significant decision concerning the airport), may alone block an attempt to enter.[21] In some airports, there simply may not be any available space at a given point in time. The expansion of airports usually involves a lumpy investment, thus the access may be a short-term problem in congested airports. One way to deal with this problem would be to eliminate the short-term leases and offer airport space through periodic bidding. The bidding, however, adds to the trans-

[20] American has recently required new hire pilots to agree to pay the airline $10,000 if they leave before working a year with American ("Pilot Pool is Drying Up", ATW, 6,1985).

[21] This problem can be illustrated by Laker Airway's attempt to obtain gate and terminal space at J.F.K. Airport in 1977 and 1978. Laker contacted various airlines and was not successful even though at least one carrier was reported to have underutilized facilities(Bailey et al.,1985).

action costs of operating the system and clouds the long term planning of airlines. There is also the possibility of anticompetitive bidding to block the entry. Thus, provisions dealing with the underutilized facilities have to be included in the optimal bidding scheme.

ABSOLUTE COST DISADVANTAGE - CAPITAL COST

The airline industry is a capital intensive industry. The problem of raising the necessary capital and the cost of borrowing are very important for the potential carriers. The acquisition of start-up capital may be done primarily by:

1. debt financing
2. equity financing

Capital costs of the new entrant may become a barrier to entry in the Stiglerian sense if the capital costs of the entrant exceed the costs of the existing airlines. This is quite likely, since the existing carriers are known to the capital lenders. The history of a successful operation provides information to the lenders about the carriers ability to survive and repay the debt. This information is not available when new carriers are concerned, and as the risks involved are higher, the associated cost of the capital will also be higher. In addition, the existing carriers may increase the entrant's risks by employing aggressive entry deterring strategies and by communicating the willingness to fight. These higher risks will further increase the risk premium required by the lenders.

The availability of equity capital depends on the expected risks and the expected profitability of the new venture. Thus, the aggressive behavior of the incumbent carriers may reduce the availability of equity capital.

NETWORK AND SCALE ECONOMIES AND GRADUAL ENTRY

As indicated in Section 4.3, 'hit-and-run' entry, or total entry is not likely in airline markets. This implies that entry has to be gradual and will take time. If the established carriers operate efficiently a new entrant will experience a cost disadvantage before he achieves a minimum scale of operation. Thus, economies of airline size will result in a barrier to entry in the Stiglerian sense.

It is possible, however, that the monopolistic or oligopolistic incumbents will operate with some degree of X-inefficiency. Selten(1986) has recently proposed a 'strong slack' hypothesis. This hypothesis maintains that slack has a tendency to increase so long as economic profits are positive. If the ownership is weak[22] economic profits will be eliminated, as cost inefficiency increases over time. Under these conditions, positive economic profits will equal zero, irrespective of market structure. Lack of positive economic profits therefore may be a sign of cost inefficiency rather than competitive pricing. Even when Selten's hypothesis does not hold in its extreme version, cost inefficiency of the incumbent firm may outweigh its size related cost advantage. When that happens, a small scale entry may be possi-

[22] The weak ownership implies that shareholders do not have a complete control over management.

ble. The success of entry, however, is not guaranteed. The incumbent, in order to deter entry, will have to adjust his costs. The entrant will have to increase his size, in order to capture size related economies, before the incumbent eliminates his cost inefficiency.

Consider a small scale entry, with an entrant having the initial cost advantage. This advantage, will likely result from lower variable costs. Assume the following average cost function(ATC):

(1) $ATC = a - b*Q + c$

where Q stands for output and average fixed cost component is given by:

$AFC = a - b*Q$ (linearity is assumed for simplicity)

and average variable cost(AVC) is constant and equal to c.

(Output is denoted by Qi for the incumbent and Qe for the entrant)

The incumbent cost function is given by:

(2) $ATCi = a - b*Qi + (1+s)*c$

where 's' describes the magnitude of cost inefficiency.

The entrants cost function is given by:

(3) $ATCe = a - b*Qe + c + BE$

where BE defines the monetary value of barriers to entry.

When the entrant has the initial cost advantage it implies that:

(4) $ATCi > ATCe$

or $a - b*Qi + (1+s)*c > a - b*Qe + c + BE.$

By rearranging terms and simplifying we obtain:

(5) $s*c - BE > b*(Qi - Qe).$

The left hand side describes the slack related cost disadvantage of the incumbent. The magnitude of structural barriers to entry reduces the cost disadvantage of the incumbent. The right hand side describes

the size related cost disadvantage of the entrant. When the incumbent, operating in 'n' city-pair markets, has a cost disadvantage, limit pricing to deter entry is not possible as it would require the incumbent to set prices below cost in each market. The incumbent is better off to wait for entry and to adjust prices when it takes place, thus, the entrant will become a von Stockelberg leader in setting prices in the market.

In a given city-pair market traffic is a function of price:

(6) $Q = d - g*P$

where Q stands for total quantity demanded and P stands for price. Since the prime objective of the entrant is growth, it is reasonable to assume that the price set by the entrant will not exceed his costs.

(7) $Q = Qi + Qe$ (total demand will be divided between the incumbent 'Qi' and the new entrant 'Qe').

By matching the entrant's fares, the incumbent incurs losses(Li) equal to:

(8) $Li = (ATCi - P)*Qi.$

Since the incumbent's resources are not unlimited, there will be some Lmax, which will set the upper bound on the amount of losses of the incumbent. These losses will depend on the initial cost disadvantage of the incumbent and the output Qi. The entrant, in order to maximize his competitive advantage, should choose the markets, where his cost advantage and the losses incurred by the aggressive incumbent are largest. These markets will be those with low structural barriers to entry and high demand elasticities. The entry of the new carrier into the market sets the price below the incumbent's price and generates

new traffic. In order to deter entry and satisfy the generated demand, the incumbent would have to add additional capacity to the market. The incumbent will require the larger capacity, the larger is demand elasticity. Increased volume of traffic will translate into increased losses for the incumbent. Thus, the optimal strategy for the new entrant is to build a network, starting from markets characterized by high demand elasticity and low barriers to entry. The incumbent's strategy will depend on his initial cost disadvantage and ability to reduce costs. If the initial cost disadvantage is small and the prospects for speedy elimination of slack good, the incumbent might employ an aggressive strategy similar to that described in the 'chain-store' game. When x-inefficiency is institutionalized into restrictive working rules and above normal wages, reduction of costs may prove more difficult. Its speed will depend on the state of labor relations, union militancy and the skills of the management. The outcome of the game is indeterminate and either side can win.

In the above game, the presence of barriers to entry protects inefficient existing firms, which has important welfare and policy implications. Public policies aimed at reducing barriers to entry may decrease the degree of x-inefficiency in the industry, as inefficient firms would become vulnerable to new entry, even when entry is small and gradual.

4.5 ENTRY BY AN EXISTING CARRIER

The entry into a given city-pair market may come from a new start-up carrier or from an already established one. Barriers to entry facing each type of carriers will likely differ in terms of their relevance and magnitude. To illustrate this consider an example given in Figure 14.

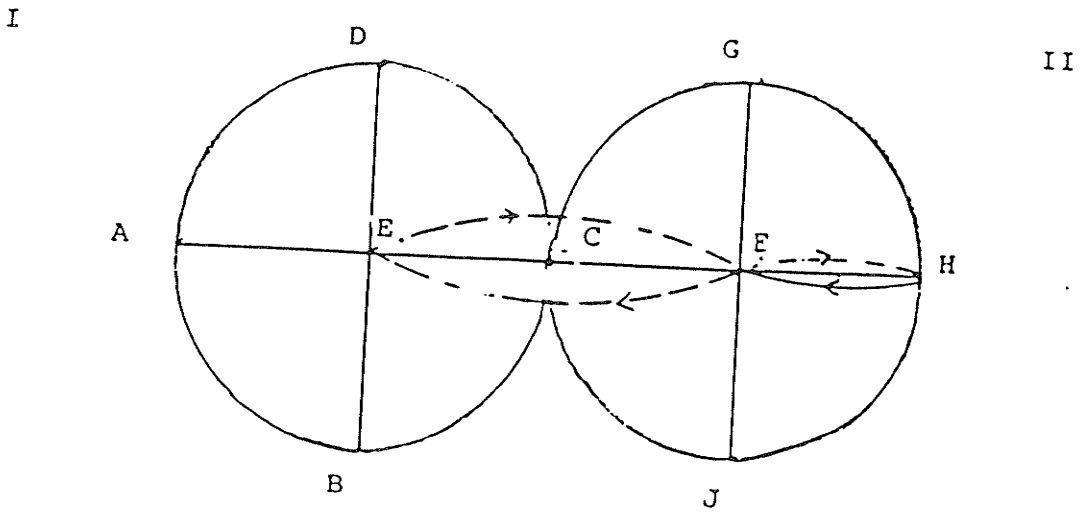

Figure 14: Entry by an Existing Carrier

Suppose that there are two carriers who are monopolists in their networks organized around E and F respectively. Both carriers have their own services between the hub cities E and F. Thus, they already have stations inside the neighbor's networks. Now suppose, that carrier I wants to expand and enter the FH market. Being already established in

F, with the access to airport facilities and name recognition, the carrier will only need to get access to facilities in H. Service to H may be offered as an extension of EF service, or as an entirely new service. While easier than a new entry this expansion is not without difficulties of its own; for example, the plane used in the EF market may be inappropriate for the FH market or the turnaround EF service may be disrupted. When separate service is established in FH, carrier I will not be able to capture the network economies in the network II and hence will suffer cost disadvantage. The partial or gradual entry therefore results in an effective barrier to entry for the existing carriers. The size-related barrier to entry for the existing carrier will be smaller than for the new entrant as it refers only to network diseconomies. Other sources of size related economies, such as common overhead, will likely be exploited by the existing carrier, who will also be known by at least some of the customers in the newly entered market. Thus, the good will related competitive disadvantage need not be large. The strength of potential competition, therefore, will be higher if it comes from the existing carriers. The number of the existing carriers in the domestic airline network will be a function of the population size and its locational distribution and other relevant factors.

4.6 NETWORK INTERDEPENDENCE, SWITCHING COSTS AND COMPETING MODES

In addition to actual and potential competition in the market, the ability of carriers to set monopolistic prices may be constrained by the interdependence of airline networks. Consider, for example, an airline system consisting of six hub and spoke networks operated by separate airlines(Figure 15).

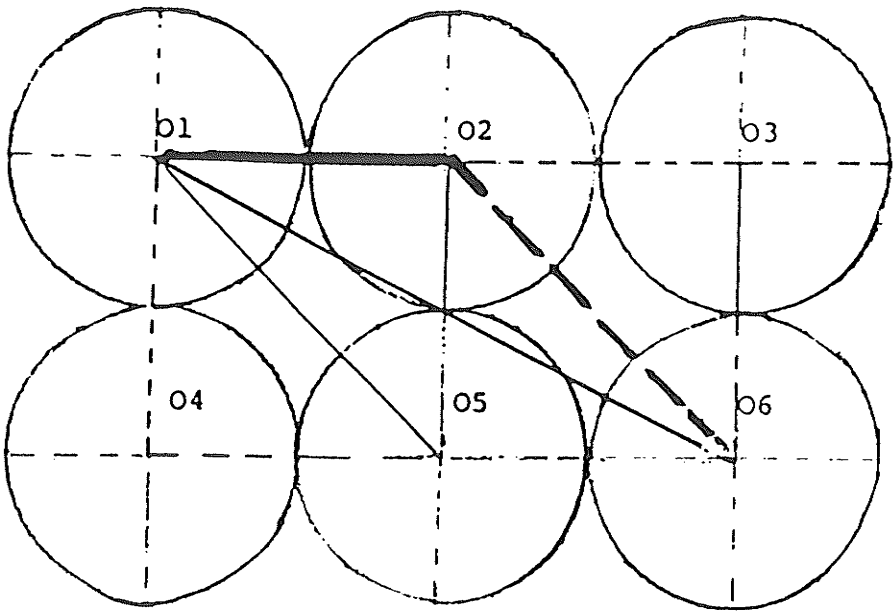

Figure 15: Network Interdependence

Each carrier is a monopolist in the 'in-hub' routes. Suppose also that no entry is possible in each of the carriers routes(entry is regulated, or airport access is denied, for example). The routes inside the hub will likely be least competitive and the prices there will be only

constrained by the prices of substitute modes. The routes connecting the other hubs and international points will likely be more competitive. Usually more than one carrier serves these routes. For example, O1-O2 route will be served by #1 and #2 carriers, which may reduce the monopolistic freedom of the carriers. Suppose, however, that carrier #1 has monopoly on all routes within its network and long distance domestic and international routes, as well. The ability of the carriers to set monopolistic prices on longer routes will likely be smaller than of the 'in hub' routes. Suppose that there is a traveller wishing to fly from O1 to O6. The traveller may fly with #1 carrier and pay $P_1(O1\text{-}O6)$, or he may fly to O2 and from there fly with #2 carrier. Thus, his total cost will be:

$$TC = P_1(O1\text{-}O2) + P_2(O2\text{-}O6) + SC$$

where SC corresponds to the consumer's switching costs, which includes the disutility of changing carriers and flying a less direct route(extra time). These switching costs will likely be higher for business consumers than for leisure ones, and the potential savings will be relatively higher depending on the length of the overall trip distance. The longest transcontinental and international routes will then exhibit the highest competitiveness in terms of network interdependence.

Network interdependence may have a positive disciplining role, only when the carriers do not recognize their mutual interdependence and do not collude. With oligopolistic markets, the possibility of collusion cannot be excluded and network interdependence may not be sufficient

to ensure competitive prices. Furthermore, the airlines may design strategies to increase consumer switching costs. Examples of such strategies are coupons and frequent flier programs. Thus, network interdependence, while being an important characteristic of airline competition, may be insufficient to prevent monopolistic/ oligopolistic pricing.[23]

Airlines may also be constrained in their pricing because of competition from other transportation modes. In the context of the scheduled jet service, the intermodal competition may originate from commuter carriers and from surface transportation. The degree to which these modes will offer competition to the airlines will depend on particular characteristics of a given country.

4.7 MARKET CONTESTABILITY AS A WELFARE STANDARD FOR THE AIRLINE INDUSTRY

Chapter 3 identified the conditions under which sunk costs and other barriers to entry may be welfare improving. These conditions include market unsustainability, 'lemon' type market failure and innovations. Potential competition may also reduce welfare if firms make socially wasteful commitments to make their entry deterring strategies credible. Public policies aimed at increasing market contestability

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[23] Network interdependence may go beyond national borders. Industry pricing and public policies toward it may be affected by developments in the airline network of a neighboring country.

may be welfare reducing in any of these cases, and it is important to examine whether these special cases are relevant in the airline industry.

Two types of unsustainability can be distinguished in the context of the airline industry:

1. Unsustainability of the natural monopoly in a given city-pair market.
2. Unsustainability of an optimal airline network.

Chapter 2 indicated that unsustainability of the natural monopoly arises when the conditions for subadditivity are fulfilled but the average total cost curve is increasing at a point of intersection with the demand curve. When a firm can offer different prices to different customers market unsustainability need not arise. It is a well known fact, that airlines can charge different prices to different classes of consumers, high prices to time sensitive travellers and low prices to less time sensitive consumers. Perry(1983) has shown that the ability of firms to set multiple prices ensures sustainability of natural monopoly. Subadditivity of a cost function becomes a sufficient condition for sustainability in such a case. To see this consider an airline having an average cost function given by ATC (Figure 16).

ATC intersects market demand curve at a point K, which would suggest a possibility of unsustainability. The airline, however, can deter entry when it is not constrained to set uniform prices. The strategy for the airline would be to sell enough seats at low prices, such as P_0, so that the entrant's residual demand is moved to the left of his

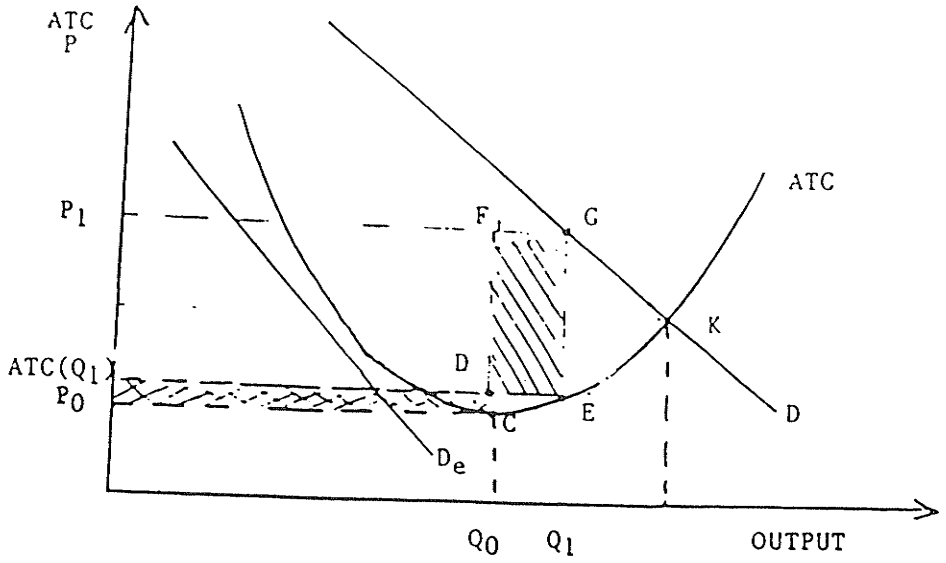

Figure 16: Airline Markets and Sustainability

average cost curve. The incumbent will then sell $(Q_1 - Q_0)$ at P_1. This strategy is possible since Q_0 can be sold to time insensitive leisure customers, who will identify their time preferences and willingness to pay by buying their tickets first. Business travellers typically cannot buy their tickets long in advance, and will be those paying the high price P_1. In the case given by Figure 17, the incumbent airline incurs a loss equal to ABCD on units 0 to Q_0 and makes a profit equal to DGFE on the remaining units. As Perry(1983) has demonstrated, as long as the cost function is subadditive the incumbent can <u>always</u> find a set of multiple prices which will allow him to at least break even and deter entry. This is an important result as it implies sustainability, even when there are no barriers to entry and the incumbent is constrained not to change prices in the event of entry. Market sustainability will be further enhanced by carriers abil-

ity to react to entry. Suppose, for example that an airline instead of setting a limit price P_0 and selling Q_0 offers a lower quantity at this price and sells the remaining quantity at a higher price. Entry may be deterred if the existing carrier threatens to increase the quantity of discounted seats to Q_0 when faced with entry, and when such a threat is credible.

Network sustainability is often related to the issues of cross-subsidy and the viability of low traffic density routes in the deregulated environment. It is argued that free entry may eliminate the most profitable high density markets from the integrated network system. The remaining routes may not offer sufficient densities and the service may break down. For example Lazar(1984) argues:

> While the airlines are correct in reporting that a very small the interdependencies among the routes in an integrated network system are such that, the weak routes contribute towards making the strong routes more profitable and the strong routes, in turn, provide the base for making the weak routes viable(within the network system). Thus, cross-subsidies appear to flow in both directions even though the strong routes could stand on their own.

In order to clarify some of these issues, consider a simple example given in Figure 17.

There are n passengers travelling on route BC. Currently there is no airline service on route AB and it is not viable on the stand alone basis. The potential customers are willing to pay the maximum price P(AB)max which is below the airline cost per seat. For simplicity it assumed that there are m passengers willing to travel when the price is below or equal to P(AB)max, and none when the price is greater than P(AB)max. It can be profitable for the airline to expand its network to A if the incremental revenue is greater than the incremental cost.

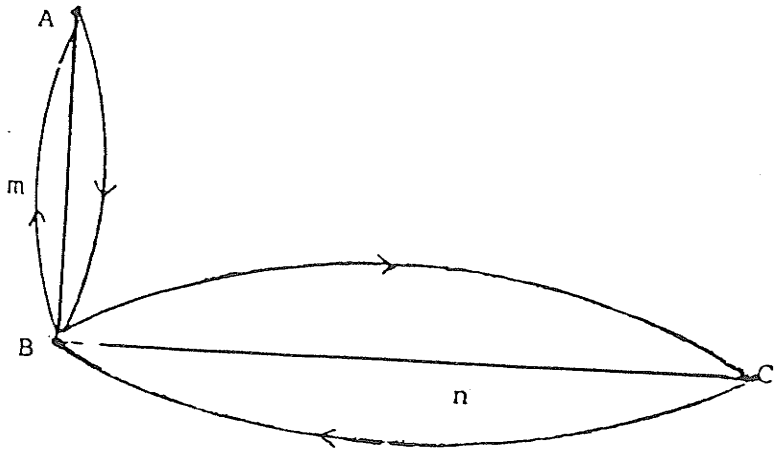

Figure 17: Network Unsustainablity

(1) $IR(AB) \geq IC(AB)$.

Due to the presence of network economies

(2) $C(AB, BC) < C(AB) + C(BC)$.

The efficiency gain due to economies of scope can be defined as IG.

(3) $C(AB, BC) = C(AB) + C(BC) - IG$.

Since the AB route is not viable on its own a subsidy S has to be offered such that

(4) $P_o = [C(AB)/m - S] \leq P(AB)max$

The incremental revenue function will, therefore, be

(5) $IR(AB) = P_o * m = C(AB) - S*m$.

Incremental cost is given by

(6) $IC(AB) = C(AB, BC) - C(BC)$.

Substituting (5) and (6) into (1) yields

(7) $[C(AB) - S*m] \geq [C(AB, BC) - C(BC)]$.

Substituting (3) into (7) produces

$C(AB) - S*m \geq C(AB) + C(BC) - IG - C(BC)$

which can be simplified to

(8) $IG \geq S*m$.

This means that the total efficiency gain has to be greater then the amount of subsidy paid to AB travellers. When this condition is fulfilled prices will be cross-subsidy free in the Faulhaber's(1975) sense and unsustainability will not arise as a potential entrant cannot offer prices lower then the established firm on either segment. (The lowest prices that a potential entrant may offer and break even are $C(m)/m$ on the AB segment and $C(n)/n$ on the BC segment.) Unsustainability will not result as long as the amount of subsidy is smaller then the efficiency gain from adding the new route to the system.

When extending the network to the new destinations an entirely new traffic is generated on the previously existing routes (such as BC), there is a possibility of a destructive 'cream skimming' entry. Consider a case when the new traffic is generated on the route BC as a result of adding the AB segment to the network. The number of travellers on the BC segment becomes now: $n+k$, where k is the new traffic.

Due to economies of scale on segment BC, costs per seat there, will be reduced ([C(n+k)/n+k] < [C(n)/n]). By adding the AB route to the system, the efficiency gain inclues now cost savings due to network economies (cost complementarity between the routes AB and BC) and cost savings on the route BC due to enhanced economics of scale, as a result of the increased traffic. It is possible, however, that in order to bring the AB segment to the network, the whole efficiency gain will have to be passed to the consumers travelling on the AB segment.[24] Thus, cost savings due to economies of scale on the BC segment cannot be passed to the consumers. Prices on the BC segment will still be equal to C(n)/n, even though costs, on the stand alone basis, have declined to C(n+k)/n+k. There is no cross-subsidy involved as the consumers on the BC segment are not asked to pay more than before the new route was added to the system. Thus, the new route can pass an incremental cost test. Consider now an opportunistic entrant. Given that the traffic on the BC route is now equal to (n+k) passengers, the new entrant can come in and offer prices as low as C(n+k)/n+k. The new entrant can now come in and undercut the incumbent on the BC route. When that happens, the incumbent is left with the AB route alone, and in order to break even has to charge prices equal to average costs on the stand alone basis. Prices on the route AB will then go up to the level C(m)/m, but will be too high to make this route viable. The route AB, therefore, will be dropped out from the network. As the AB route is eliminated, the traffic on the BC segment drops to

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[24] The similar results will be obtained if only a part of efficiency gain due to economies of scale has to be transferred to AB travellers. The case where the total gain is transferred to AB customers is assumed for simplicity.

the previous level n. The new entrant, then, will have to increase prices to the previous level [C(n)/n]. Given the possibility of an opportunistic entry, the carriers may opt against adding new routes, if these routes require to receive the whole efficiency gain due to expanding the network. Thus, the new entry prevents extending the airline network, even though the new routes are cross-subsidy free in the Faulhaber's(1975) sense as they pass an incremental cost test. Therefore, the established carriers may require a protection from an opportunistic entry in the network development stage. Once the network is developed, however, the case for entry regulation becomes less obvious. As indicated in chapter 3, markets may be ex-post sustainable if there are barriers to entry present. Another factor enhancing market contestability is the impossibility of 'total' entry. When entry is small and gradual, the new entrant cannot take over the whole segment BC and exploit the economies of scale on this segment. Given the carriers ability to set multiple prices and the impossibility of 'total' entry, both types of unsustainability should be very unlikly in the airline industry, especially where integrated networks are developed.

As far as 'lemon' type market failure is concerned, airline travellers are repeat customers. Airlines, therefore, have an incentive to built a reputation for high quality, which alone makes this type of market failure unlikely. The ability of the customers to switch from unreliable carriers should provide a sufficient disciplining mechanism.

The issue of innovation and technological progress in the industry appears to be the most complex of the above cases. In the last 50

years, innovation in aviation has centered on the development of the jet engine for civil aviation, which together with improvements in airframe design and control systems has resulted in successive improvement in aircraft speed and size (Doganis,1985). Airlines, however, do not produce airplanes, the production of airplanes being currently dominated by Boeing and McDonald Douglas of the United States and Airbus Industrie, a consortium of British, French, West German and Spanish companies. These three producers dominate the market for the bigger(100 seats and more) jet airplanes("Eternal Triangles", The Economist, June 1,1985).[25] The issue of the impact of barriers to entry in the airline industry on the technological progress, therefore, deals with the problem of interactions between the airline industry and the airplane manufactures. Phillips(1971) has suggested that interactions between the two industries are weak. According to Phillips, technological progress in the industry has been determined by the spin-offs from the military and space contracts. Capron and Noll(1971) have suggested that barriers to entry created by the industry regulation had a positive impact on the speed of technological change. As Douglas and Miller(1974) have demonstrated, entry regulation created conditions favorable to frequency and quality competition in the oligopolistic industry. This, in turn, increased demand for the new and improved planes. The case of European aircraft manufacturing is that of high a degree of public intervention (Newhouse,1985), which has effectively created the industry and defined the nature and the speed of the technological progress. The national airlines have

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[25] The production of aero-engines is dominated by General Electric and Pratt&Whitney of the U.S. and Rolls-Royce of Britain.

served as 'captive' buyers for the new planes of European airplane manufacturers. As far as countries other than the U.S. and the European members of Airbus consortium are concerned, the intraction between the structure of their airline industries and technological progress has to be considered as weak and uncertain. Given the Canadian perspective of this study, independence of this type of technological progress from the conditions of entry in the airline industry will be assumed.

Innovation in the airline industry may also involve service innovation and methods of production. The most important innovations related to these type of activities in recent years have been the introduction of computer reservation systems and 'hub-and-spoke' networks. Introducing computer reservation systems was possible because of the technological progress in computer technology. Innovation here is a successful application of technology, which was developed elsewhere. Computer reservation systems were instrumental in allowing airlines to introduce frequent flier programs and reduced consumer transaction costs by making possible a simultaneous reservation of seat, renting a car and booking a hotel room. The reservation system also enhanced the ability of carriers to offer jointly an advance booking charters and scheduled services. This reduced the airline costs and enhanced the ability to obtain cheaper services by consumers. It appears, however, that lower entry barriers would not have affected this type of innovation. As indicated in Section 4.4, the principal source of sunk costs in computer reservation systems is software. The presence of these costs, however, does not make the innovating firm vulnerable to

opportunistic entry, as costless imitation is impossible. The entrant would have to incur identical sunk costs of developing the program. As far 'hub-and-spoke' networks are concerned, innovation here involved the application of techniques of combining traffic which were previously used by trucking firms and railroads. 'Hub-and-spoke' networks were first introduced to airline operations in the late sixties by the European airlines Sabena, KLM and Swissair. The objective was to feed intra-European traffic into inter-continental routes.[26] Introducing this type of networks to scheduled passenger service involved an application of the idea developed elsewhere. It does not appear that enhanced market contestability could have been detrimental to the ability of airlines to introduce 'hub-and-spoke' networks. On the contrary, elimination of legal barriers to entry after the deregulation of the U.S. industry allowed airlines to reorganize their routes into 'hub-and-spoke' networks.

While the possible innovations in the future cannot be predicted, it does not appear that lower barriers to entry can be detrimental to innovation in the industry, especially in the case of countries, where intractions between airlines and aircraft manufactures are weak.

Public policies aimed at enhancing market contestability may be welfare reducing if firms make socially wasteful commitments in order to erect compensating barriers to entry. It was demonstrated by Eaton and Lipsey(1981) that the commitments are credible only if they are irreversible. Investment in making commitments, therefore, implies

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[26] This information has been brought to my attention by Dr. Studnicki-Gizbert.

incurring sunk costs. The most important assets are planes and the airlines typically do not have a choice between technologies characterized by different levels of sunk costs. The only choice is between owning and leasing of the equipment, but even if the equipment is fully owned the degree of cost sunkness will be small, and the requirement of the credibility of commitments will not be met. The airlines could also try to increase advertising expenditures. Historically advertising expenditures of airlines have amounted between 1.7 to 2.5 percent of all operating expenditures(Table 1). Thus, even doubling these expenditures would not significantly increase the social cost of producing the service. The good will capital gained from advertising expenditures is relatively short-lived (Schmalensee, 1972), which will further reduce the usefulness of advertising as a tool of making commitments. It appears that the scope for making 'wasteful' commitments is limited in the airline industry.

The nature of technological progress in the industry, impossiblity of 'lemon' type market failure and the presence of factor enhancing market and network sustainability, would suggest that market contestability can be an appropriate welfare standard for the industry. It has to be remembered, however, that market contestability is an appropriate welfare standard when the externalities are absent or means to internalize them do not require to impose restrictions on entry. The airline industry has been found to be a source of important externalities. These externalities involve negative effects such as pollution, noise, congestion, etc., and positive effects such as enhancing regional development(Harris,1978). Public policies aimed at increasing

market contestability will be welfare improving only if internalizing externalities does not require restricting entry (externalities present in the industry and policies towards them are discussed in ch.6).

Finally, the airline industry provides a service which has both economic, political and social dimensions. Political and social dimensions involve issues such as nation building and national identity, national defence, interregional equity in terms of access to the airline service and regional development. Market contestability offers only an economic criterion. Public policies towards the industry cannot ignore non-economic issues. A possibility of conflicts between the short-run, static economic efficiency and longer term economic and non economic goals has to be considered when designing public policies toward the industry. The degree to which the above objective may be inconsistent with contestability will depend on particular conditions of a given country, such as its stage of development, population size and its distribution, international relations, political and social organization and the dominant value system.

The analysis of this chapter suggests a general inconsistency between the assumptions of market contestability and economics of the airline industry. 'Hit-and-run' entry has been found impossible in the industry. In addition to this, the airline industry is not free of barriers to entry as required by market contestability. Further empirical evidence concerning the type of entry possible and barriers to entry will be presented in chapter 5. Market contestability as welfare standard for the industry may be useful in cases where enhanc-

ing market contestability does not interfere with network development, internalizing externalities and other social and economic goals.

Chapter V

DEREGULATION OF THE U.S. AIRLINE INDUSTRY AND ITS IMPLICATIONS FOR CONTESTABLE MARKETS

This chapter examines the experience of the U.S. airline industry following the Airline Deregulation Act of 1978 and its implications for market contestability. The assumptions of market contestability are compared with the industry conduct and performance. Special attention is given to the experience of the new jet entrants. Some related issues, such as concentration trends, destructive competition and safety are also addressed.

5.1 REGULATION OF THE U.S. AIRLINE INDUSTRY AND THE AIRLINE DEREGULATION ACT

The experience of the U.S. airline industry provides empirical evidence which can be used to assess the validity of market contestability hypothesis. Before an evaluation of the evidence can be done, it will be necessary to discuss the past regulatory regime and its effect on the existing carriers before the Airline Deregulation Act(later referred to as ADA) of 1978.

Regulation of the U.S. airline industry started in the 1920's with the awarding of contracts for carrying mail (Kaplan, 1986). The increased importance of passenger service led to the establishment of

the Civil Aeronautic Board(CAB) in 1932. The infant industry argument provided a basic rationale for regulation at that time. CAB was granted authority to control entry, fares, mail rates, safety (later transferred to the Federal Aviation Administration(FAA)), mergers and inter-carrier agreements. Given the comprehensiveness of CAB's control, the industry was granted anti-trust immunity. CAB did not regulate either schedules, capacity or equipment choice of the carriers. The national air transportion network, built under CAB authority, encompassed nineteen major trunk carriers, which served on the long-distance routes, between major population centres, and a number of smaller, local carriers servicing the regional markets. Eventually this policy was liberalized by allowing the local carriers to serve major points within their regional service areas when demand conditions allowed entry without harming the trunks. As a result of this type of route allocation, passengers often had to change airlines, which they generally preferred less than on-line service. CAB restricted the number of carriers in the market, making entry difficult, even for already established carriers. For a successful airline, the easiest way to obtain new routes was to merge with financially troubled carriers (Bailey et al., 1985, p. 13).

The CAB regulation has been blamed for causing the following inefficiencies:

1. Inefficient route structure.

   Restrictive entry regulation was an impediment to the development of hub-and-spoke networks. These networks, generally, al-

low for greater efficiency in the supply of airline service and increase the share of on-line versus interline connections.

2. Inefficient Price/Quality Mix.

Fares under regulation were related to the distance, even though the distance is only one of the many variables affecting costs. Fare formula was not adjusted to account for changes in airline costs due to technological progress(CAB,1974), which resulted in lower costs, especially on the long-distance routes. Since frequency was not regulated, airlines used it as a principal competitive tool. Increased frequency meant lower load factors, and increased costs which eliminated potential economic profits. Regulation resulted in fares being approximately equal to costs, which happened not by reducing fares to costs, but by increasing costs to fares (Douglas and Miller, 1974). Since markets differed in terms of the optimal price /quality mix, depending on such characteristics as distance, composition of travellers - business/leisure, the effect of this distortion was not identical in all markets.

3. Inefficient Input Utilization.

Increased frequency/quality type rivalry resulted in excess capital investment. The rate of return regulation justified excessive costs and allowed labor to increase wages and implement restrictive working rules.

The failure of U.S. airline deregulation can be described as a failure of the regulatory system to adjust to changes in the condi-

tions of the industry. Competition, as a decentralized mechanism of coordination, allows for more experimentation and discovery, than does planning by political institutions. The relative inflexibility of the U.S. regulatory system made these inefficiencies even more severe.

The inefficiency of the regulatory system became more obvious because of two developments. One was the entry of supplemental charter carriers, offering services at fare levels well below the regulated ones. The second involved the experience of the intrastate carriers. These carriers, operating mainly in Texas and California, were subject to less stringent regulations than the rest of the industry, and operated at higher load factors and with fares below those of CAB regulated carriers (Jordan(1970) and Keeler(1972)). Even if the magnitude of this advantage tended to be overstated, by not accounting for route characteristics and weather conditions specific to these intrastate networks, the intrastate carriers' performance was an indication of CAB regulatory failure.

Hirshman (1970), suggested that the consumers have two ways to indicate their dissatisfaction - 'exit' and 'voice'. Exit means switching to alternative suppliers, voice refers to actions aimed at modifying the current supplier's behaviour. Because of regulation the exit option was not feasible for the public. It was the political action (voice), which resulted in the regulatory reform. In addition to consumer groups and the academic profession (which provided theoretical and empirical evidence supporting the reform), some airlines such as the former intrastate, P.S.A., Southwest, Pan Am(who wanted to expand its network to include domestic routes) and United (the biggest carri-

er) supported the change. Predictably, most of the carriers as well as organized labor opposed the regulatory reform (Kahn, 1983). Following the Senate Judiciary Committee hearing in 1977, and the appointment of A. Kahn, as the Chairman of CAB, CAB moved toward a more flexible regulatory regime. Operating requirements for charters were relaxed, greater fare flexibility was introduced and route application procedures were simplified. The process of gradual and cautious change could eventually lead to complete deregulation of entry and pricing. Nevertheless, a radical approach was chosen. The Airline Deregulation Act of 1978 ended CAB's authority over routes by December 1981, and fares by January 1983. CAB itself was to be abolished in 1984. The remaining antitrust authority and the control over international routes was transferred to the Department of Transportation(DOT). Full deregulation took place before the industry could eliminate the inefficiencies associated with the previous regulatory regime.

5.2 NEW ENTRY AND CONTESTABILITY

The Airline Deregulation Act of 1978 opened a possibility of entry into new markets by existing carriers and allowed (since 1981) for entirely new carriers to enter the industry. In the first year after ADA, some industry characteristics helped the new entrants. These characteristics included:

1. Excess costs of trunk and many local carriers, resulting from insufficient time given for elimination cost inefficiencies re-

lated to the past regulatory regime. Cost inefficiencies of the established carriers created an opportunity for a small scale, gradual entry.

2. Rearrangement of route networks by the existing carriers toward more efficient hub-and-spoke networks created a state of flux in many markets. Carriers entered and exited markets, opening under-served market niches for the potential new entrants.
3. Characteristic mix of the service offered by the existing carriers was not always best suited to all markets. There was some room for experimentation and innovative entry.
4. Government policies. One of the most important policies here was the Federal Loan Guarantee program. Under this program, FAA, acting for DOT, was authorized to guarantee a loan if the entrant could not obtain financing on reasonable terms from private sources (Mayer, 1984, p. 112). This program reduced the cost of borrowing and the magnitude of the capital cost barrier to entry.

The new entrants can be broadly divided into the following categories:

1. Former intrastate carriers: Southwest (1979)[27] P.S.A. (1979), Air Cal (1979), Air Florida (1979).
2. Former charter operators: Capitol (1979), World (1979).
3. New jet carriers: Midway (1979), New York Air (1981), People Express (1981), Muse Air (1981), Jet America (1982), Pacific Express (1982), Northeastern (1982), Hawaii Express (1982), Air

[27] The year of entry into interstate, scheduled markets.

One (1983), Sunworld (1983), America West (1983), Florida Express (1984), Frontier Horizon (1984), and Presidential Air (1985).[28]

The new entrants' cost advantage resulted primarily from lower labor costs due to employing non-unionized low-seniority labor. Table 3 offers a comparison of labour costs of two entrants, New York Air and Southwest, and the selected major carriers. The analysis of this data suggests that labour costs were significantly lower for the new entrants in all labour categories. This cost advantage is especially significant for New York Air, which represents a class of start-up entrants. In addition to low labour costs, capital costs were also low because of favorable conditions on the used plane market. An excess supply of used planes resulted from the over-optimistic expansion of established carriers in the past and airline bankruptcies. In addition to this, new carriers increased seating densities, eliminated some amenities and refused to interline(Graham,1982). These last cost reduction measures cannot be considered as true cost advantages but rather a part of product differentiation strategy of the entrants. The airline industry had a long history of industrial conflict and high unionization. By employing non-unionized workers, the new entrants were able to avoid restrictive working rules, which gave them greater flexibility and allowed for better use of labor. Assigning workers to different jobs reduced boredom and job-related alienation. In addition to this, the new entrants introduced a variety of profit-sharing plans (Southwest) or asked workers to buy the airline's stock

[28] New York Air and Frontier Horizon were created by the established carriers - Texas Air and Frontier, respectively.

TABLE 3

Labour Costs of the New Entrants and the U.S. Majors, 1984

AIRLINE	PILOTS AND COPILOTS	CABIN ATTENDANTS	MECHANICS AND OVERHAUL PERSONNEL	TICKETING SALES AND PROMOTIONAL PERSONNEL	OTHER PERSONNEL
New Entrants					
New York Air	20,723	10,240	-	11,318	26,456
Southwest	56,477	15,073	27,606	-	18,200
Major Carriers					
USAir	85,850	21,356	30,620	22,733	32,870
Eastern	81,119	22,000	23,555	22,215	30,233
TWA	79,820	23,963	26,495	24,194	26,842

Source: ICAO(1984a).

(People Express). These measures enhanced workers' identification with the carriers' goals, indirectly increasing productivity and reducing costs. While crucial for the original success of the new entrants, these advantages were not likely to last forever, as the existing carriers attempted to adjust their costs and increase productivity. The new entrants' costs were expected to increase as their labor force gained seniority and unionization started to take place.[29]

Route strategies of the entrants depended on an entrant's original category and types of markets entered. The simplest route strategy was that of former charter operators - Capitol and World, who introduced scheduled service on routes which had previously been served by charter service. Their networks consisted of point to point routes, primarily long-distance ones. Former intrastate carriers simply extended their networks beyond their respective states' borders. The new carriers did not follow a unique route development strategy; most of them favored point to point turnaround service, extending it to hedge-hop networks - People Express, Muse Air, Jet America, America International, Pacific Express, Northeastern, Hawaii Express, Air At-

[29] As literature on labor participation in management or labor-managed firms suggest, many of the gains due to greater flexibility in job assignments, greater workers identification with the firm are transitory in nature, and do not increase the productivity permanently. Some of the industry's insiders seem to agree with that notion:

> "Burr (People Express Chairman) has brain-washed employees into working a 60 to 80 hour week by calling them managers. They are in Disney Land, but this spell can go only so far" - a former P.E. executive: ("A Yankee Preacher on a Pilot Seat", Time January 8, 1986.)

lanta, NY Air, Frontier Horizons and Sunworld. America West, Midway and Presidential Air based their route strategies on hub-and-spoke networks. The routes entered by the new carriers were primarily of short to medium length(Meyer,1984,p.128), which was partly determined by the types of planes available on the used-plane market. In addition to this, short and medium distance rates were characterized by a relatively high demand elasticity due to a possiblity of attracting customers previously relying on road transportation.[30] Entry, therefore, can be described as being gradual, aimed at building an integrated network. This is consistent with the model of entry presented in chapter 4.

One of the conditions for 'hit-and-run' entry is that new entrants expect no reaction to entry from the existing carriers, but the experience of the new entrants contradicts this notion. The new carriers were very aware of potential predatory responses from the established carriers and avoided open confrontation.[31] In order to reduce the risk of confrontation with the established carriers, the new entrants used product differentiation as part of their entry strategy, which involved the choice of airports and changing product characteristics mix. As far as location is concerned, the majority of the new

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[30] People Express advertised their services, using the slogan 'Flying that costs less than driving'(" People Express slashes its way into market with cheaper than driving fares", ATW, 10,1983).

[31] The prospectus, announcing People Express's original stock offering stated: ' The company's prospect for success depends on its ability to establish and maintain rates and prices which will build passenger volume and permit the company to operate profitably, but will not provoke disadvantageous competitive practices by rival carriers' ("People Express Earns Profit in the First Year", ATW, 4,1983).

carriers used satellite, under-utilized airports (with the exception of New York Air and Air Florida). Product differentiation by means of offering a distinct characteristics mix involved both adding and eliminating product characteristics. Some of the carriers (People Express, World, Capitol, Pacific Express, Sunworld, Florida Express) differentiated their service by eliminating some of the characteristics, in their attempts to reduce costs and attract price sensitive, discretionary consumers. Typically, the eliminated characteristics were: interlining, free baggage handling, drinks and food, and other amenities. People Express and Southwest refused to participate in computer reservation systems. The examples of carriers adding special characteristics involve Midway, American International and Southwest. Midway differentiated its business oriented service by offering special working areas with desks and secretarial services at each airport. Also an additional employee, called passenger coordinator, was assigned to each plane. The passenger coordinator's job was to assist the passenger with car rentals, hotel reservations, etc.("Midway Airlines Goes for the Business Market", ATW, 6,1983). American International offered a scheduled service to casinos in Atlantic City("American International Bets on the Lure of Atlantic City", ATW, 8,1983). Southwest tried to attract male customers by hiring attractive female flight attendants, dressing them in 'hot pants' and emphasizing the 'love' theme in their advertising. (This strategy was eventually eliminated after complaints of sexism from feminist groups.)

TABLE 4

The New Entrants - Traffic and Financial Data

CARRIER	PASSENGERS (000)	RPM (Millions)	LOAD FACTOR (%)	OPERATING REVENUES ($ mln)	NET INCOME ($ mln)
Southwest					
1978	3,528	1,049	67.4	81	17
1979	5,000	1,585	68.3	136	16
1980	5,975	2,024	68.2	213	28
1981	6,793	2,310	63.6	270	34
1982	9,079	4,865	61.6	270	34
1983	10,798	6,270	61.6	448	40
1984	12,063	7,521	58.5	536	49
1985	13,214	8,604	61.3	606	47
PSA					
1978	7,802	4,015	N/A	230	11
1979	6,233	4,203	N/A	299	23
1980	6,053	3,310	N/A	301	4
1981	6,153	3,582	54.0	438	28
1982	7,119	4,289	55.2	475	19
1983	8,099	4,921	55.2	531	(9)
1984	7,878	4,965	53.8	630	2
1985	9,121	5,806	57.2	780	
1985 - entered a marketing agreement with Northwest.					
1986 - sold to US Air.					
Air Cal					
1978	2,433	1,308	N/A	N/A	N/A
1979	2,935	1,611	N/A	60	1.3
1980	3,026	1,874	N/A	159	9.8
1981	3,490	2,150	58.9	211	(9.13)
1982	3,490	2,076	51.4	215	(35.5)
1983	3,566	2,201	58.2	239	(2.92)
1984	4,090	2,728	55.1	304	8.5
1985	4,451	2,961	56.6	344	9.3
1986 - sold to American Airlines.					
Air Florida					
1978	636	294	N/A	16	1.3
1979	820	1,396	N/A	51	2.1
1981	3,218	4,958	53.6	303	(4.1)
1983	1,854	4,549	62.4	218	(39.2)
1984	OUT OF	BUSINESS			

Continued

Capitol					
1980	611	2,880	77.9	113	(5.3)
1981	1,153	4,451	82.2	185	(2.04)
1982	1,824	6,547	75.5	267	(21.2)
1983	1,335	3,896	78.4	177	(11.1)
1984	OUT OF	BUSINESS			
World					
1980	803	2,388	62.2	200	(28.2)
1981	2,058	8,672	79.0	342	(10.4)
1982	1,651	6,871	69.0	269	(43.7)
1983	1,237	6,020	64.9	274	(29.3)
1984	1,604	7,300	65.8	322	(17.9)
1985	1,568	6,718	70.8	360	(9.4)
1986	OUT OF BUSINESS (Returned to the charter service)				
Midway					
1980	462	271	50.0	24	(5.0)
1981	748	607	59.1	73	7.5
1982	1,098	1,040	54.4	94	0.3
1983	1,197	1,43	48.4	104	(11.6)
1984	1,309	2,317	50.9	149	(21.9)
1985	1,871	1,747	58.2	181	(3.6)
People Express					
1982	2,502	2,859	60.9	133	1.01
1983	5,902	5,697	73.5	259	10.4
1984	12,390	11,775	67.4	589	8.4
1985	17,637	14,832	61.1	928	1.6
1986 - sold to Texas Air and was absorbed by Continental.					
Muse Air					
1982	867	699	4.18	33	1.4
1983	1,439	1,047	50.9	72	(1.9)
1984	1,987	1,498	47.1	101	(17.04)
1985	2,048	1,868	47.1	132	(8.7)
1986 - sold to Southwest and became Southwest's subsidiary.					
Jet America					
1982	205	557	58.5	29.9	(8.8)
1983	398	983	71.2	60.0	(7.9)
1984	538	1,329	59.7	90.2	(3.7)
1985	774	1,659	64.0	101.9	(8.1)
1986 - sold to Alaska Airlines(a regional carrier).					
American International					
1983	374	400	62.5	52.9	(11.8)
1984	OUT OF BUSINESS				

Continued

Pacific Express					
1982	480	336	52.6	25.1	(16.8)
1983	896	483	56.6	37.8	(7.2)
1984	OUT OF BUSINESS				
Northeastern					
1982	N/A	N/A	N/A	10.5	(2.9)
1983	505	798	707	94.7	(0.8)
1984	OUT OF BUSINESS				
Hawaii Express					
1982	Started in 1982 and failled in the same year. Data incomplete.				
Air One					
1983	142	153	47.4	19.8	(21.0)
1984	OUT OF BUSINESS				
America West					
1983	304	317	51.7	18.1	(9.8)
1984	2,398	2,006	52.8	122.5	(15.4)
1985	5,126	3,674	62.4	241.3	11.3
1985 - entered a marketing agreement with Northwest.					
Sunworld					
1984	363	295	52.0	24.0	(0.53)
1985	555	488	59.3	41.2	(2.4)
Presidential Air					
1985	129	102	37.5	N/A	(9.5)
1986 - changed its name to Continental Express following entering marketing agreement with Continental.					
New York Air					
1981	1,562	737	62.7	63.8	(11.6)
1982	1,739	977	54.6	95.4	(23.2)
1983	2,104	972	57.3	128.1	4.1
1984	2,795	1,509	56.0	176.0	(6.7)
1985	3,483	2,269	56.4	N/A	N/A
1986	absorbed by Continental, ceased to exist as separate corporate entity.				
Frontier Horizon					
1984	Out of business in the same year. Data incomplete.				

Source: CAB(1983a); CAB(1983b); DOT(1985); DOT(1986).

The size of entry barriers and risks facing new entrants in the industry can be inferred by examining data on financial performance and success/failure ratio of the entrants(Table 4). Despite the conditions favoring new entry, the financial performance of the new entrants, especially the start-up operators, have been very disappointing. Air Florida, Capitol, People Express, Muse Air, Jet America, America International, Pacific Express, Northwestern, Hawaii Express, Air One and Frontier Horizon all went out of business or sold out to avoid bankruptcy. PSA and Air Cal, former intrastate carriers, were sold to the major carriers while being profitable. World left the scheduled market to return to the charter service. Presidential Air and America West entered marketing and scheduling with Continental and American respectively, while New York Air was absorbed by Continental. Of the remaining three carriers only Southwest has been consistently profitable, America West appears to be moving towards profitability while Sunworld has not made a profit so far. Nine out of fourteen start-up operators failed or sold out to avoid bankruptcy, which indicates high barriers to entry and high risks facing these carriers. The typical result of the new entry was either explicit failure or reaching some form of an agreement with the established carriers. In either case, the new entrants ceased to provide competition to the existing carriers. Traffic data, also presented in Table 4, indicate gradual and slow growth of the new carriers, which offers further evidence for the claim that entry in the airline industry cannot be of a 'total' or 'hit-and-run' variety.

5.3 ESTABLISHED CARRIERS RESPONSES TO ENTRY AND CONTESTABILITY

Contestability theory requires that the incumbent firms do not respond to entry, or that the response lag exceeds the entry and exit lag. When this and other assumptions of market contestability hold, the carriers should set prices in anticipation of entry, rather than in reaction to it. Some form of limit pricing should characterize the incumbent carriers' pricing. Following regulatory reform of 1978, the established carriers were faced with competition from the new jet carriers. As chapter 4 indicated, an inefficient carrier could be vulnerable to entry of an efficient start-up carriers even when such an entry is small and gradual, and the efficient majors which were more successful in reducing their costs and improving productivity could enter and take over markets of the less efficient carriers. Entry deterring strategy of the carriers had therefore to involve:

1. Cost reduction measures to eliminate their initial cost disadvantage.
2. Pricing and other measures, aimed at deterring or slowing down entry.

Only a combination of both strategies could give credibility to the incumbents' attempts to preserve their position in the industry. In order to reduce labor costs, airlines used different strategies. Some, like Braniff and Continental, filed for bankruptcy and abrogated their labour contracts. The airlines' employees were laid off and offered their jobs back at substantially lower levels. Table 5 presents data concerning labour cost reductions implemented by Continental. It

TABLE 5

Reduction of Wages - Continental Airlines

LABOUR CATEGORY	1981	1984	PERCENT CHANGE
Pilots and Copilots	67,492	29,695	(-56%)
Cabin Attendants	22,041	16,023	(-27%)
Maintenance and Overhaul Workers	21,269	11,731	(-44%)
Ticketing and Sales	24,564	18,042	(-26.5%)
Other	33,198	23,566	(-29%)

Source: ICAO(1984a).

appears that the wage reductions were very substantial, ranging between 56% for pilots and 27% for ticketing and sales personnel, even without adjusting for inflation. American Airlines used a different strategy by introducing a two-tier pay scheme. According to this scheme, new employees were offered wages up to 50% less than existing workers. Similar schemes were introduced by United and Northwest. Eastern negotiated 18-22% wage cuts in exchange for employee stock participation("Labor Wage Standards Adrift under Deregulation Pressures", ATW, 6,1984). Some carriers had to fight to obtain necessary concessions. TWA, for example, broke the strike of flight attendants by laying off most of them and replacing them with new workers, at much lower wages ("A Fatal Flight Takes its Toll" Newsweek, September 8, 1986). Not all major carriers were equally successful in reducing labour costs and the process of cost adjustment still continues in the industry.

Equally important for the carriers were work rule concessions and other productivity increasing measures. Figure 18 presents data on RPM and employment of the major carriers. Between 1978 and 1981 output of employment were moving together. This indicates no significant change in labour productivity. After 1981(the year when new entry was allowed) output began to increase while employment continued to drop, resulting in an increase in labour productivity. This would suggest that it was the new entry which forced the existing carriers to adjust their costs and enhance productivity. Thus the new entry might add a constraint on the degree of x-inefficiency in the industry.

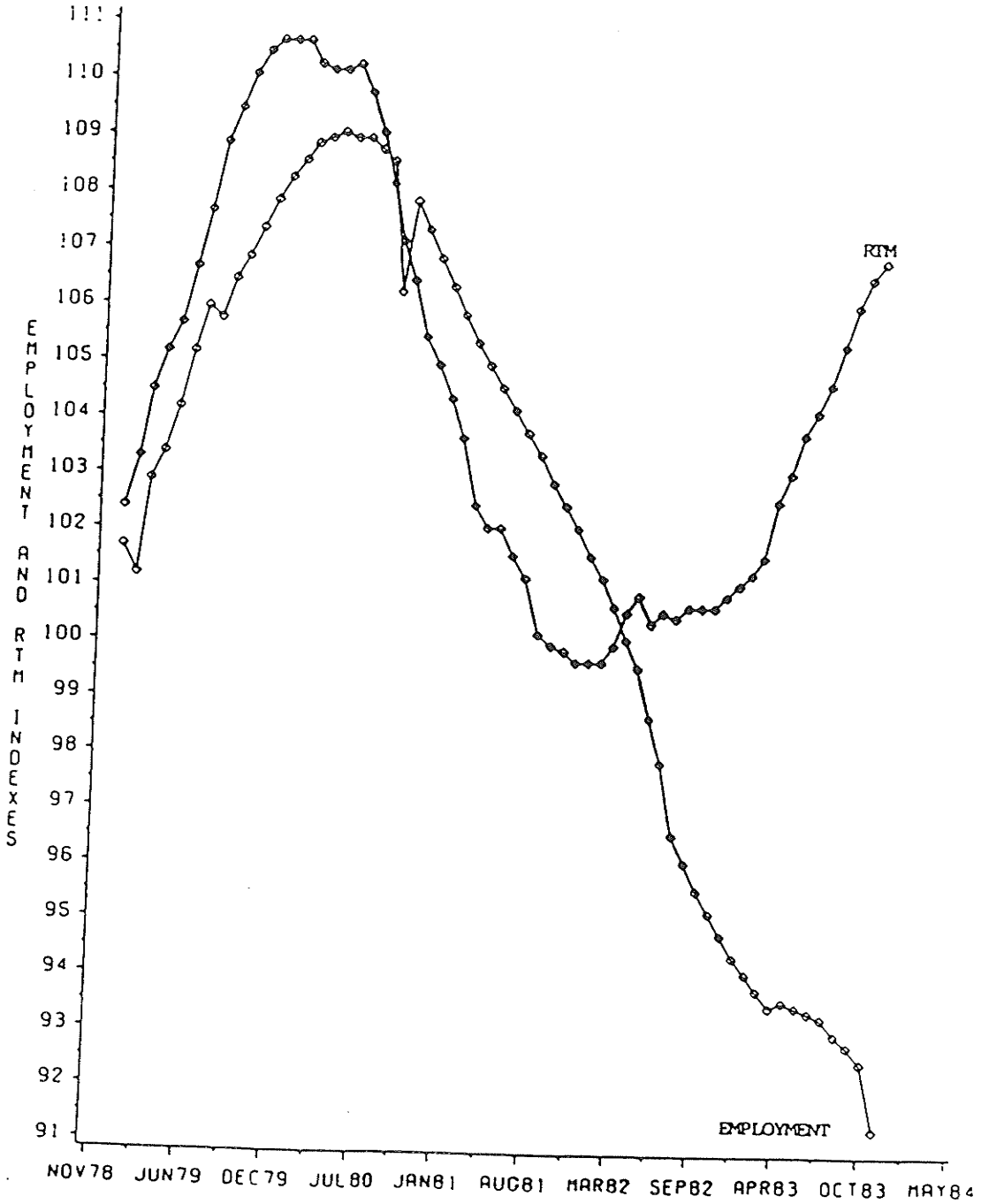

Figure 18: RPM and Employment - U.S. Majors.
Source: CAB(1984).

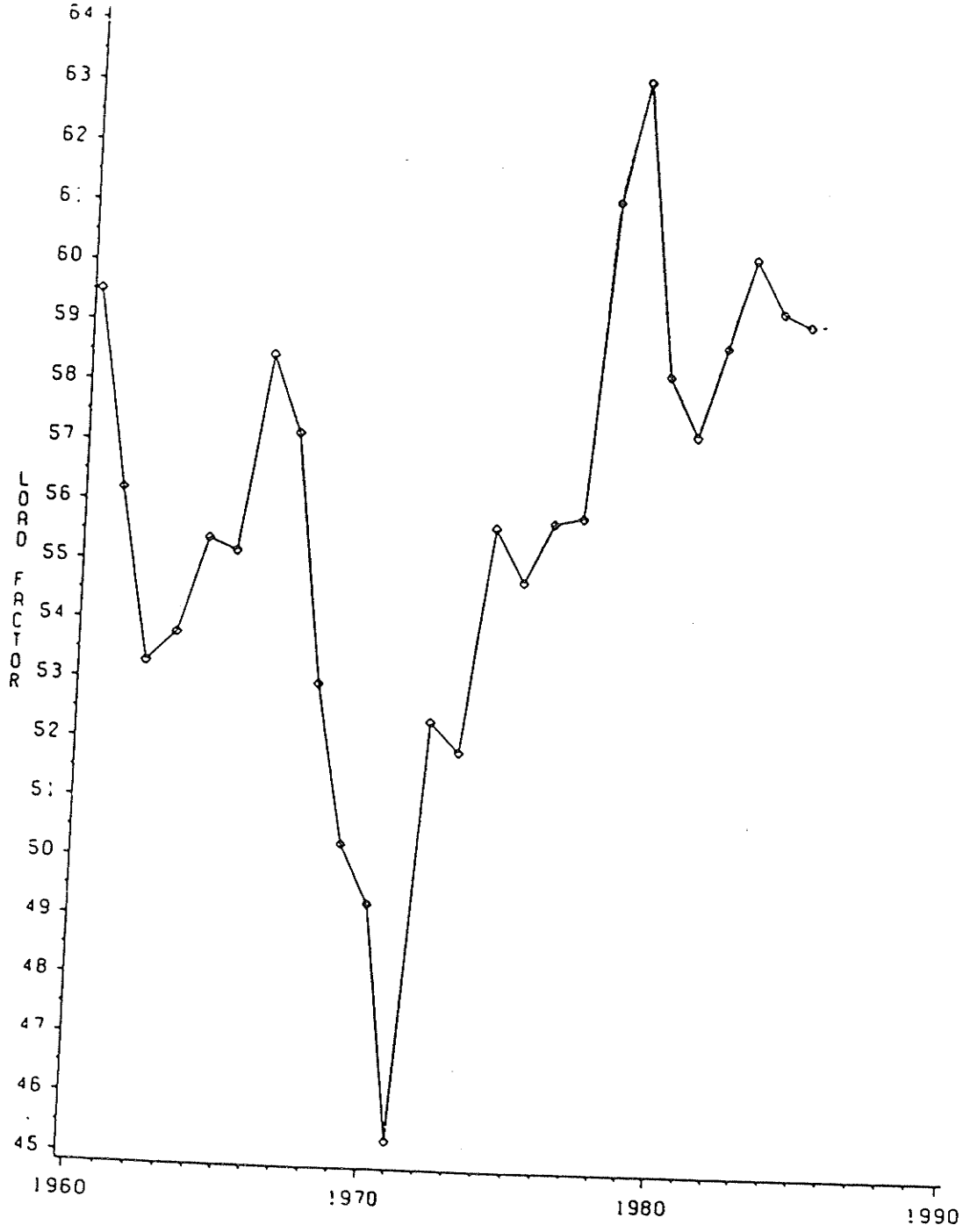

Figure 19: Load Factors - U.S. Majors.
Source: CAB(1983a).

The major carriers also improved use of their equipment (Figure 19). Load factors of the major carriers increased in 1978, and stabilized at about 60% in the following years compared to 54.2% average in the previous period(1960-77).

As far as pricing was concerned, the incumbents' response depended primarily on their initial competitive position and price elasticity of demand in a given market. In general, strong incumbents responded with aggressive pricing, often adding capacity to meet increased demand. For example, USAir responded to the People Express entry into the Buffalo-Network market by reducing its fare from $97 to $35 (People's fare) and by expanding capacity from 25 flights a month to 42 flights a month(Bailey et al.,1985,p.106). The most popular response was to offer capacity controlled discounts, while matching the entrants' fares; this strategy was especially attractive to the carriers operating sophisticated computer reservation systems. Information gathered from the computer systems allowed carriers to offer the minimum capacity necessary to satisfy the demand at the entrants' fares. Capacity controlled discounts helped the established carriers to minimize losses in the period of transition to lower cost operations. Another strategy was used by Eastern. In order to fight New York Air's entry into New York markets, Eastern offered discount coupons to its passengers. In some instances, the announcement of intention to fight was sufficient for deterring entry. For example, People Express dropped Cleveland as one of its destinations when United and American said that they would match People Express' fares("People Express Earns Profit in the First Year", ATW, 4,1983).

The established carriers also attempted to reduce the entrants cost advantage by increasing entrants costs. This was done primarily by charging the new entrants monopolistic prices for using computer reservation systems("Reservation Systems are Likely to be Disciplined", ATW, 9,1983). In addition to this, the established carriers used some innovative strategies, such as the establishment of frequent flier programs, which could be most efficiently administered by carriers having their own computer reservation systems. Carriers serving many points had a distinct advantage here since they could offer attractive destinations and enter reciprocal agreements with foreign carriers.

Finally, the established carriers managed to use the government in their entry deterring strategies. Following intensive lobbying by the established carriers, FAA declared that the slots at the most congested airports (J.F. Kennedy, La Guardia in New York, National for Washington, D.C., and O'Hare in Chicago) were the property of airlines using them("Clipping Wings", Fortune, March 3, 1986). In addition to giving a windfall to the existing airlines, the FAA move had important competitive implications. The new entrants would have to buy the rights to the airport slots from the very firms they intended to compete with.

In general, the U.S. experience provides an additional proof that the behavioral assumptions of market contestability, related to 'hit-and-run' entry, do not hold in the airline industry. The incumbents were able to react swiftly using a variety of entry deterring strategies.

5.4 INDUSTRY CONCENTRATION AND CONTESTABILITY

Market contestability predicts fares to be set in anticipation of entry, rather than in reaction to it. Kaplan(1986) has provided a sample of fares in markets entered by People Express and Southwest and in similar markets, not affected by the new entry. Markets entered by People Express or Southwest experienced a decline in fares between 17% and 41% while other markets experienced price increases between 53% and 103%(!). Similarly, an empirical study by Graham, Kaplan and Sibley (1983) found that fares in the markets served by the new carriers were approximately 20% lower than in the other comparable markets. Thus, the fares were not set in anticipation of entry. Carriers cut their fares only when faced with the actual entry.

Market contestability predicts that fares are determined by costs and are independent of market structure. Using a cross-sectional sample (second quarter 1981), Bailey et al.,(1985) found fares to be significantly correlated with concentration. Fares, in markets with two carriers, were on average 6% lower than fares in monopolistic markets. Fares, with four carriers in the market, were about 11% below the fares in monopolistic markets. Call and Keller(1985) found further support to the claim of positive correlation between fares and concentration. Moore(1986) examined changes in fares between 1976 and 1983, in markets characterized by different levels of concentration. Markets served by only one or two carriers experienced price increases of over 40% in real terms, those with three and four carriers experienced increase by 33% and 30% respectively, while markets with five or more carriers experienced increases of only 2.6%. A big jump in fare in-

creases when the number of carriers drops to four suggests that with four or less carriers in the market, the perceived interdependence of carriers restricted their price competition - the standard result of the oligopoly theory(Scherer,1980). Because of the industry disequilibrium in the period of transition to the deregulated environment, these test do not offer a decisive proof, if considered alone. However, the results of these tests are consistent with the theoretical and empirical analysis of chapter 4 and other evidence from deregulation of American airlines.

When fares are correlated with concentration, changes in industry will likely effect the industry performance. Concentration trends may also indicate whether there are any economies of airline size present. If an industry is naturally perfectly competitive then its levels of concentration should decline. If, on the other hand, there are important economies of airline size, concentration in the industry should increase. Table 6 presents data on concentration trends in the U.S. after 1978. In the first year of deregulation shares of first four, first six and first eight carriers were 60.5%, 75.1% and 83.2% respectively. Between 1978 and 1983 these shares dropped to 45.9%, 60.9% and 67.3 respectively. This would suggest the presence of diseconomies of scale in the past structure of the industry. It would also suggest an increased strength of potential competition, as the number of existing carriers and potential entrants should increase. This decreasing trend in concentration, however, came to an abrupt end after 1983. As the existing majors adjusted their costs and productivity, they were able take advantage of the economies of their size. Between 1983

and 1986 shares of the first four, first six and first eight carriers increased dramatically to 64.35%, 85.35% and 92.03% respectively. Thus, concentration in the industry increased above the pre-deregulation levels, indicating the presence of economies of airline size. The biggest carriers appeared to be winning the 'survivor' test.

Increased concentration in the industry resulted from the internal growth of the carriers and from airline mergers. The most important mergers and takeovers included:

1. North Central-Southern (merger) - 1979.
2. Republic-Hughes Air West (acquisition of Hughes Air by Republic)-1980.
3. Texas International-Continental (acquisition of Continental by Texas Air, a holding company owning Texas International)- 1981.
4. Northwest-Republic (merger) - 1986.
5. Texas Air-Eastern (acquisition of Eastern by Texas Air) - 1986.
6. TWA-Ozark (acquisition of Ozark by TWA) - 1986.
7. Texas Air-People Express (acquisition of People Express by Texas Air) - 1986.
8. Delta-Western (merger) - 1986.
9. PSA-U.S.Air (acquisition of PSA by U.S.Air) - 1986.
10. Air Cal-American (acquisition of Air Cal by American) - 1987.

Initially, CAB's position on mergers and takeovers was based on the following assumptions:

1. Concentration ratios alone are not an accurate guide of competitive performance.

TABLE 6

Concentration Trends - the U.S. Airline Industry

YEAR/CARRIER		PERCENT OF TOTAL SCHEDULED TRAFFIC *
1978	1. United	23.5%
	2. American	15%
	3. Delta	13%
	4. Eastern	12%
Sub-total		60.5%
	5. TWA	9.5%
	6. Western	5.1%
Sub-total		75.1%
	7. Continental	4.4%
	8. Braniff	4.4%
Sub-total		83.2%
	Other Carriers	16.8%
Total		100%
1983	1. United	15%
	2. American	12%
	3. Eastern	9.5%
	4. TWA	9.4%
Sub-total		45.9%
	5. Delta	9%
	6. Northwest	6%
Sub-total		60.9%
	7. Republic	3.2%
	8. Western	3.2%
Sub-total		67.3%
	Other Carriers	32.7%
Total		100%

Continued

1986	1. United	18.66%
	2. Taxas Air (includes Continental, Eastern, New York Air, People Express)	17.4%
	3. American	15.14%
	4. Western	13.15%
Sub-total		64.35%
	5. Northwest	11.6%
	6. TWA	9.4%
Sub-total		85.35%
	7. USAir	3.53%
	8. Piedmont	3.15%
Sub-total		92.03%
	Other Carriers	7.97%
Total		100%

* Traffic is measured by revenue passenger miles(RPM).

Source: CAB(1983a); DOT(1985); DOT(1986).

2. Potential competition has a disciplining effect on market performance.

> In the Texas international and National acquisition case, for example, the Department of Justice recommended disapproval based in large part on market share data.... The CAB countered by arguing that concentration ratios were not instructive in this case, since with the passage of the Airline Deregulation Act of 1978, there was now relative ease of entry, even for small carriers(Bailey,1981,p.183).

It appears then, that CAB was guided by market contestability theory. After the CAB's disbandment in 1984, the antitrust authority was transferred to the Department of Transportation(DOT). At first, DOT followed CAB's approach. Recently, however, DOT has reversed its position in favor of a more traditional approach. An example of this is the initial disapproval of Texas Air's acquisition of Eastern. The takeover was approved only after Eastern agreed to swap some of its slots with Pan Am. DOT found it necessary to allow Pan Am's entry into eastern corridor markets in order to offset some of the anti-competitive effects of the merger ("Battle for Air Slots", Fortune, May 26, 1986).

In addition to mergers and takeovers, some airlines reached marketing and scheduling agreements, which included:

1. Agreements between carriers offering scheduled jet service such as Northwest-America West and Northwest-PSA.
2. Agreements between the scheduled jet carriers and commuter carriers("Allegheny Commuter Sets the Pace for Marketing Agreements" ATW 3,1986).

The second type of agreement became especially popular. When the industry was deregulated in 1978, major carriers abandoned many unprofitable routes which served smaller cities, which were taken over by the commuter airlines, operating mainly twin-engine turboprops. Many of these commuter carriers entered agreements with major carriers (of the top 25 regional lines, 19 signed agreements with a major carrier("Buddy system in the Skies", Time, November 11, 1985)). In the typical agreement, the commuter airline adjusts its frequencies to those of the major carrier, supplying the carrier with 'feed'. In exchange for this, the commuter airlines are allowed to share the majors' code on flight-reservation computer systems. This is important for the smaller airlines because the major carriers' codes get priority display in reservation systems and are, therefore, booked first. These inter-carrier agreements have two anti-competitive effects:

1. They eliminate competition between major jet and commuter services, even when such a competition is possible.
2. They result in a barrier to entry for the potential entrants.

The established carriers, having secured the 'feed', can exploit the economies of scale, in the given market. The new entrants, being denied 'the feed' would have to come at a smaller scale and experience the scale related diseconomies. 'Hit-and-run' would also not be possible.

5.5 DESTRUCTIVE COMPETITION AND SAFETY

Some critics of deregulation predicted that the industry's performance would follow a destructive competition pattern. The destructive competition hypothesis suggests depressed economic profits, breakdown and discontinuity of service. While carriers entered and abandoned markets in their attempts to reorganize their networks, there is no empirical evidence of service breakdown. Some small communities lost their jet service, but it was usually replaced by commuter service. Some other communities experienced carriers entering and leaving their markets, which brought some confusion and disutility. High density routes typically experienced increased frequency of service(Brenner et al.,1985). The main suggested area of service deterioration was service for small communities. However, the empirical evidence is mixed. Brenner et al.(1985) suggest service deterioration, while Moore(1986) suggests that service has actually improved. Given that these studies were conducted during the period of industry restructuring, the issue of service quality has to be considered as being still unresolved.

The industry's profitability[32] is presented in Figure 20. In four out of the eight years the industry incurred losses, but in the remaining four years it earned positive profits. The industry's profitability is not impressive in terms of its own historical standards, but does not appear to be consistent with what the destructive competition hypothesis predicts. As the industry slowly evolves towards a tight oligopoly, the incidence of price wars should drop and the in-

[32] Net income has been used rather than operating profits. Net income is an operating profit net of interest expenses. Therefore, it can be used as a proxy for economic profits.

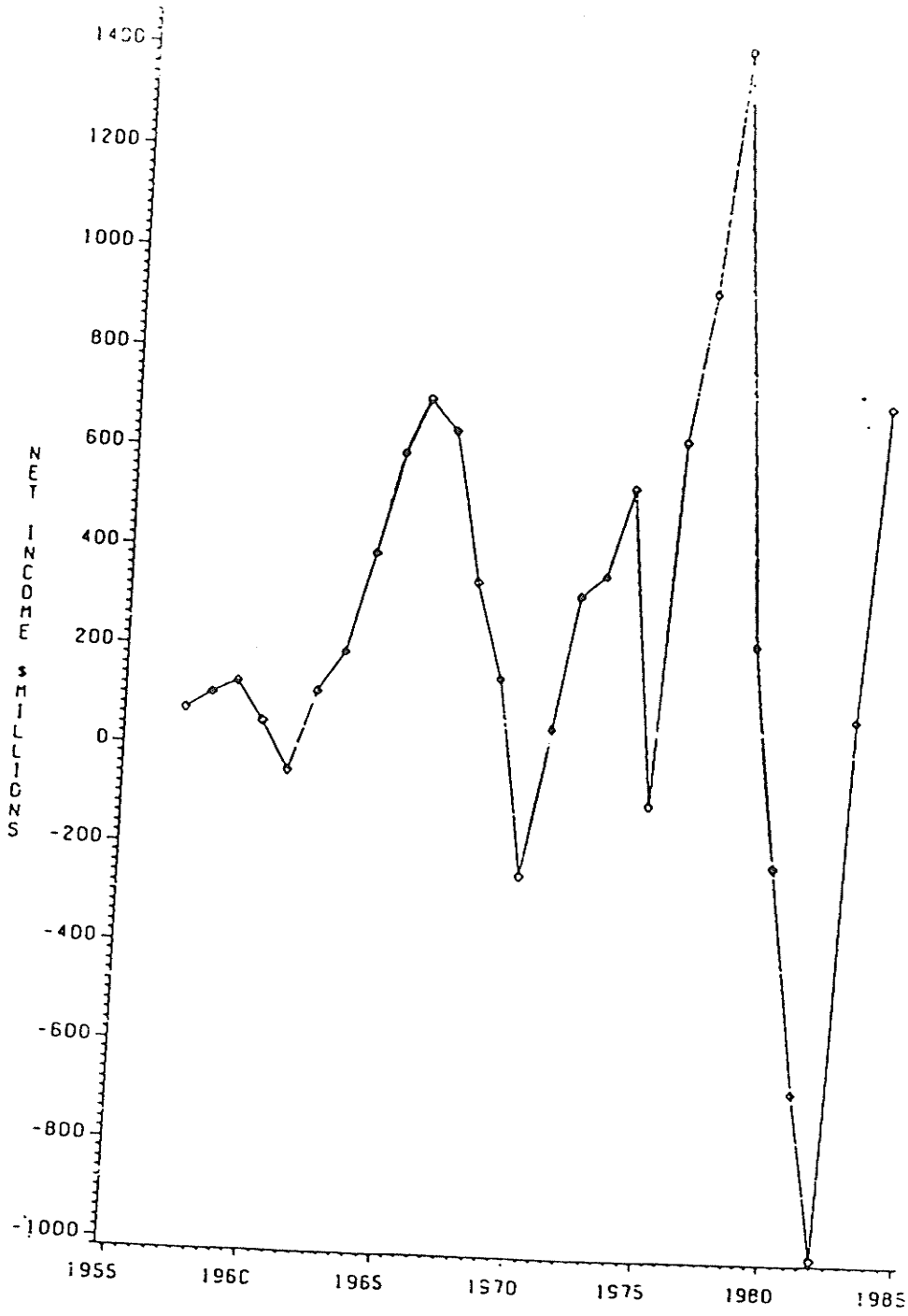

Figure 20: Profitability of the U.S. Airlines.
Source: CAB(1983b).

dustry's profitability should improve.(Coordination of pricing strategies is typically easier when the number of firms in the industry decreases(Scherer,1980)).

Safety, in the context of the airline industry, depends primarily on the proper maintenance of planes. It also depends on the quality of air traffic control systems, congestion at the airports, and purely random factors such as weather or collisions with birds, factors, which are beyond control of airlines. Even though safety was not deregulated in the U.S., there was some concern, that removal of entry and price controls would degrade safety. This could have been possible, if the increased competition eliminated profits and forces the airlines to cut expenditures on the maintenance programs. Table 7 contains data on RPM and maintenance expenditures of the U.S. industry. The expenditures on maintenance did decline dramatically after deregulation, from $8.10 to $4.00 per RPM,[33] which would indicate deterioration of safety in the industry. However, this decrease in maintenance expenditures did not result in into the increased numbers of accidents and fatalities. This is illustrated in Table 8.

The number of accidents in the industry, both in terms of the absolute number and per 100,000 hours flown, has dropped after deregulation. The empirical evidence therefore is mixed, but the declining expenditures on maintenance indicate a potential problem and the need for measures aimed at enhancing the compliance of airlines with safety standards.

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[33] The expenditures on maintenance were adjusted for inflation. Revenue passenger miles are measured by multiplying the number of passengers carried times the number of miles flown.

TABLE 7

Maintenance Expenditure: 1970-1983

YEAR	MAINTENANCE EXPENDITURES (Millions of 1970 dollars)	RPM (BILLION)	MAINTENANCE EXPENDITURES PER RPM
1970	1,402	131.7	10.70
1971	1,376	135.6	10.18
1972	1,468	152.4	12.23
1973	1,504	161.9	9.28
1974	1,458	162.9	8.95
1975	1,430	162.8	8.78
1976	1,516	178.9	8.51
1977	1,565	193.2	8.10
1978	1,561	226.7	6.90
1979	1,254	262.0	4.78
1980	1,270	255.2	4.97
1981	1,195	298.8	4.80
1982	1,105	259.6	4.25
1983	1,125	281.3	4.00

Source: Statistical Abstract of the United States(1985), Tables 1098 and 1099.

TABLE 8

Accidents and Fatalities - 1979 to 1983

	1979	1980	1981	1982	1983
Accidents					
Total	24	15	25	16	19
Fatal	4	0	4	5	4
Fatalities	351	0	4	235	15
Accident Rate per Hours Flown					
Total	0.36	0.22	0.38	0.23	0.29
Fatal	0.06	0.00	0.06	0.06	0.06
Accident Rate per 100,000 Departures					
Total	0.45	0.28	0.48	0.31	0.39
Fatal	0.07	0.00	0.08	0.08	0.08

Source: FAA(1983).

In Chapter 4, the market contestability theory has been found to be inconsistent with the basic economics of the airline industry. The empirical evidence gathered from the U.S. deregulation of the industry provides further evidence to this claim. Particular conditions of the industry and government policies were responsible for the relative ease of entry in the first years of deregulation. These conditions no longer exist, since the major carriers have managed to adjust their costs, route networks, and develop new entry deterring strategies. Contrary to the predictions of the contestability theory, concentration levels are found to be important determinants of fares. Increasing concentration in the U.S. industry and the disappearance of the class of small scale entrants suggest the presence of important economies of airline size. The experience of the new jet carriers is especially interesting for countries with small domestic markets. In such countries, the industry will likely be highly concentrated and potential competition will have to originate from the new start-up carriers. The high failure/success ratio, despite the conditions favoring new entry, has to be considered as an indicator of the weakeness of this type of potential competition. Inconsistency of the theory's predictions with the industry's conduct and performance, seems to have been recognized by the U.S. policy makers.

Recent decisions by DOT, concerning industry mergers, suggest that DOT has abandoned market contestability as a theoretical framework for policy making.

Chapter VI

MARKET CONTESTABILITY AND DEREGULATION OF THE CANADIAN AIRLINE INDUSTRY

In this chapter the traditional rationale for regulation of transportation industries is reviewed. The proposals to deregulate the Canadian airline industry are related to the history of airline regulation in Canada. The question of contestability of the Canadian airline industry is then addressed. The sources of deviations from contestability are presented and the desirability of enhancing market contestability is discussed. Public policies to enhance contestability and their limitations are examined, and 'Freedom to Move' proposals dealing with pricing and entry are evaluated.

6.1 REGULATION OF THE AIRLINE INDUSTRY - PUBLIC INTEREST PERSPECTIVE

The airline industry provides a service that has both economic and political dimensions. Airline networks, once established, enhance economic integration of different regions. They also allow for a greater interaction among people and may be helpful in building the nation. Establishment of the airline network is a continuous process and involves:

1. Building the necessary infrastructure - airports, roads to the airports, air traffic control systems, etc.
2. Establishing an industry which would supply the transportation services using the provided infrastructure.

Because of the high capital requirements and the risks involved, governments traditionally assumed the responsibility for the provision of the infrastructure. The airline service is also determined by the number of air carriers, their route structures, interlining agreements, types of planes, frequency, quality of services and fares. Government intervention into the industry's operation has been rationalized on the grounds of 'infant industry' argument, in the initial stages of development of the industry, and market failure in the later stages. The market failure argument for regulation suggests inefficient provision of service by an unconstrained industry. Traditionally, government intervention took the form of regulation, but other measures such as direct government ownership and subsidies and taxes were used as well. Regulation can be defined as public intervention by the imposition of rules. These rules are backed by the coercive power of the state and are directed at modifying the economic behavior of firms. The scope of economic regulation involves: (a) conditions of entry and exit; (b) pricing; (c) product/service quality and safety; (d) externalities; (e) relations between buyers and sellers.

Public regulation may be both restrictive and promotional in nature. Restrictive role involves imposition of constraints on behavior of firms which is found inconsistent with the social welfare. The promotional role involves creating conditions favorable to the indus-

try's development by reducing uncertainty and enhancing the long-run planning. The promotional role may also involve non-economic objectives such as nation building, defense and regional development. The most common arguments for airline regulation are:[34]

1. Natural monopoly.
2. Destructive competition and service continuity.
3. Externalities.
4. System effects and public good characteristics of on-demand airline service.
5. Safety.

Natural Monopoly

The natural monopoly problem arises in countries with small domestic markets, relative to the minimum efficient size of an airline as well as when the level of intermodal competition and competition from the transportation systems of the neighboring countries does not set a constraint on the monopolistic pricing. When the actual and potential competition is insufficient, government intervention may be necessary. It is not obvious, however, that the government intervention has to take the form of regulation. The Chicago School's approach, as developed by Demsetz (1968), Stigler (1968) and Posner (1972) has suggested franchise bidding as an alternative form of dealing with the monopoly problem. Auctioning of the franchise rights may take two basic forms(Williamson,1985):

[34] Only normative arguments for regulation are considered in this section. Positive theories of regulation such as capture theory(Stigler), rent-seeking activities(Posner) and other theories, are not discussed here.

1. Selling the monopolistic rights to the highest bidder.
2. Allocating the monopoly rights to the bidder offering to supply a given service at the lowest price.

Allocating the franchise to the highest bidder seems to guarantee monopolistic pricing, since it is rational for the bidders to increase bids, as long as the bid is below the discounted value of the monopolistic profits. The proceeds from the sale of monopoly rights theoretically could be distributed back to the consumers, however, there would be transaction costs present, and the usual welfare loss due to monopolistic pricing will not be avoided.

Option two may result in competitive pricing, but is not without problems of its own. Airline service as well as any service has a quality dimension in addition to price. Thus, there is a possibility of reducing service quality by the winner of the contract. Not only does quality have to be defined but it is also necessary to establish a system of quality monitoring. However, establishing an institution to monitor the airline's compliance with the terms of the franchise contract could be considered a form of disguised regulation.

Uncertainty about demand and costs makes complete contracting even more difficult. One way to deal with the problem of uncertainty is to shorten the length of the contract. However, shortening the contract's length will increase the social costs of franchise allocation, as additional costs of organizing auctions and screening the applicants have to be incurred. Short-term contracts would pose additional difficulties if the life of some assets exceeds the length of the con-

tract, and these assets cannot be deployed elsewhere. Posner (1972, p. 116) suggests the requirement that the former franchisee transfer the unamortized portion of assets to the new franchisee. This solution may require government arbitration when the involved parties cannot agree on the value of the assets. Secondly, Posner's solution may force the incumbent firm to bid below the level of all historical costs, if a portion of the sunk costs cannot be recovered in the arbitration process. Uncertainty about the entrant's costs, together with a possibility of strategic bidding by the entrant, may also force the incumbent to set a bid that will not allow the recovery of all costs. This may undermine the long run stability of the industry. Thirdly, Posner's rule ignores the role played by good will. Because of the informational asymmetries, satisfied consumers are willing to pay a premium to fly with the airline they know and whose service they have found satisfactory. Consumers assign good will capital to a particular airline and to is impossible to transfer good will unless the new entrant acquires the name and corporate organization of the incumbent. A higher bid by the existing carrier may merely reflect the necessity to recover past investment in good will and be fully consistent with the consumers' product valuation. Assigning franchise rights to the lowest bidder can make it unprofitable to invest in good will, which will result in a lower than the optimal quality of service. Finally, airline markets are defined over city-pairs but these markets are typically interrelated as parts of airline networks. Auctioning the rights to service separate markets may lead to disintegration of the airline networks. Auctioning rights to operate the network may not be easy either. Consider a country with just one national carrier. If the

right to operate this carrier's network is auctioned, who will be the other bidders? Considering the problems and difficulties involved, franchise bidding may be a very imperfect substitute for regulation. It is not clear that franchise bidding will be any cheaper nor less distorting than regulation.

Destructive Competition

The case of destructive competition has been already referred to as market and network unsustainability. Unsustainability was found to be theoretically possible, although unlikely, given a variety of factors enhancing sustainability. Another type of destructive competition may arise in an industry characterized by a high level of sunk costs and unpredictable shifts in demand(Kahn,1971). The airline industry is not characterized by a high level of sunk costs and there is no evidence of violent shifts in the demand for airline services. Consistently low profitability of unregulated airline industry as an indication of destructive competition has not been found in the deregulated American industry. Destructive competition may also arise in case of service provision to small isolated communities. Real-life economic agents do make mistakes and there is a possibility on an entry, leading to a disruption of service if two carriers cannot operate the route profitably. While there is no reason to expect this problem to be endemic and destroying the service permanently, when continuity of service is essential, entry regulation may be warranted. Continuity of service can also be enhanced by restricting exit, for example by requiring that an advance notice is given. As Caves and Porter(1977)

have demonstrated, exit barriers are entry barriers, and their presence should reduce the likelihood of destructive entry.

Externalities

The airline industry is a source of important negative externalities such as noise, pollution, and congestion which may be corrected using methods other than regulation. For example, airlines may be required to purchase the right to pollute or to impose noise related disutility. The affected parties involve people whose properties are within the range of the pollution and the noise, and correction for these externalities should involve compensation to the affected parties, if society implicitly agrees that these parties have the property rights to the air. The problems are how to identify the value of these negative externalities and how to distribute the compensation to the affected parties.[35] The government will have to make the necessary evaluations and take the responsiblity for distribution of compensation funds. Monitoring of the levels of pollution and noise is necessary, in order to make sure that the airlines do not exceed the agreed upon levels. This is quite similar to the usual noise and pollution regulations. An alternative to selling the pollution rights can be a pollution tax. This scheme, however, may fail if the demand for the airline service is inelastic. The airlines may simply shift the tax to the consumers without reducing the level of pollution. In cases like this, setting standards (that is regulating) may be the only fea-

[35] With transaction costs present, the Coasian solution of explicitly allocating the property rights to clean air and noise abatement will not be sufficient.

sible solution.

Another type of externality, present in the airline industry is congestion, which primarily affects the carriers involved and their customers. It may also affect third parties if it reduces the level of safety, thereby increasing the probability of accidents, resulting in medical costs, which could be passed on to the public, if they are subsidized by government. Congestion in the airline markets can occur as a result of an increasing demand on existing infrastructure or may arise as a result of new entry. The new entrant may cause congestion, even though there is no new traffic generated. This can happen when the incumbent's traffic loss results in lower load factors and unchanged frequency. When the entrant generates new traffic, congestion in capacity constrained airports becomes even more likely. In addition to the costs imposed on the incumbent airlines, time delays will result in additional costs for the travellers. When the new entry aimes primarily at discretionary, time-insensitive consumers, time delays may impose an asymmetric burden if they affect time-sensitive business travellers. Hub-and-spoke networks may be especially sensitive to this problem, since time delays will have a cumulative effect on connecting flights.

The policy options involve:

1. Assigning property rights to the airport and air space to the incumbent carriers. The new entrant would have to buy the right to impose congestion costs. The estimated effects will be internalized. The problem here is that the incumbent carriers could use their control to forestall any new entry.

2. Allowing strategic behavior on the part of incumbents faced with the congestion costs. The incumbent carriers would be willing to engage he predatory practices up to a point when the losses and predatory actions become equal to the discounted value of the congestion costs. This option, however, sets a dangerous precedent in justifying predatory strategies which can be used for reasons having nothing to do with externalities.

3. Auctioning the access rights to the highest bidders (Greather, Isaak and Plott, 1979). Congestion costs can be internalized since the entrant will have to outbid the incumbent carriers. Only when the benefits of new entry exceed congestion costs may the entrant succeed. The problems with this option are the following:

   (a) the upper value of the access rights is equal to the discounted monopolistic profits. Thus, this option degenerates into the franchise bidding scheme. Monopolistic pricing and allocative inefficiency may result.

   (b) When demand is inelastic, the bidding costs and the transaction costs will be passed onto the consumers. Thus, the very possibility of entry may impose an extra burden on the time-sensitive consumers. This burden could be reduced if the collected funds were used by the authorities to increase the airport capacity.

(c) Establishing scheduling committees (Bailey et al., 1985, p. 182). The airlines, the incumbents and the new entrants have to reach a cooperative allocation of capacity. Since airlines may fail to reach a cooperative solution, public authorities may have to step in as arbitrators.

(d) Explicit regulation - regulation becomes a substitute for the auction bidding mechanism. Allocation of the scarce capacity may avoid the problems mentioned in point 3. It is possible that the regulating agencies will not have information as good about the congestion costs as the affected parties. The affected parties (incumbent airlines) will have an incentive to overstate the congestion costs, in an attempt to forestall the new entry. Lobbying and rent-seeking activities may also result.

(e) Provision of excess capacity could prevent the congestion to occur. However, excess capacity has its opportunity cost which has to be weighted against the costs of congestion.

It appears that there are no perfect solutions to the congestion problem. Particular conditions of a given country will have a decisive role in choosing the optimal policy.

Positive externalities are typically related to the effects of availability of airline services on regional development. Airline service is an important part of economic infrastructure and has to be provided first, before business decides to locate in the region. Demand is unknown and has to be evaluated ex-ante, which given uncer-

tainties may involve underinvestment in the service provision. Regulation of entry might be necessary if cross-subsidy is used to make the service viable.

Systems Effects and the Public Good Characteristic of 'On Demand' Air Transportation Service

On demand scheduled air transportation service ensures the availability of service at short notice, which is valued positively by consumers. However, it comes with a cost, since it requires that some seats remain unfilled, and the cost of unfilled seats will translate into higher average fares. The availability of service has some public good characteristics; when the scheduled service is available, some consumers may choose the services of cheaper, but irregular carriers, and by losing customers, the regular service may cease to be viable. Discontinuity or undersupply of 'on demand' service may result(Kahn,1971). Recent developments of computer reservation systems which allow offering 'on demand' and cheaper discount service, make this type of market failure less likely.

Operating integrated airline networks is a source of potential cost savings. In addition to increased cost efficiency, due to network economies and economies of scale, there is another potential benefit of adding additional routes to the airline system. Should the necessity arise, the consumers are able to travel on these routes. However, the consumers may be uncertain about future needs. They may also behave opportunistically and refuse to pay for the benefit of the

access voluntarily. Thus, expanding airline networks may encounter difficulties which characterize the provision of public goods. A direct subsidy to airlines with a simultaneous tax on all system users may offer a potential solution. When the subsidy-tax option is impossible, the alternative would be to cross-subsidize the added routes from revenues generated elsewhere. This, however, will lead to the usual unsustainability problem. Extending the network could become unfeasible if a cross-subsidy in excess of the cost efficiency gain is used to make these destinations viable. Regulation of entry might be necessary to develop an integrated transportation network. Once the network is established, the case for regulation becomes less clear. Structural barriers to entry may be sufficient to prevent network unsustainability.

Safety

Safety has traditionally been regulated and the need for this type of regulation is rarely questioned. As indicated in Chapter 3, good will is an important asset for the airlines. When the airline reduces its maintenance expenditures or employs underqualified pilots, the probability of accidents and the loss of reputation for service quality increases. Risk-averse and risk-neutral managers should never underinvest in safety, given the possibility of losing good will capital. However, there is a possibility that some the airline operators may behave as 'risk-takers'.[36] These operators will 'gamble' not only

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[36] Safety has often been related to destructive competition. When profits in the industry are negative, the managers may reduce expenditures on safety. Risk preference becomes a function of the industry's profitability.

with their intangible good will assets, but also with the lives and welfare of their customers. If the customers could easily identify the risk preference of the airline operators, one could imagine a situation where risk-taking customers choose to fly with cheap but less-safe airlines. Risk-neutral and risk-averse customers would use the more expensive, but safer, services. Because of asymmetric and imperfect information, customers may not be in a position to identify the risk preference of the airline. Especially, when the risk-taking airlines have no incentive to reveal their own risk preference. In addition to this, accidents resulting from safety violations can involve parties other than airlines and their customers, and impose additional costs on society.

Safety regulation involves entry regulation in a sense that only 'fit and able' operators are allowed in the industry, and conduct by setting standards on maintenance and other relevant operational characteristics.

Cost of Regulation

Regulation results in a variety of costs which can be broadly divided into direct and indirect categories. Direct costs involve the expenditures on the regulatory agency itself, on government, and the cost of compliance with regulation, for the industry. Indirect costs involve induced inefficiency in input mix, output mix and x-inefficiency. Most of these indirect costs result not from the regulation per se, but rather from inefficiencies in the regulatory process. Some of the inefficiencies might be unavoidable due to bureaucratic

inertia and the low adaptability of political institutions to changing economic conditions. Regulatory systems designed to help the industry in its 'infant' stage may be inappropriate for the mature industry. In comparing the cost of regulation with its benefits, however, one has to use, as a point of reference, other possible institutional arrangements, rather than some unattainable ideal.

It appears, that the case for safety and environmental regulation is strong. As far as entry, exit, and price controls are concerned, characteristics of each country, such as the stage of development, location, population, income, political system and international relations have to be considered in order to determine the desirability of regulation.

6.2 "FREEDOM TO MOVE" IN THE HISTORICAL PERSPECTIVE ON CANADIAN AIRLINE REGULATION

The history of Canadian airline regulation reflects changes in the economics of the industry and changing public policy objectives towards the industry. The following stages can be identified:

1. Early pioneering of commercial air services (1919-1925).
2. Establishment of the air transport industry in Canada (1926-1937).
3. Promotional regulation (1937-58).
4. Regulatory planning (1958-1977).

5. Experimentation and gradual deregulation (1978 till present).

In the first period, commercial aviation in Canada was largly limited to surveying and aerial reconnaissance. There was some experimentation with transport and communication work (Studnicki-Gizbert,1960).

The second period (1926-1937) markes the establishment of the industry. Two major sectors began to emerge, frontier aviation aimed at the need of northern settlements and mainland aviation aimed at providing service between the major population centres in the south. Two international developments affected the industry. The first one was the attempt of the U.S. airlines to enter and serve the Canadian markets. Secondly, the British Commonwealth was pressing Canada to join it in an all-British round the world air transportation system. The Canadian government choose a domestic option of building a separate Canadian air network, using a newly created Trans-Canada Airlines(TCA).

The third period (1937-1958) is marked by creation of regulatory system aimed at protecting TCA from competitive pressures in its mission to build the national airline network. Entry control was used to protect TCA routes. A second national carrier Canadian Pacific Airlines (a subsidiary of CP Rail), emerged from the amalgamation of a number of smaller carriers (Studnicki-Gizbert,1960). Its expansion into domestic routes was constrained but it was granted a number of international routes in the Pacific, South America and Europe.

The third period (1958-1977) is marked by a more procompetitive approach. In this period Canadian Pacific Airlines and regional carri-

ers, which served regional markets, were allowed to compete with TCA on some domestic routes(Schulz,1985). However, the regulatory process was used as a principal tool of planning of the industry development. CP Air and Air Canada(renamed TCA) were chosen to provide the transcontinental domestic service. International routes were divided between CP Air and Air Canada in a way that the carriers did not compete on the international routes. Five regional carriers, Pacific Western, Transair, Nordair, Quebec Air and Eastern Provincial Airlines, were given specific regions to operate, and were allowed entry into a number of route which were previously served by the major carriers. The scope of regulation in this period involved not only the usual entry and price control, but also financing of aircraft acquisition and frequency of service(Graig,1977). The biggest challenge to the regulatory planning came from the provincial governments, which attempted to gain control over regional carriers, the most important event being a purchase of PWA by the government of Alberta, despite the objections of the federal government. Political inability of the federal government to enforce its vision of the national network as well as doubts about correctness of this vision led to a gradual demise of the regulatory planning(Shulz,1985).

The process of gradual deregulation of the industry started in 1978 when Air Canada's status as the 'chosen instrument' of public policy was revoked. Under the new Air Canada Act, Air Canada was required to 'have due regard to sound business principles and in particular the contemplation of profit'. Capacity restrictions on CP Air were subsequently eliminated which allowed the carrier to be more com-

petitive with Air Canada(1979). Gradual deregulation of pricing started with the liberalization of the charters in 1978. The low-fare experiment included both domestic Advance Booking Charters and comparable fares offered by the scheduled carriers. The proportion of discount fares increased from 14% of passenger-kilometeres in 1978 to 37% in 1983, 45% in 1984 and 60% in 1985 (Statistics Canada,1986), which benefited the consumer without harming the industry. The industry's regulatory regime was further liberalized after the announcement of the New Canadian Airline Policy(1984). New zones of flexibility were introduced by the regulatory agency, the Canadian Transport Commission(CTC), which simplified the carriers' fare filling requirements. Carriers were also allowed to offer various promotional giveaways and incentives to regular fliers, and the route application procedure was significantly simplified.

Table 9 presents data on traffic, employment and financial performance. Traffic increased by 14% in terms of passengers carried, 17% in terms of passenger-kilometers and 20% in terms of ton-kilometers. Employment in this period increased by only 5% which would indicate improved productivity. Except for the two year period of deep recession(1982 and 1983), the industry remained profitable. The rate of return has declined but has remained consistent with the rates of return of the industry during the post war period.[37] These developments created a favorable climate for further deregulation of the industry, although it must be remembered that the regulatory process has created

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[37] The detailed information on the Canadian airline traffic growth and financial performance between 1926 and 1985 can be found in Statistics Canada(1986).

TABLE 9

Canadian Airline Industry - 1978 to 1984

	1978	1979	1980	1981	1982	1983	1984
TRAFFIC							
Passengers (000,000)	23.6	27.1	28.5	27.2	24.4	23.8	27.7
Passenger-kilometers (billion)	38.2	38.2	44.9	46.1	44.2	44.4	46.4
Ton-kilometers (000,000)	4291	4981	5198	5590	5418	5398	5410
FINANCIAL							
Operating revenues ($000,000)	2680	3256	3985	4649	4679	4676	5093
Operating expenses ($000,000)	2514	3091	3798	4494	4693	4609	4932
Net income ($000,000)	98	95	112	45	(-84)	(-14)	80
EMPLOYMENT AND PRODUCTIVITY							
Employees (000)	40.2	43.3	47.6	47.5	45.7	42.1	42.3
Ton-km per employee (000)	106.9	114.9	109.2	117.6	118.5	128.2	128.0

* Terms in brackets denote the percentage shares of the totals.

Source: Statistics Canada(1986).

a well developed airline system, with even the smallest communities having reasonable access to the national network. The regulatory system was not rigid, and responded to changing economic realities of the industry. For example, it was a regulated and publically owned Air Canada which introduced 'seat management' in North America. Similarly, Advanced Booking Charters were introduced in Canada by the CTC before they were introduced in the United States.[38] In addition to this, despite fierce competition from the foreign carriers(which are often subsidized by their governments), the Canadian carriers performed remarkably well on the international routes. According to Statistics Canada(1986), 55.1 percent of international traffic(except for the transborder routes) was carried by the Canadian carriers.

The detailed proposals of regulatory reform were presented in the document 'Freedom to Move'(Mazankowski,1985), which became the framework for the new legislation tabled in Parliament in July of 1986. In the opening statement the document states:

> Transportation is the cornerstone of all modern economies. This statement is especially true for Canada, with its larger geographical area and small population...It is therefore crucial for our economic well-being that we maintain an efficient and productive transportation system.

and

> There is no compelling reason to discard the heart of the NTA statement of objectives, which calls for 'an economic, efficient and adequate transportation system...'. It is in the subsequent parts addressing the means whereby these policy objectives are to be achieved that the policy statement needs to be changed in order to meet current realities(Mazankowski,1985).

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[38] These facts were brought to my attention by professor R.F. Harris.

Thus, the special role of transportion system has been recognized by the document. The reform deals not with the policy objectives but with the methods of achieving them. The document suggests continued commitment to safety and the necessity for safety regulation, while at the same time reducing the role of economic(entry and price) regulation.

As far as entry is concerned, the document proposes freedom of entry to all 'fit, willing and able' carriers in the south. In the north, entry is to be more closely regulated and the 'public convenience requirement' is to be continued(Mazankowski,1985,p.26).[39] The more restrictive entry regulation of northern service is justified on the grounds of the relative fragility of routes and the potential for destructive competition. However, the burden of proof for the lack of public convenience and necessity will be on the objecting parties. Thus, even in the north, entry will be easier. Exit will not be impeded but it will be required that advance notice be given - 60 days on monopoly routes and 30 days on others.

Pricing in the south is to be deregulated while allowing for some control over price increases(Mazankowski,1985,p.28).

> Freedom of entry and exit in the domestic markets and the attendant increase in competition would eliminate the need for continued tariff regulation. Recent Canadian experience with reduced regulation indicates that market forces will

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[39] The dividing line separating the southern and northern domestic sectors is defined by the 50th parallel from the Atlantic Ocean to the Ontario/Manitoba boundary, the diagonal joining the 50th parallel at the Ontario/Manitoba boundary to the 53rd parallel at the Manitoba-Saskatchewan boundary, the diagonal joining the 53rd parallel at the Manitoba-Saskatchewan boundary to the 55th parallel from the Sasketchavan/Alberta boundary to the Pacific Ocean(Statistics Canada, 1986,p.207).

> produce a wide range of product and price options at reasonable price to consumers. Amid the general consensus that downward pricing should not be regulated, some argue that controls of upward pricing is needed to protect consumers. In order to relieve concerns about unreasonable price increases, the Government sees benefit in empowering the Regulatory Agency, upon complaint, to review upward pricing, particularly where monopoly routes are concerned.

Approval of fare changes, then is to be essentially eliminated except for the monopoly routes where price increases can be appealed, which would suggest that prices on routes with two or more carriers would be unrestricted, and no provision for a possible collusion is made. The document claims that potential competition will be sufficient to ensure competitive pricing. The provisions against monopolistic pricing are made not in anticipation of it in the routes characterized by high concentration, but rather to reassure those afraid of monopolistic abuses. Even on the monopolistic routes prices are to be reviewed only upon complaint. In the north, not only price increase but also price levels can be appealed. The mechanism of the appeal, not a routine evaluation, is essentially the same in the north as in the south. Regulation of international airline services is to continue. These services are governed by bilateral agreements. The document, however, states the desire to negotiate new agreements with an intent to increase competition on international routes.

As far as the competition policy issues are concerned, the document suggests that the responsibility for mergers be retained by the regulatory agency.

> The revised legislation will have provisions for discretionary Governor-in-Council powers to disallow domestic mergers and acquisitions of major transportation firms in the national interest - powers beyond those contained in general legislation applying to other firms. These powers will apply to acquisitions of assets or control of federally regulated

> transportation undertakings valued at $20 million or more, by provinces, companies, associations, or individuals.... This provision will complement the application of anticombines legislation(Mazankowski,1985,p.21).

As the national interest is a very ambiguous notion, a more precise definition of the criteria for assessing mergers would be desirable. Since the control of mergers by the regulatory authorities is to complement the application of anticombines legislation, it might be interesting to examine how mergers are treated in the new anticombines legislation, Bill C-91.[40] The new bill provides a list of factors relevant, in evaluating mergers:

> (a) the extent to which foreign products or foreign competitors provide or are likely to provide effective competition...; (b) whether the business, or a part of the business, of a party to the merger or proposed merger has failed or is likely to fail; (c) the extent to which acceptable substitutes....are likely to be available; any barriers to entry into a market,..... and any effect of the merger.....on such barriers; (e) the extent to which effective competition remaines or would remain in a market.....; (f) any other factor that is relevant to competition in a market...(Section 65, Bill C-91).

Thus, the bill emphasizes both the actual and potential competition in the market. This is consistent with the traditional structure - conduct - performance approach. There is no evidence of the new competition legislation being affected in any way by market contestability approach. Bill C-91 also recognizes the importance of economies of scale, given the small size of the Canadian domestic market.

> The Tribunal shall not make an order under section 64 if it finds that the merger....is likely to bring about gains in efficiency that will be greater than, and will offset, the effects of any prevention or lessening of competi-

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[40] Deregulation of transportation coincides with the reform of the Canadian competition legislation. Following four failed attempts to reform the competition law (Bill C-256(1971), Bill C-42(1977), Bill C-13(1977-1979) and Bill C-29 of 1984), Bill C-91 became the new competition law in June of 1986.

tion...(Section 68.(1), Bill C-91).

Thus, the Canadian competition legislation remains, as it always has been, torn apart between the Scylla of allocative inefficiency associated with high concentration, and the Charybdis of cost inefficiency due to unrealized economies of scale. It may be noted that in the period of gradual deregulation CTC has generally favored airline mergers (these merger will be referred to in Section 6.3). The document 'Freedom to Move' does not mention other competition policy issues such as conspiracy and predatory pricing. This would imply that these issues are to be dealt with by the anticombines authority.

The proposed regulatory reform can be broadly defined as deregulation of entry and pricing, with weak safeguards to prevent monopolistic pricing in the south, and continued but somewhat relaxed regulation in the north. There is no mention of the role of concentration, barriers to entry and other structural characteristics and their links to the conduct and performance of the industry. In the south, where the overwhelming share of traffic is generated, freedom of entry alone, is considered sufficient to prevent monopolistic/oligopolistic pricing and other inefficiencies associated with high concentration. While there is no available proof that the authors of 'Freedom to Move' were influenced by contestability hypothesis, the emphasis on potential competition as a means of ensuring the socially optimal performance is consistent with market contestability approach. It is important, therefore, to examine how contestable the Canadian airline industry is.

6.3 HOW CONTESTABLE ARE CANADIAN AIRLINE MARKETS?

Chapter 4 suggests a general inconsistency of the industry economics and market contestability hypothesis, which applies to the Canadian airline industry and to industries of other countries. Airline industries of different countries will likely differ in terms of the magnitude of deviations from the contestability ideal. As indicated in chapter 5, the U.S. airline industry's conduct and performance has been inconsistent with the predictions of the theory. These developments have occured despite the unique characteristics of the U.S. industry, which make it closer to the contestability ideal then it is possible for airline industries of other countries. These unique characteristics of the U.S. industry include the number of independent carriers operating in the industry and the share of international traffic in the industry output. Given the large size of the U.S. population and its even geographical distribution, the industry is able to support a large number of independent carriers. Thus, potential competition may come from the already existing carriers. These carriers face lower barriers to entry than the new start-up operators. As far as international traffic is concerned, according to DOT traffic data(DOT,1986), the percentage of domestic traffic, measured by RPK amounts to 92% of the total industry's output. Thus, market imperfections related to international aviation should have a small effect on the industry(these imperfections will be discussed later in this section). The Canadian airline industry can be compared with its American counterpart in terms of the nature and magnitude of the deviations

from the contestability ideal. The most important differences between the industries are likely to be the levels of concentration and the share of international traffic in the industry output.

Concentration in the airline industry may be measured using concentration ratios based on system shares of the market, or in terms of the number and shares of carriers in each city-pair market. Current levels of concentration in the industry are the result of industry restructuring, which started with the PWA's purchase of nearly the bankrupt Transair(1978). It was followed by the acquisition of Eastern Provincial Airways(1984), Nordair(1985) and Quebec Air(1985) by CP Air. CP Air, in turn, was acquired by PWA(1986). These two carriers have recently integrated their corporate structure and assumed the name of Canadian Airline International(CAI). Using the most recently published data and taking into account the above acquisitions, Table 10 presents the industry concentration. The share of the two major carriers amounts to 77.5% of operating revenues, 97.9% of ton-miles, 77% of passengers, 83% of the industry's employees and 77% of industry's assets. Thus, for all practical purposes the Canadian airline industry may be described as a duopoly.

In addition to the acquisitions of the established jet carriers, industry restructuring also involved an increasing control by the two major carriers of the small regional carriers. The major carriers achieved this by buying the majority or minority shares of the small regionals. Using this strategy, PWA has bought 30% of Norcanair of Saskatoon, 20% of Air Atlantic of St.John's, 46% of Time Air of Lethbridge,Alberta, and 35% of Nordair-Metro of Montreal, while Air Canada

TABLE 10

Concentration in the Canadian Airline Industry

CARRIER	OPERATING REVENUE ($MLN))	RTK (MLN)	PASSENGERS (000)	EMPLOYEES	ASSETS ($MLN)
1. Air Canada	2334737 (46.4%)*	2819.8 (61.5%)	12959 (55%)	21551 (51.5%)	2507 (44.4%)
2. CP Air	932902	1355.8	3534	7554	1178
3. EPA	93734	69.8	933	874	62
4. Nordair	157766	41.4	621	1313	106
5. PWA	322674	162.5	2817	2943	438
6. Quebec Air	90700	40.9	480	849	101
CAI Group (2 to 6)	1567749 (31.1%)	1670344 (36.4%)	5205 (22%)	13533 (32%)	1885 (33.4%)
7. Wardair	282712 (6.5%)	NA NA	1499 (13.6%)	1245 (3%)	166 (3%)
8. Other Carriers	811640 (16%)	110683 (2.4%)	2216 (9.4%)	5953 (14%)	1055 (19%)
Total	5026838	4584962	23560	42282	5654

Source: Statistics Canada(1984a) and Statistics Canada(1984b)

has acquired 100% of Air BC and First Air, 49% of Air Nova of St.John's and 75% of Air Ontario and Austin Airways, 100% of Northwest Territorial Airways and Commuter Express. These commuter airlines typically share the major carrier's computer reservation codes, coordinate their flight scheduling and marketing strategies. The commuter airlines also participate in the frequent flyer programs of the majors, serving as feeders to the major carriers. As indicated in Chapter 5, the control of the commuter carriers by the majors, eliminates competition between these two types of carriers and results in a barrier to entry for potential entrants.

Airline markets are typically defined as city-pair markets, and concentration levels can also be examined in each of these markets. Unfortunately, data on market shares,in terms of either passengers or revenues, is not available. Table 11 gives data on concentration based on the number of carriers in the individual city-pair markets. The levels of concentration in individual city-pair markets are similar to those based on system data, with 82% of the fist 100 city-pair markets served by one or two carriers. Only 18% of the markets are served by three or more independent carriers. The levels of concentration in the Canadian airline industry are, therefore, much higher than those in the U.S. The two dominant carriers Air Canada and CAI compete with each other on most of their routes. Wardair provides the service to selected high density routes (The Official Airline Guide, July, 1986). Potential competition to the two major carriers, therefore, would have to originate either from Wardair or from the new start-up carriers. Given the height of barriers to entry facing the

TABLE 11

Number of Carriers in the Major City-Pair Markets

CITY PARS RANKED BY VOLUME OF TRAFFIC	NUMBER OF MARKETS WITH: ONE	TWO	THREE OF MORE CARRIERS
RANKS:			
1-to 25	3	12	10
26 to 50	5	17	3
51 to 75	7	16	2
75 to 100	6	16	3
Sub-totals	21	61	18

Both scheduled jet and non-jet commuter carriers were inclueded. Commuter carriers partly or completely owned by the major carriers were not considered separately.

Source: Official Airline Guide (July 1986).

new carriers and the presence of only one existing competitor for the majors, the strength of potential competition in Canada will be much lower than it is in the U.S.

As far as international traffic is concerned, the Canadian carriers carry the larger proportion of their traffic on international routes. As indicated by data in Table 12, international traffic amounts to about 45.7% of total industry's output, measured by passenger-kilometers and 21.1%, in terms of passengers carried. Bilateral agreements regulate international traffic between countries and deal with such issues as definition of traffic rights, capacity controls, route allocation, tariffs and procedures to solve the possible disputes. Typically, each country has the right to select a flag carrier to serve the allocated route. Most of the bilateral agreements request the airlines to adopt International Air Transport Association's (IATA) price setting procedures.[41]

High proportions of international traffic and market imperfections related to the bilateral agreements have important implications for the Canadian airline industry. The designated 'flag' carriers can experience a significant product differentiation advantage over new entrants. The first source of advantage arises from the consumer preference of on-line versus inter-line service. This means that the consumer flying on a domestic route, which is a part of his international journey, will likely prefer to fly with the designated carrier,

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[41] IATA'S price setting mechanism consists of three traffic conference. Conference I consists of Western Hemisphere, Conference II consists of Asia and Australia and Conference III includes Europe, Africa and the Middle East.

TABLE 12

Canadian Air Services, by Area of Operation

AREA OF OPERATION	PASSENGERS (000)	PASSENGER-KILOMETERS (000,000)
Domestic	18736	18813
	(79%)	(54.3%)
Transborder	2812	4650
	(12%)	(13.4%)
Southern	425	1507
	(1.8%)	(4.4%)
Pacific and Orient	300	2338
	(1.2%)	(6.7%)
Other Foreign	65	44
	(0.3%)	(0.15%)
Total International	4824	15829
	(21%)	(45.7%)
TOTAL	23560	34642
	(100%)	(100%)

Source: Statistics Canada(1984a).

rather than having to switch airlines, as will the customer flying to Canada from abroad. Another advantage of international airlines arises from operating frequent flier programs. Airlines offering many attractive overseas destinations as premiums will have a distinctive competitive advantage, and international airlines often form coalitions by participating in each other's programs. A Canadian traveller, on holidays in Europe can earn points by flying with British Airways, Air France and Lufthansa, even if these trips are not a part of transatlantic trip. These agreements can include coordinating marketing strategies, flight scheduling and joint fares. Air Canada-Cathy Pacific is an example of such an agreement ("Air Canada Enters Pact", The Globe and Mail, July 5, 1986). Thus, the very fact of being a designated carrier results in a product differentiation advantage. The new entrant would have to offer discounts or incur other costs to overcome this disadvantage.

Like their U.S. counterparts, the Canadian carriers have been making making conscious efforts to differentiate their products and enhance consumer loyalty. In 1984, CP Air introduced its business oriented Attache service, which it decided to offer separately from its regular scheduled flights. Five of CP Air's Boeing 737s were converted especially for Attache service the planes carried 54-66 passengers in wider seats instead of the regular 108. Instead of movies, popular with the general public, a special news and weather service was provided, and food service was upgraded. At airports, CP Air installed separate waiting rooms, check-in counters and baggage handling for Attache customers ("Airlines Chasing Business Travellers to Lift Prof-

its" The Financial Post, January 22, 1986). Air Canada responded to CP Air's premium service by introducing a special Executive Class service. It offered a standard of seating comfort similar to Attache class. Air Canada, however, decided against offering the service separately, and instead it converted its fleet of Boeings 767 into three separate cabins, with 48-seat middle sections reserved for the business travellers. Changing the characteristics mix of the service does not automatically result in a barrier to entry, as the new carrier can offer the identical services. However, with the presence of good will advantage closing of all possible market niches, by offering services appealing to all potential customers may result in a barrier to entry. Entry with a differentiated service might be difficult if all the possible market niches have been closed. In addition to the 'natural' good will advantage, the airlines have designed programs to further increase consumer loyalty. Most important here are the frequent flier programs. The most popular frequent flier program in Canada is Air Canada's Aeroplan. Membership in the plan is estimated to have been about 225,000 in 1986 ("Frequent Flier Programs Being Extended" The Globe and Mail, December 8, 1986). The points can be accumulated by travelling not only with Air Canada but also with Air Ontario, Air Nova, Northwest Territorial Airways and First Air and with the following international airlines: Air France, Lufthansa, Cathy Pacific and Air New Zealand. The above airlines have established a system of clearing the accumulated points and cashed-in awards. In addition to airlines, program participants include car rentals(Budget, Avis, Hertz and Tildens) and hotel chains(Westin Hotels, Hilton International, CN Hotels, Courtyard Inns and Ming Court Hotel). Participat-

ing car rental agencies and hotels not only offer special discounts to the plan participants, but also allow the fliers to accumulate points if they rent a car or stay in the hotel, even if it means no flying at all(!). CAI offers a similar frequent flier program called CAI Plus. The participating airlines are: Air Atlantic, Air BC, Nordair Metro, Intercity Airlines, Aloha Airways, Eastern and KLM and British Airways. Car rentals and hotels include: Thrifty, Budget-Rent-a-Car, Tilden, Park and Fly, Park and Jet, VIP, Delta Hotels, Mannot Hotels, Mandarin Oriental, CP Hotels, and Pan Pacific Vancouver. As indicated in Chapters 4 and 5, frequent flier programs result in a competitive disadvantage for new entrants.

As far as computer reservation systems are concerned, the Canadian industry is dominated by Air Canada's Reservec system. It is connected to more than 3,000 travel agencies in Canada. The second system, CAI's Pegasus 200 is less popular and is connected to about 500 agencies. Because of the dominance of Air Canada's system, CAI has been forced to subscribe to Reservec despite having its own system. While there has been no evidence that Air Canada has practiced 'display bias' type strategies, its user charges for the service have been claimed to be excessive ("Air Canada's Rise in Fees Angers CP Air" The Globe and Mail, February 11,1986).

As indicated in Section 4.4, the airline reliance on travel agents may result in a barrier to entry and the Canadian carriers are no exception here. The data describing the scope of this reliance is very limited but according to ATW's survey, 70% of CP Air's revenues have been generated by travel agents ("Airline Dependence on Travel Agents

Rising, ATW, October, 1985). It can be assumed that the figures for other carriers are likely to be similar.

In addition to the above sources of entry barriers, the availability of essential inputs, such as specialized labour (pilots and mechanics) and access to congested airports may result in a short-run barrier to entry. Except for Toronto's Lester Pearson Airport and Vancouver International, there is an excess capacity at the major Canadian airports(Ellison,1981). Given the generally high unemployment and the labour saving measures implemented by the existing carriers, the availability of qualified labour should not be a problem for potential entrants.[42] As far as the availability of planes is concerned, there is a well developed market for used equipment. However, at times of relative shortages, the entrant might be forced to pay a premium which can result in a cost disadvantage.[43]

In addition to the actual and potential competition, firms' conduct may be constrained by the availability of substitutes and by network interdependence. In the context of the Canadian industry, however, these constraints do not appear binding. Given the locational characteristics of the country, with the large distances between the major population centres, there seems to be little room for intermodal competition. According to the Origin and Destination Survey of Statis-

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[42] According to Statistics Canada, between 1980 and 1985, employment in the industry has dropped from 47,676 to 42,451 workers(Statistics Canada,1986).

[43] Availability of planes has been claimed to be the most important factor preventing Wardair's entry into the new domestic markets ("Aviation Old Master Readies for Next Battle", The Globe and Mail, January 25, 1986).

tics Canada(1985a), all of the top 25 city-pair markets cover the distances over 100 miles while 20 of the top 25 markets cover the distances above 300 miles.

As far as network interdependence is concerned, at present there are only two, largly overlapping, networks operated by Air Canada and CAI. Network interdependence competition would have to come from the American networks. The strength of this interdependence, however, appears to be small. One of the reasons is that it is not possible to travel via the U.S. between many Canadian points. For example, a traveller wishing to go to Edmonton from Calgary cannot go via U.S. because the city of destination is located to the north of the city of origin. Only transcontinental routes which are parallel to the U.S. networks offer some potential for network interdependence. There are, however, important limitations. First, using the U.S. networks to travel between Canadian points implies a necessity to cross the border twice. This can be a source of added disutility and transaction costs, as the travellers have to go through the usual customs and immigration procedures. Secondly, to enter the U.S. networks, a customer has to travel to the U.S. which is not costless. Thus, both competition from other modes and network interdependence do not appear to impose a meaningful constraint on the industry.

Except for excess capacity at the Canadian airports, other structural characteristics of the Canadian industry suggest its low contestability compared to the U.S. industry.

6.4 IS ENHANCING MARKET CONTESTABILITY A DESIRABLE POLICY OBJECTIVE FOR THE CANADIAN AIRLINE INDUSTRY?

One of the unique characteristics of the Canadian airline system is the difference between northern and southern routes. The northern routes serve small and isolated communities. Small population size, weather conditions and types of economic activity define the specificity of these routes. Air transport in the Canadian north provides a link between the northern communities and between these communities and the south. Given the distance, weather and geographical conditions, air transport often provides the only feasible means of transportation. Air service also allows for carrying public administration and enhances exploration of natural resources(Archambault,1981). The issue of service continuity is, therefore, of fundamental importance in these communities. The following carriers categories provide northern passenger services: Level I - 0.35%; Level II - 3.73%; Level III - 60.18%; Level IV - 21.61% and Level V - 14.74%.[44] Thus, the most

[44] Level I, comprising of air carrier that,- earned annual revenues of $500,000 or more, - carried 500,000 or more enplaned passengers, 100,000 or more tonnes of enplaned goods or both the passenger and goods.

Level II comprising any carrier not assigned to reporting Level I that -earned annual gross revenues of $500,000 or more,-carried more than 50,000 passengers, more than 10,000 of enplaned goods or both the passengers and goods.

Level III comprising any carrier not assigned to other levels that, -earned annual gross revenues of $500,000 or more.

Level IV comprising any carrier that earned gross revenue of less than $500,000.

Level V comprising any carrier that was licenced to operate only Class 6(Flying club) or Class 7(Specialty) air services(Statistics Canada, 1984a).

important carriers serving the northern communities are Level III carriers.[45] Low densities of traffic make these routes extremely fragile, and the equipment used is typically turbo-prop airplanes. The capital requirements to start this type of operation are not large. Except for good will, there is little room for product differentiation. Airline routes are of point to point variety, without much room for establishing integrated networks. Thus, the characteristics which enhance market sustainability are largly absent in these routes. In addition to this, real life economic agents do make mistakes and differ in terms of their risk preference. A 'risk-loving' operator may enter the market, even though the expected value of entry is negative. Thus, a possibility of a mutually destructive entry cannot be excluded. While there is no reason to believe that the disruption of service will be permanent or even long-lived, when the continuity of service is essential, constraining entry or other measures, such as restricting exit may be justified. Social and political significance of service continuity in the north may be more important than the narrowly defined allocative efficiency. Market contestability, therefore, does not appear an appropriate welfare standard for northern routes.

As far as southern routes are concerned, a problem there is insufficient actual and potential competition. As already stated, the federal government has given up the idea of using regulation as a planning mechanism, which in the past provided a rationale for entry regulation. The other arguments for entry regulation may be congestion and network unsustainability. However, given that most of the

[45] In 1984 there were 102 Level III carriers in Canada(Statistics Canada, 1984a).

Canadian airports operate with excess capacity and that the airline networks are already well developed, there seems to be no compelling reason to restrict entry in the south. Public policies aimed at enhancing market contestability by reducing impediments to entry and the possibility of predation, therefore, should be welfare improving. As indicated in Section 3.4, the issue as to whether increasing market contestability will lead to a continuous improvement in performance in all relevant aspects remains still unresolved and the exact magnitude of improvement in the industry performance cannot be predicted. Increasing market contestability in the Canadian industry could achieve two minimum objectives. First, Wardair could disrupt a possible collusion between the two major carriers by entering new markets where prices set by the majors offer positive economic profits(in the absence of collusion between all carriers). Secondly, enhanced contestability could put pressure on cost efficiency. Leibenstein(1976) has suggested that cost inefficiency(x-inefficiency) often exceeds allocative inefficiency in highly concentrated industries. The government may find it difficult to address the problem of cost inefficiency in a direct manner, as it would require intervention into areas considered as management prerogative. State ownership and complete control over the productive process is a possibility, but the experience of the government owned firms indicates that this option may not be very promising. State ownership has often led to a decline in cost efficiency and may be unacceptable for political reasons.

Increased contestability could enhance cost efficiency in two ways. First, should some, but not all of the existing carriers become inef-

ficient, more efficient carriers could take over the markets, if barriers to entry do not offer sufficient protection to the inefficient operators. Secondly, should all the carriers in the industry become inefficient, there would be a possibility of a new entry. As indicated in chapter 4, small and gradual entry may be successful, when the existing carriers operate inefficiently. The American experience also demonstrates that the existing carriers can be forced to improve their efficiency when they become exposed to the threat of new entry. By reducing barriers to entry and the probability of strategic entry deterrence, the degree of allowable cost inefficiency in the industry would be reduced. Thus, market contestability may be acceptable as a policy guide when designing policies towards the southern routes. It should be noted, however, that the policies of reducing impediments to entry and possibility of predation, suggested by market contestability theory, are consistent with the policies advocated by the traditional workable competition approach.[46]

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[46] This similarity raises a question to what degree, after accounting for all its limitations, market contestability as a welfare standard is different from workable competition. However, the issue whether market contestability, as a theory, is progressive in the Lakatosian sense is beyond the scope of this study.

6.5 DOMESTIC POLICIES TO ENHANCE MARKET CONTESTABILITY AND THEIR LIMITATIONS

Public policies aimed at enhancing market contestability are likely to encounter two difficulties. First, asset related sunk costs, transaction costs and risk cannot be legislated away. Secondly, 'hit-and-run' entry cannot be made viable in the industry. The conditions for this type of entry in the context of the industry have been examined in section 4.3. Out of these conditions only a freeze of incumbents' prices by means of regulation or antitrust could make 'hit-and-run' entry possible. Such a freeze, however, is clearly impractical. Prices in the industry have to reflect changing cost and demand conditions. In order to be able to identify which price changes reflect changes in economic conditions and which are aimed at deterring entry, the authorities would have to monitor and approve all price changes. Therefore, this solution would degenerate into a restrictive price regulation. The best that public policies could do is to reduce the likelihood of predatory conduct. Given these limitations it is impossible to bring the industry to the contestability ideal in all respects. Domestic policies to enhance market contestability could include:

1. Industry restructuring.
2. Disallowing airline marketing and scheduling agreements.
3. Reducing product differentiation and good will advantage of the existing carriers.

4. Disciplining the computer reservation systems and airline marketing systems.
5. Eliminating the absolute capital cost advantage of the existing carriers.
6. Reducing the possibility of strategic entry deterrence.
7. Eliminating legal impediments to entry.

As far as the first case is concerned, restructuring the industry would have to involve dividing the existing major carriers into a number of smaller airlines. While this would not alter concentration in individual city-pair markets (due to economies of aircraft size), a larger number of independent carriers would increase the strength of potential competition. This is because entry could come from the existing, rather than from the new start-up carriers. This policy, however, has serious limitations. First, it would not allow the carriers to capture the available network economies. Increased costs would most likely outweigh the benefits of increased competition. These costs would include both airline costs and increased transaction costs for the consumers. Secondly, Canadian carriers would not be able to compete effectively with foreign carriers on international routes. Competition on these routes requires both cost efficiency and the ability to offer many destinations. Thus, it appears that industry restructuring is not a feasible policy option in Canada.

The second case involves agreements between the major carriers and the commuter airlines. It is not obvious, however, that disallowing airline agreements would improve welfare. The reason being that these agreements, while having an anticompetitive effect on the new ent-

rants, improve coordination of schedules and reduce airline marketing costs. They serve as a planning mechanism, whereby an airline can reduce the consumer transaction costs by minimizing waiting-time between flights and reducing the probability of baggage loss. The authorities would have to be able to compare the benefits of coordination with the cost of reduced competition. While such a comparison is theoretically possible, data limitations and estimation problems may make it not feasible.

The third case involves reducing product differentiation advantage of the existing carriers. It seems that little can be done to eliminate good will advantage of the existing carriers. Furthermore, attempts to eliminate the good will advantage may be counter-productive, if they result in inferior service quality (airlines would have little incentive to invest in their reputation, if the good will related competitive advantage was to be eliminated by the government). As far as the characteristics mix of the product is concerned, only frequent flier programs appear to be a candidate for intervention as they result in a barrier to entry. These programs are popular with business travellers because they offer a premium to the flier rather than to the firm which incurs the cost of the travel. This characteristic of frequent flier programs could be eliminated by strict enforcement of the tax law, which considers program awards as taxable income when used for private consumption. A case for a complete elimination of these programs is less obvious. First, the Canadian carriers have to compete internationally. If they are denied the use of an efficient marketing tool, which continues to be used by their rivals, their com-

petitive position will deteriorate. The second argument against elimination of these program has to do with the nature of competition in oligopoly. While frequent flier programs result in a barrier to entry they are also an important tool of rivalry between the existing carriers. When the number of firms in the industry is small, firms often favor product differentiation type of rivalry to price competition. It is even possible that the potential economic profits may be competed away, if non-price rivalry is sufficiently vigorous. Welfare loss of such competition occurs if the consumers would prefer lower prices to increased quality or added characteristics(Douglas and Miller,1974). According to the member survey of the Canadian Traveller Association 61.3% of frequent flier users would prefer lower ticket prices to 'in kind' awards ("Frequent Flier Programs to be Extended", The Globe and Mail, December 8, 1985). If the frequent flier programs are eliminated, however, there is no guarantee that firms' rivalry will change to price competition. If the nature of competition between firms does not change, firms will replace frequent flier programs with other marketing tools, such as increased advertising, increased frequency or increased amenities, which may be of less value to the consumers than current frequent flier awards. Thus, elimination of frequent flier programs would have to be considered within the 'second-best' framework. If elimination of all sources of deviations from contestability ideal is not possible in a given industry, elimination of some of them may not necessarily improve welfare.

As indicated in Section 6.3, the designated international airlines can experience a product differentiation advantage versus the poten-

tial entrants. In order to eliminate this disadvantage, the new entrant would have to be given an equal opportunity to enter international routes, currently served by the established carriers. The difficulty lies in the fact that bilateral agreements, regulating international aviation, typically do not allow more than one designated carrier to serve a foreign country's route(CTC,1985), and the new entrant would now have to be able to replace the existing airline as a designated carrier, which could be done by periodically auctioning the rights to serve international routes, using the franchise bidding scheme(franchise bidding was discussed in Section 6.1). This solution, however, has two important limitations. First, the airlines gain name recognition and good will capital with the foreign travellers. The name recognition and good will capital could be lost, should the entrant outbid the existing carrier. Secondly, international routes are part of integrated networks. Periodic auctioning of the rights to serve these routes would increase uncertainty and hamper network planning and development. Other methods of designating carriers such as arbitrary allocation by the regulatory authority would have similar effects.

The fourth case involves the computer reservation systems and airline marketing. As far as the computer reservation systems are concerned, two major options available are:

1. Separation of the computer reservation system from the industry. This option could involve two solutions - (a) common ownership of the system by the industry with the provision allowing entrants to become equal partners, and (b) complete

separation by setting up a new firm, independent from the carriers. Both options would eliminate the sunk costs, display bias and other problems currently associated with the computer reservation systems. The difficulty lies in separating the existing systems from the industry. Since existing privately owned systems are designed to perform other functions for the airlines, separability of these systems may not be possible. Thus, a new system would have to be designed and implemented after the cost of the existing systems is recovered by the carriers. In the meantime, computer reservation systems could be regulated. The second option(complete separation by means of creating a separate firm) may lead to monopolistic pricing for reservation services if the firm is not regulated or publicly owned.

2. Regulation of the existing systems. Under this option, current ownership structure would be retained but user fees, rules regulating the listing of flights and connections could be established and rules governing the access to information generated by the systems would be regulated.

It appears that at least some of the problems created by computer reservation systems can be corrected by public policy measures.

As far as airline reliance on travel agents is concerned, the policy options are more limited. The ability to book flights using a large network of travel agents is clearly beneficial to consumers and public authorities are unlikely to be able to prevent travel agents from selecting carriers, which they think offer the best service to their customers.

The fifth case involves the capital cost disadvantage of the new entrants. This disadvantage arises from two phenomena. First, the new entrants are unknown to the lenders of capital. Uncertainty about the new carriers ability to compete will force the lenders to impose a risk premium on the cost of capital. Secondly, a new venture may be intrinsicly riskier than operations of the existing carriers. In the U.S. the problem of the capital cost disadvantage was resolved by giving a loan guarantee to the new entrants(Mayer,1985). The problem is that only the first reason for capital cost asymmetry is a legitimate candidate for public intervention. If government reduces the capital costs of the new entrants in such a way that they do not truly reflect the riskiness of entry, excessive entry will be possible. It is not socially optimal to encourage entry, only to see the entrants fail. In practice it may be difficult to separate asymmetric and imperfect information related capital cost premium from the higher risk premium.

The sixth case involves predatory pricing and other predatory practices. The new competition legislation, Bill C-91, leaves the past laws dealing with predatory pricing uneffected. The existing legislation considers pricing to be predatory when a firm "engages in a policy of selling products at prices unreasonable low, having the effect or tendency of substantially lessening competition or eliminating a competitor"(Section 34(1c), Combines Investigation Act). The new legislation introduces the concept of 'abuse of dominant position', which applies to both monopoly and 'joint dominance' of oligopolists. It can be used to deal with the various forms of conduct aimed at preventing or lessening competition in the market. This clause, however, does not

apply when the reduced competition is a result of superior economic performance(Section 51(4),Bill C-91). The difficulty lies in separating predatory practices from the 'innocent' competitive conduct. Useful here may be Bork's(1965,p.144) formulation of the problem.

> Predation may be defined....as a firm's deliberate aggression against one or more rivals through the employment of business practices that would not be considered profit maximizing except for the expectation either that rivals will be driven from the market, leaving the predator with a market share sufficient to command monopoly profits.

Predatory practices have often been downplayed in the recent literature (e.g., McGee,1980), where the large firm faces a small scale entrant, the typical argument being that the existing firm is more likely to incur greater losses than the new firm due to its larger output. This argument, however, does not hold in the context of the airline industry, the reason being that the incumbent carrier can restrict the output affected by the price cut. Capacity controlled discounts have often been used by airlines, especially those operating big computer reservation systems.

Historically, Canadian courts have not followed any specific rule in defining predatory pricing and other predatory practices(Green,1985). In the United States, the Areeda-Turner criterion has attracted most attention and influenced many antitrust cases(Hay,1981). According to this criterion:

> 1.(a) A short-run profit-maximizing(or loss-minimizing) price is nonpredatory even though below average cost.(b) A price at or above average cost should be deemed nonpredator even though not profit-maximizing in the short run. (c) A price at or above reasonably anticipated short-run marginal and average variable costs should be deemed nonpredatory even though not loss-minimizing in the shirt run. (d) Unless at or above average cost, a price below reasonably anticipated (1) short-run marginal costs or (2) average variable costs should be deemed predatory, and the monopolist may not

> defend on the grounds that his price was 'promotional' or merely met an equally low price of a competitor.
>
> 2. Recognizing that the marginal cost data are typically unavailable,.. (a) A price at or above reasonably anticipated average variable cost should be conclusively presumed lawful. (b) A price below...average variable cost should be conclusively presumed unlawful.
>
> 3. Promotional spending should be deemed predatory when timed to coincide with entry or promotion by a rival, and when average variable cost, including the promotional expenditure, exceeds price(Areeda and Turner,1975).

An interesting characteristic of the Areeda-Turner rule is that pricing is deemed predatory when prices are set below average variable costs even if the incumbent only matches the entrant's prices.[47] The relevance of this criterion is in that it could be used identify a variety of predatory strategies, not only predatory pricing. It is important in the context of the airline industry since in addition to predatory pricing, airlines can use increased frequency and increased promotional expenditures to deter entry. Using the Areeda-Turner rule, increases in frequency which result in average revenue(price) falling below average variable cost can be considered predatory. The costs of extra promotional expenditure should be added to variable costs which then could be compared with average revenues. One problem with applying the rule is that airlines may not change prices or promotional expenditures and still be able to strategically deter entry. Consider an airline which offers a variety of services(i.e. premium, first class, economy and discount). The airline may increase the number of discount seats available and meet the increased demand without ever resorting to changes in prices. In order to identify this conduct

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[47] For limitations and problems in applying the Areeda-Turner criterion see Scherer(1976) and Williamson(1977).

as predatory, the average variable cost of the whole product mix would have to be compared with average revenues. All services have to be included in the evaluation because of the jointness in production. The test could also be applied by comparing total revenues generated by a given product mix with its total variable cost. It has to be emphasized, however, that the Areeda-Turner test can fail to identify predatory conduct if entry is small and/or gradual. This can happen when the incumbent carrier operates efficiently or with minimum x-inefficiency. If economies of scale are present, the new entrant has to experience a cost disadvantage before he reaches the minimum efficient scale of operation. By setting prices at the level of his average variable costs, the incumbent may impose losses on the new entrant. Thus, the Areeda-Turner condition may not be violated, even though such conduct is not socially desirable. Given these limitation, the Areeda-Turner condition may be considered as a <u>sufficient</u> but not <u>necessary</u> condition in identifying predatory practices (i.e. when prices are below average variable costs, predation is considered as proven, while prices above average variable costs do not preclude predation). The Areeda-Turner condition, therefore, could be applied as a first step in evaluating a suspected predatory conduct. Should the test fail to identify predation, a more complete evaluation in the spirit of Bork's definition of the problem could follow.[48]

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[48] While improving the rules and procedures to deal with predatory performance is important, it is unlikely that any rule can eliminate predation. The objective of improving these rules is to reduce to likelihood of predation in the industry. The Canadian experience with applying anticombines legislation to fight predatory conduct has been generally very disappointing(Green,1985).

In addition to designing appropriate rules and procedures, the responsibility for enforcing them has to be assigned. In the past, due to regulation, transportation industries were exempted from anticombines legislation. 'Freedom to Move' mentions the responsibility for mergers as the only competition policy issue retained by the regulatory agency, which suggests that the remaining competition policy issues will be transferred to the jurisdiction of the anticombines authorities. The lack of experience on the part of the anticombines authorities in dealing with the complexities of the industry economics may make enforcement of antipredatory rules difficult. Since the responsibility for mergers has been retained by the regulatory authorities, it might be more efficient for this agency to deal with the remaing competition policy issues as well. The regulatory authority, with a good knowledge of the specific characteristics of the industry appears to be more suited to deal with enforcing the competition legislation.

As far as the last case is concerned, the legal impediments to entry may result in the industry deviating from the contestability ideal. Legal entry barriers typically involve a necessity to obtain a licence or a permit. Such a licence may be granted on the basis of 'public convenience and necessity' of service and on the basis of being 'fit and able'. While the first requirement may be eliminated, the second one is needed to ensure airline safety. Thus, some legal constrains on entry have to be retained.

The analysis presented in this section suggests that the domestic options to enhance market contestability in the industry are very limited. Even if the possible domestic policies, such as restricting

frequent flier programs, regulating computer reservation systems, improving rules to deal with predatory practices and reducing legal impediments to entry, are successful, the industry will still be far from the contestability ideal, as given the high levels of concentration in the industry, the potential competition would have to originate primarily from the new start-up carriers. The American experience suggests that these carriers are unlikely to provide a meaningful threat to the existing efficient carriers. Given these limitations, an alternative approach could be to introduce foreign competition.

6.6 "OPEN SKIES" POLICY AS A MEANS OF ENHANCING MARKET CONTESTABILITY

The experience of highly concentrated industries, such as automotive, steel and others, suggests that the most powerful disciplining force is not regulation or antitrust, but foreign competition. Foreign competitors having their own domestic markets can capture all economies of scale, even if their entry in the foreign market is small. The special characteristic of transportation markets is that the production and sale cannot be done in different locations. Foreign competition in air transportation necessitates entry in terms of the production of the service. Locational characteristics of the Canadian air transportation network, with its closeness to the U.S. air transportation network, suggest a possibility of an 'open skies' agreement with the U.S.[49] Given their size and financial resources, the American

[49] Such an agreement, as a substitute for insufficient domestic compe-

carriers should not fear the predatory practices of the Canadian carriers. Should the Canadian carriers operate inefficiently and/or set monopolistic prices they would become exposed to entry from the American carriers. The potential competition, therefore, would serve a substitute for the lack of sufficient competition in the Canadian airline markets.

In addition to increasing the actual and potential competition, the 'open skies' deal could also allow the Canadian carriers to compete more effectively for the transborder traffic. As indicated in Figure 21, the market share of the scheduled transborder between 1975 and 1984 traffic of the Canadian carriers declined from 41% to 34% (Fig.21).[50] The declining share of the Canadian carriers may be explained partly by the establishment of hub-and-spoke networks by the American carriers, following the Airline Deregulation Act of 1978. These hubs offer many attractive destinations with which the Canadian carriers cannot compete without cabotage rights.[51] The large number of connecting destinations makes it more convenient for the traveller to fly with the American carrier and change planes at the hub city, rather than flying with a Canadian carrier and having to switch airlines,

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tition, has been recently proposed by the Consumers Association of Canada ("Hearings Demanded on CPAL Takeover" The Globe and Mail, January 22, 1987).

[50] The charter traffic, on the other hand, has always been dominated by the Canadian carriers with their market share for 1985 being 94.9%. The overwhelming market share of the Canadian carriers can be explained by the fact that most of the charter traffic originates in Canada and concentrates on routes linking Canada to vacation spots in the U.S. In 1985, of the 10 principal city-pairs, eight involved either Florida or Hawaii (Statistics Canada,1986).

[51] Cabotage can be defined as a right to pick up and dispense of traffic between a foreign country traffic.

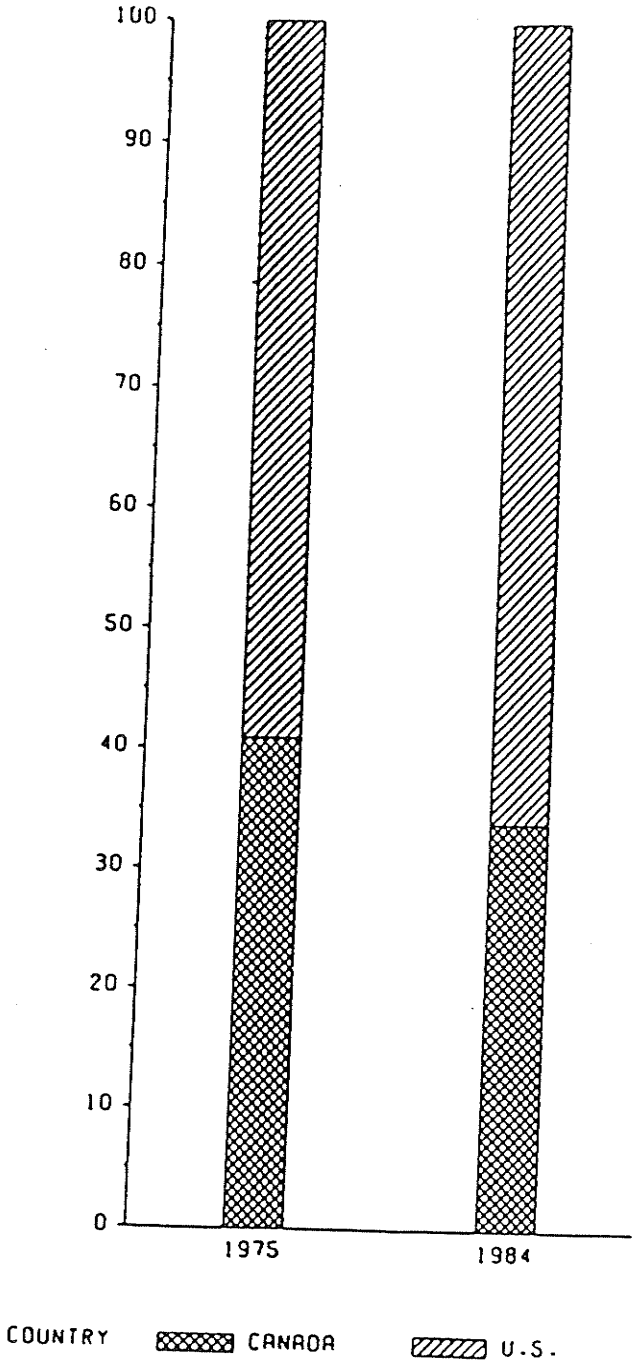

Figure 21: Shares of the Transborder Traffic.
Source: Statistics Canada(1986).

TABLE 13

Relative Shares of the U.S. and Canadian Carriers, by City Pairs - Scheduled Traffic (1983)

CITY PAR	CARRIERS	O&D TRAFFIC (000)	REVENUE PASSENGERS CARRIED	%CANADIAN CARRIERS	%US CARRIERS
New York Toronto	Air Canada American U.S. Air	559.7	242,162 474,763 460,000	33.7%	66.3%
New York Montreal	Air Canada Eastern	284.4	220,031 337,070	39%	61%
Chicago Toronto	Air Canada American United	196.7	73,895 367,321 217,888	7%	93%
Los Angeles Vancouver	CP Air Western	174.7	22,492 152,208	13%	87%
Los.Angeles Toronto	Air Canada	161.0	126,185	100%	
Boston Toronto	Air Canada U.S. Air	160.4	77,567 174,622	30%	70%
Miami Montreal	Air Canada Delta	151.1	130,047 138,033	48.5%	51.5%
Miami Toronto	Air Canada Eastern	130.1	173,180 40,706	95.75%	4.25%
San Francisco Vancouver	CP Air Western	125.0	49,377 75,623	40%	60%
Boston Montreal	Delta	123.0	385,844	0%	100%
Tampa Toronto	Air Canada Eastern	121.0	162,556 53,903	75%	25%
San Francisco Toronto	Air Canada	111.2	120,342	100%	0%

Continued

Los Angeles Calgary	Air Canada Western	87.4	108,906 102,636	51.5 %	48.5%
Chicago Montreal	Air Canada American	71.7	36,180 120,296	23%	77%
Tampa Montreal	Air Canada	69.1	84,605	100%	0%
Philadelphia Toronto	Eastern	62.3	116,287	0%	100%
Detroit Toronto	Republic	58.4	287,870	0%	100%
Cleveland Toronto	Air Canada U.S. Air	53.8	29,846 116,665	20%	80%
Dallas Toronto	Air Canada American	52.1	82,640 94,337	47%	53%
San Francisco Calgary	Air Canada United	47.4	73,604 26,730	73%	27%
Philadelphia Montreal	Eastern	34.3	64,546	0%	100%
Minneapolis Winnipeg	Northwest	25.1	119,432	0%	100%
Portland Vancouver	Western	32.6	125,571	0%	100%

Source: ICAO(1984c).

if direct service to his ultimate destination is not available. It is not surprising, therefore, to see that most of the city-pair markets are dominated by American carriers(Table 13).

The importance of the connecting traffic can be inferred by comparing the origin and destination(O&D) traffic and the number of passengers actually carried between the two cities. If the number of passengers carried between the cities exceeds the origin and destination traffic, it means that some of the passengers are continuing their journeys beyond the end point of the O&D route. Thus, in the Chicago-Toronto route, with the 93% of passengers travelling with the American carriers, the number of passengers exceeds the O&D traffic by 3.3 to 1; in the Boston-Montreal market(100% American share) this ratio is 3.1 to 1; in the Detroit-Toronto market(100% American share) it is 4.9 to 1; in the Cleveland-Toronto market(80% American share) it is 2.7 to 1; in Philadelphia-Toronto market(100% American share) it is 1.9 to 1; in the Minneapolis-Winnipeg market(100% American share) and in the Portland-Vancouver(100% American share) it is 3.8 to 1. The importance of the connecting traffic is also supported by the data from markets dominated by the Canadian carriers, which those linking the Canada with the popular vacation spots in Florida and California. The travellers in these markets are mainly Canadians, and the end point of the international route in the U.S. is typically the final destination point for the Canadian travellers. On the other hand, the Canadian end points of the transborder routes are not the ultimate destinations for many Canadian passengers. For example, a traveller from Quebec City may have to fly to Montreal on route to Tampa(Florida). On his route

back, he would have to fly from Tampa to Montreal and from Montreal to Quebec City. Consumer preference for on-line versus interline service, will favor the Canadian carrier, who can offer connecting flights to most of the Canadian cities.

'Open skies' policy or free-trade in air transport service is different from a similar arrangement for manufactured goods and most services in that it involves giving up some sovereignty over the national air space. Recognizing the principle of the sovereignty over the national space, international aviation between countries is regulated by bilateral agreements(Harris,1975). These agreements, among other things, define rights of airlines when serving international routes. These rights, traditionally called 'freedoms', are the following:

1. First freedom: the privilege to fly across the territory of a foreign country.
2. Second freedom: the privilege to land for non-traffic purposes (e.g. maintenance, refueling).
3. Third freedom: the privilege to put down passengers, mail and cargo taken on the territory of the state whose nationality the aircraft possesses.
4. Fourth freedom: the privilege to take on passengers, mail and cargo destined for the territory of the state whose nationality the aircraft possesses.
5. Fifth freedom: the privilege to enplane traffic in a foreing capacity and deplane it in another country(CTC,1985).

In addition to defining the freedoms, bilateral agreements also specify routes, rate setting mechanism and dispute setting procedures. The Canada-U.S. bilateral agreement explicitly identifies the actual routes that may be served by each country carriers. The current agreement encompasses service between 120 pointss and involves 60(major and local) carriers(Statistics Canada,1986). Rates require an approval of both governments(CTC,1985). 'Open skies' option would require to go beyond the traditionally defined five freedoms by granting the carriers an unrestricted right of cabotage.

In evaluating the possibility of 'open-skies' agreement the following issues have to addressed:

1. Would such an agreement increase market contestability?
2. Can Canadian carriers compete with their American rivals?
3. What are the problems and risks involved?
4. How feasible is such an agreement?

To answer the first question, it is necessary to examine the conditions of entry of the American carriers in Canada. The reason being that the threat of entry may serve as a disciplining force only if the U.S. carriers do not face significant barriers to entry in the Canadian markets. These barriers include the asset related sunk costs, availability of essential inputs, airport access and product differentiation/good will disadvantage. As the American carriers are already well established in the U.S., asset related sunk costs and availability of inputs should not be a problem for them. If the Canadian markets offer an opportunity to make profits, all they have to do is to rede-

TABLE 14

American Carriers at the Major Canadian Airports

CITY	PERCENTAGE OF TOTAL OUTBOUND AND INBOUND DOMESTIC TRAVEL	CARRIERS
Toronto	20.20	U.S. Air Eastern United American Republic
Vancouver	11.58	United Western Frontier
Montreal	10.03	U.S. Air American Republic Delta Eastern
Calgary	8.53	Western Republic United
Edmonton	7.20	Western Northwest United
Winnipeg	6.22	Frontier Western
Ottawa	7.20	Eastern Continental

Source: ICAO(1984d); Statistics Canada(1985a).

TABLE 15

American Carriers in the Major Canadian City-Pair Markets

CITY-PAR	VOLUME OF TRAFFIC	PERCENTAGE OF TOTAL	CUMULATIVE PERCENTAGE	U.S. CARRIERS PRESENT IN BOTH CITIES
Montreal-Toronto	1085.9	9.13	9.13	U.S. Air Eastern American Republic
Ottawa-Toronto	623.7	5.25	14.38	Eastern
Toronto-Vancouver	495.3	4.17	18.55	United
Calgary-Vancouver	436.8	3.68	22.23	United Western
Calgary-Toronto	395.7	3.33	25.56	Republic United
Calgary-Edmonton	362.1	3.05	28.61	Western United
Edmonton-Vancouver	353.1	2.97	31.58	Western United
Toronto-Winnipeg	305.4	2.57	34.15	---
Edmonton-Toronto	273.5	2.30	36.45	United
Halifax-Toronto	299.7	2.06	38.51	---

Source: ICAO(1984d); Statistics Canada(1985a).

ploy their planes to the Canadian routes. Most of the Canadian airports are not as congested as the American ones, so getting access does not appear to be a serious source of entry barrier and many American carriers are already present at the major Canadian airports. The presence of the U.S. carriers in Canada originates from past bilateral agreements regulating the scheduled traffic between Canada and the United States(Table 14). As indicated in Table 14, the American carriers are well established in the major cities which account for more than 70% of total domestic traffic in Canada, and which means that the American carriers would be able to offer service in the Canadian city-pair markets on very short notice, especially those carriers currently present in both cities of the city-pair market. Table(15) illustrates the presence of American carriers in the major Canadian city-pair markets.(Included are carriers which are already established in both cities of a given city-pair market.) Given their presence at the major airports the American carrier have stations in both cities of the major city-pair markets in Canada. Being present in the major Canadian airports also reduces the product differentiation/good will barrier to entry. This is because the American carriers are well known by Canadians, many of whom have flown with these carriers on transborder routes, while Canadians who have not actually used the services of the American carriers have been exposed to the carriers' advertising. A more significant source of entry barrier for the American carriers would be frequent flier programs offered by the Canadian carriers and subscribed by the majority of Canadian business travellers. Overall, however, barriers to entry facing the American carriers in Canada, are minimal, compared with the situation of an en-

tirely new Canadian carrier. Thus, an 'open-skies' agreement could substantially increase potential competition in the Canadian airline markets. The the 'open skies' agreement in transportation could benefit the Canadian consumer by putting pressure on prices and costs, and the Canadian carriers by allowing them to expand their networks south of the border. Assuming that it would be unacceptable to the Canadian public not to have a Canadian airline industry, the benefits of free trade can only be realized if the Canadian carriers are able to compete with their American rivals.

The competitive position of firms depends on the productivity and per unit costs of the employed factors of production. Factor productivity is typically defined as the relationship between output and inputs used in production. The two approaches to productivity are total factor productivity and partial productivity ratios. Total factor productivity methods include estimating the flexible functional forms of cost functions(the most popular being the translog form), Divisia indexes and Exact Index Number approach (Roy and Cofsky,1984). The disadvantage of these methods is that they make some strong assumptions about firms objectives and the nature of technology. For example, they require strict profit maximization and constant returns to scale(Divisia and Exact Indexes). If these assumptions are not fulfilled, the total factor productivity approach may yield biased results. Partial productivity indicators are typically in the form of ratios, where the firm's output is divided by the quantity of each input. Its disadvantage lies in the fact that productivity of a given factor may depend on the quantity of other factors used. The advantage

of partial productivity method lies in its simplicity. When all the relevant partial productivity indicators are calculated, their evaluation may provide a reasonable approximation of the firm's efficiency.

A difficulty common to all methods lies in defining the airline's output. It can be defined as the number of the passengers carried, number of passenger-kilometers or the number of ton-kilometers. The most appropriate definition appears to be the number of ton-kilometers, as it includes the number of passengers carried, the amount of cargo hauled and the actual distance travelled. Another problem arises from the differences in the types the networks served by the airlines. The stage length, which is the average length of flight between landings, has been found to be positively correlated with factor productivity and negatively correlated with costs(Laprade,1981). Given this fact, shorter distances imply lower factor productivity and higher costs. It is important, therefore, to adjust for stage length when comparing airlines' productivity.[52]

The most important productive inputs in the airline industry are labour, capital and materials. Material inputs include a range of products such as fuel, energy and heat, passenger meals, office supplies, etc. Aggregation of these inputs would require expressing them in monetary terms. This, however, may cause problems if the ratios are

[52] The average stage length is only one of the factors affecting productivity and costs. Other factors may include traffic density, type of equipment used, etc. To see how other factors affect productivity and cost a number of regressions, using additional variables such as traffic density(RTM) and type of equipment(percentage of wide-body equipment) were run. In the 1984 cross-section of airlines, these variables were either insignificant or improved the goodness of fit only marginally. A list of these regressions and the estimation results are available from the author, on request.

to be used for inter-country comparisons. Domestic prices of these inputs may vary and they may be subject to different taxation. Furthermore, data on these inputs is often unavailable. Given these difficulties, only capital and labour productivity will be examined here.

The most widely used productivity measure is the ratio of revenue-tone-kilometers(RTK) per employee. Relative efficiency can be measured by comparing the actual RTK per employee with the trend value, obtained by adjusting for the average stage length. The actual and adjusted values of RTK per employee for the Canadian and the American carriers are presented in Table 16 and Figure 23.

According to the data given in Table 16, all of the Canadian carriers, except for Quebec Air with productivity 7.7% above the trend, have labour productivities below the trend. This labour productivity disadvantage amounts to 29.7% for Air Canada, 11.2% for CP Air, 2.3% for Nordair, 7.2% for PWA and 5.69 for EPA.ec Air. Lower labour productivity, however, may not result in a competitive disadvantage if labour costs are lower in Canada. Wages, classified by employee group, are presented in Table 17. Except for Continental, the Canadian carriers pay lower wages than the American majors. Labor costs may also be compared by using aggregate system data. Labour costs(wages and benefits) per RPK are presented in Table 18 and Figure 23. Comparing the actual with the trend adjusted values, it can be found that except for PWA, with labour costs per RTK marginally(1.12%) above the trend, the remaining Canadian carriers have lower costs than the values predicted by the trend line. Labour costs are very important for the overall level of competitiveness as they amount to about 30% of all

TABLE 16

Employee Productivity - RTK per Employee

CARRIER	AVERAGE STAGE LENGTH	RTK PER EMPLOYEE (000) ACTUAL	TREND	PERCENT DEVIATION* (%)
CANADIAN CARRIERS				
Air Canada	1234	127,148	164,912	(-27.701)
CP Air	1568	172,895	192,336	(-11.244)
Nordair	757	113,379	115,988	(-2.301)
Pacific Western	497	77,175	82,760	(-7.238)
EPA	445	71,351	75,410	(-5.689)
Quebec Air	466	84,951	78,410	7.701
AMERICAN CARRIERS				
American	1365	164,714	176,233	(-6.993)
U.S. Air	608	106,690	97,626	8.495
Continental	1309	205,310	171,489	16.473
Delta	916	121,606	133,815	(-10.040)
Eastern	973	123,678	139,806	(-13.042)
Frontier	777	133,165	118,326	11.144
Northwest	1376	308,385	177,149	42.556
Pan Am	1843	190,368	211,709	(-11.231)
Republic	640	101,963	101,717	0.242
TWA	1554	183,404	191,278	(-4.293)
United	1268	179,813	167,926	6.610
Western	1003	153,250	142,884	6.764

Trend values were obtained using the following functional form:
(1) RTK/EMPL = ASL/(a + b*ASL), which was transformed into
(2) RTK/EMPL = 1/(a/ASL + b) and (3) 1/RTK/EMPL = b + a*1/ASL

Using the ICAO data on the Canadian and American airlines, (3) was estimated and the values of the coefficients were obtained.

1/RTK/EMPL =	2.00474 +	5008.94036*1/ASL	
Se	(0.57851)	(451.6239)	
t	3.465	11.09	R SQUARE=0.8849

Thus, the predicted values of output per employee are given by
RTK/EMPL = ASL/(5008.94036 + 2.00474*ASL) .

* Percent deviation = 100*(Actual-Trend)/Actual.

Source: ICAO(1984a).

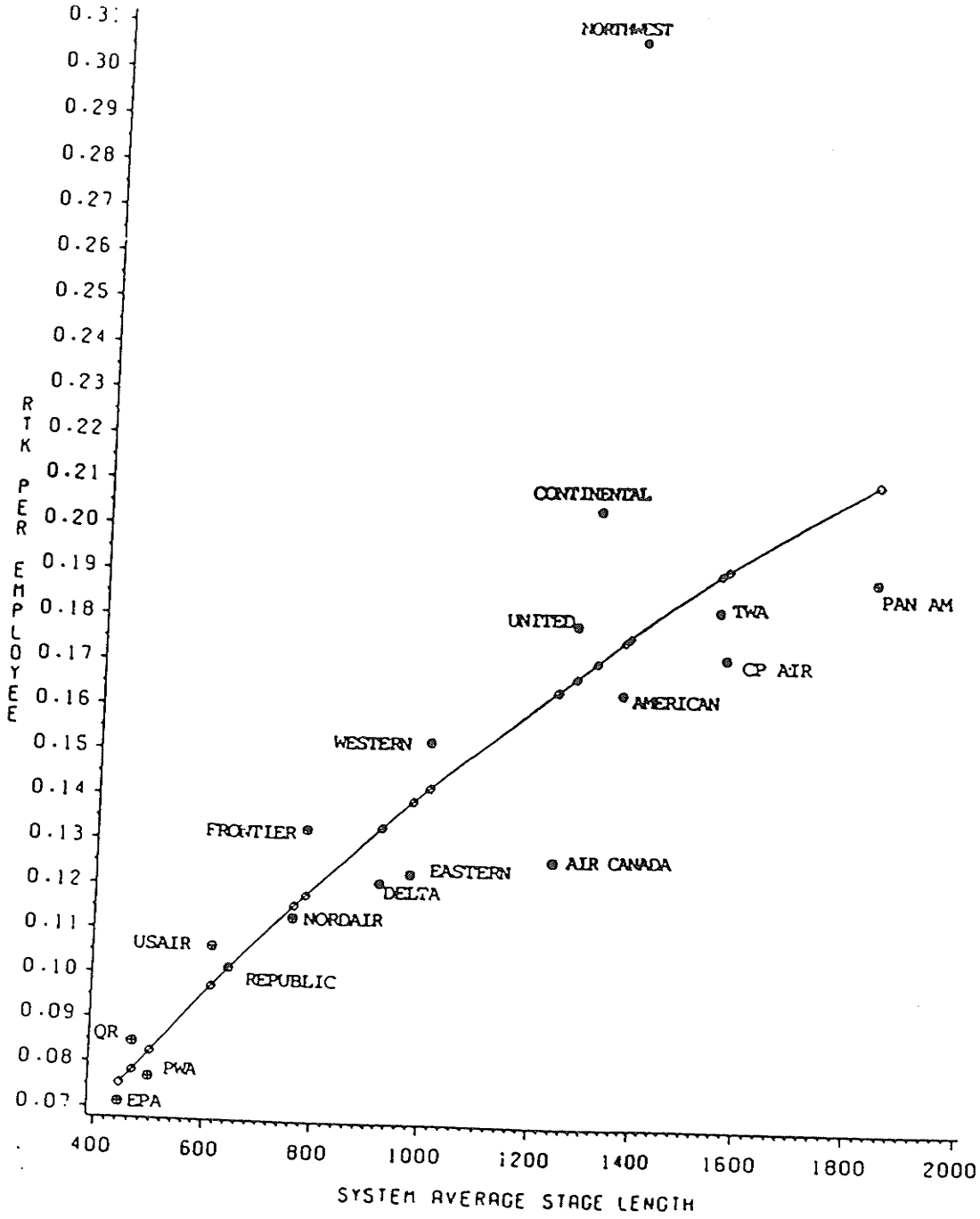

Figure 22: RTK per Employee, by Carrier.
Source: Table 16.

operating costs.[53] Despite this generally favorable situation a note of caution applies here. Two of the American majors, Northwest and Continental have labour costs substantially lower than the other carriers. Northwest's costs are 60.13 below the trend adjusted level, while the same figure for Continental is 94.78%(!). Northwest, after its merger with Republic is present in five of the major Canadian cities(Toronto, Vancouver, Montreal, Calgary and Edmonton), while Continental is planning to offer service between Ottawa and Washington. Continental(owned by the Texas Air group, also the owner of Eastern Airlines) has become the fastest growing major carrier, particularly since after its takeover of People Express and Frontier and its absorption of New York Air(also owned by Texas Air). Its low labour costs are putting pressure on the remaining American carriers to reduce their wage bill. Thus, the Canadian carriers would have to monitor their labour costs so as not to lose their current advantage over the majority of the American carriers.

A difficulty in comparing the efficiency in the use of capital lies in the fact that airline assets are highly heterogeneous. The most important asset of the airline is the flight equipment(planes). It amounts to about 70-80% of airline assets. Aggregating the capital by using the value of all assets is not appropriate, since the airlines often use leased equipment. Given these difficulties, it is necessary to examine the asset productivity by disaggregating the data on the capital used by the airlines, by the the types of planes employed.

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[53] In 1984, labour costs constituted 33.5% of all operating costs for Air Canada, 28.7% for CP Air, 28.4% for EPA, 29.8% for Nordair, 38% for PWA and 31% for Quebec Air(CTC,1984).

TABLE 17

Average Annual Renumeration, by Employee Group, 1984 ($U.S)

AIRLINE	PILOTS AND COPILOTS	CABIN ATTENDANTS	MECHANICS AND OVERHAUL PERSONNEL	TICKETING SALES AND PROMOTIONAL PERSONNEL	OTHER PERSONNEL
Canadian Carriers					
Air Canada	55,412	22,284	25,254	23,745	25,470
CP Air	66,612	22,284	25,524	21,373	24,864
Nordair	58,725	17,358	25,756	NA	21,915
PWA	75,054	25,292	29,823	26,275	25,215
Quebec Air	47,443	16,917	29,168	NA	NA
American Carriers					
American	94,440	26,341	33,509	26,430	37,953
USAir	97,528	29,108	39,943	27,269	34,164
Conti-nental	29,695	16,023	11,731	18,042	23,566
Delta	93,516	27,097	29,095	28,057	34,810
Eastern	91,190	24,191	27,740	22,740	29,829
Northwest	94,427	27,086	33,522	23,288	29,074
Republic	67,271	21,299	27,780	23,177	21,541
TWA	87,555	34,722	30,850	23,049	33,140
United	96,086	28,092	39,491	34,041	27,165
Western	67,202	20,649	30,930	26,801	28,603

Source: ICAO(1984a); Statistics Canada(1984b).

TABLE 18

Labour Expenditures per RTK

CARRIER	AVERAGE STAGE LENGTH	LABOUR COSTS PER RTK (CENTS PER RTK) ACTUAL	TREND**	PERCENT DEVIATION* (%)
CANADIAN CARRIERS				
Air Canada	1234	21.48	23.32	(-8.58)
CP Air	1568	15.00	21.26	(-41.75)
Nordair	757	22.66	29.44	(-29.88)
Pacific Western	497	38.13	37.71	1.12
EPA	445	34.84	40.52	(-16.29)
Quebec Air	466	33.71	39.31	(-16.60)
AMERICAN CARRIERS				
American	1365	27.65	22.39	19.00
U.S. Air	608	44.81	33.31	25.66
Continental	1309	11.69	22.77	(-94.78)
Delta	916	37.68	26.69	29.16
Eastern	973	31.51	25.93	17.71
Frontier	777	30.21	29.03	3.92
Northwest	1376	13.93	22.32	(-60.13)
Pan Am	1843	21.03	20.12	4.32
Republic	640	36.42	32.33	11.23
TWA	1554	24.86	21.33	14.21
United	1268	25.07	23.06	8.00
Western	1003	25.70	25.56	0.54

** Trend values were obtained from the equation:

LCOSTS/RTK = 0.136305 + 119.68200*1/ASL

Se (0.037415) (29.3088)

t 3.643 4.097

R SQUARE=0.5120

Where LCOSTS stands for total labour expenditures and ASL stands for average stage length.

* Percent deviation=100*(Actual-Trend)/Actual

Source: ICAO(1984a); ICAO(1984b).

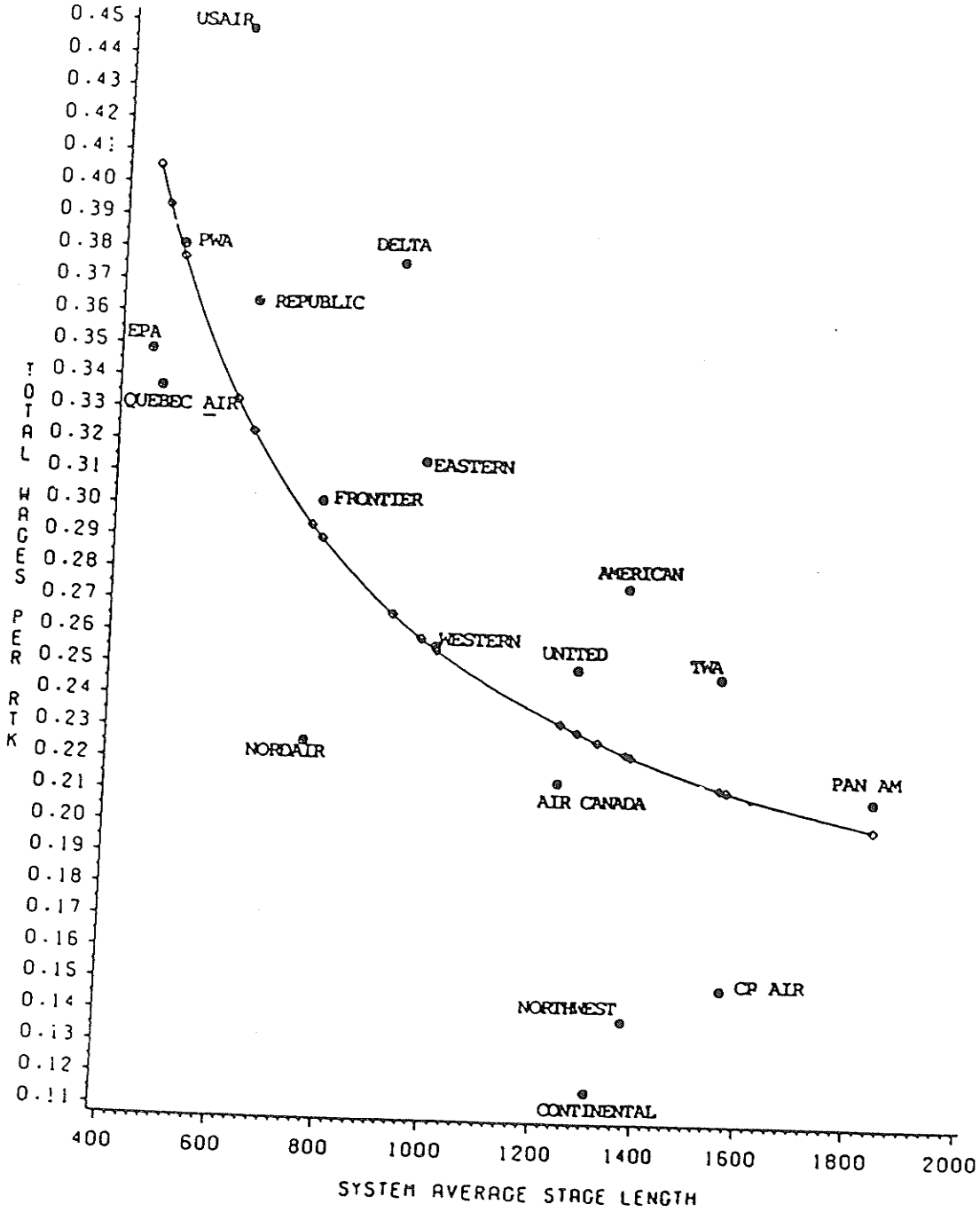

Figure 23: Labour Costs per RTK, by Carrier.
Source: Table 18.

The efficiency in the use of planes can then be measured by comparing the average flying time per day for each type of plane. Utilization of the aircraft space may be evaluated by looking at the number of seats per plane(Table 19). The Canadian carriers have achieved better utilization of planes in terms of the average daily revenue hours flown. The number of seats per given type of plane has typically been higher for the American carriers. This, however, does not always have to imply lower efficiency. Low seating density with wider seats and more leg space may merely reflect the product differention strategy of Canadian airlines. Unfortunately, the magnitude of this phenomenon cannot be easily identified because of the lack of data on the product mix, by the aircraft type.

The aggregate utilization of the equipment can also be evaluated by looking at the airlines' load factors(Table 20). The load factors of the Canadian majors(CP Air and Air Canada) have been consistently higher than those of the American major. Canadian regional carriers(except for Quebec Air), however, had lower load factors than the American locals.

The overall competitive position of the carriers may be assessed by examining the airlines' direct operating costs and total operating costs per RTK(direct operating costs and total operating costs are defined in Tables 21 and 22). The comparison of direct operating costs per RTK is given in Table 21 and Figure 25. With the exception of EPA and Nordair with direct costs above the trend by 9.75% and 10.99%, the Canadian carriers have had lower operating costs than suggested by the trend. Air Canada's costs are 13.96% below the trend adjusted levels.

TABLE 19

Utilization of Aircraft, by Aircraft Type

AIRCRAFT TYPE	NUMBER OF AIRCRAFT	AVERAGE NUMBER OF SEATS	DAILY REVENUE HOURS FLOWN
Boeing 727(200)			
Air Canada	37	141 (-9.0)*	8.4 (+0.5)
American	125	147	8.0
USAir	14	145	9.1
Continental	45	157	8.0
Delta	93	148	8.9
Eastern	96	162	7.5
Northwest	56	146	7.1
Pan Am	38	157	6.0
Republic	15	155	8.6
TWA	56	146	6.4
United	104	147	8.2
Western	45	145	8.8
PSA	2	170	9.0
Weighted Average		150	7.0
Boeing 737(200)			
CP Air	19	104 (-12)	8.8 (+1.1)
EPA	6	110 (-8)	8.6 (+0.9)
Quebec Air	1	120 (+2)	9.3 (+1.6)
American	125	147	8.0
USAir	22	120	7.8
Delta	30	107	7.8
Frontier	41	109	8.9
Pan Am	16	157	6.0
United	49	109	6.9
Western	17	121	6.7
AirCal	18	100	8.4
Piedmont	63	112	6.9
America West	20	122	8.7
Weighted Average		118	7.7

Continued

Boeing 747B			
Air Canada	6	363.5 (-31.41)	7.4 (-1.65)
Northwest	29	400	9.1
Pan Am	7	362	10.9
United	18	410	8.8
Weighted Average		395	9.05
Boeing 747(200)			
CP Air	4	351 (-7)	11.9 (+0.6)
Pan Am	7	362	11.0
Weighted Average		358	11.3
Boeing 767			
Air Canada	12	201 (0.0)	9.4 (+0.2)
American	10	204	9.6
Delta	15	204	8.4
United	19	197	9.6
Weighted Average		201	9.2
DC 8 (60)			
Air Canada	9	210.5 (-2.5)	3.9 (-2.87)
Delta	13	212	7.1
United	30	214.5	7.50
Weighted Average		213	6.77
DC 9 (30)			
Air Canada	35	100	7.9
USAir	71	110	7.0
Continental	23	108	7.8
Delta	36	98	7.7
Eastern	58	99	7.6
Republic	60	101.5	7.2
NY Air	16	110	6.7
PSA	4	107	7.3
Weighted Average		103	7.4

Continued

DC 10 (10)			
CP Air	3	259 (-13)	11.3 (+2.8)
American	45	288.5	8.9
United	47	254	8.7
Western	10	291	5.1
Weighted Average		272	8.5
DC 10 (30)			
CP Air	5	281 (+6)	11.3 (+1.0)
American	6	267	11.5
Continental	13	284	9.2
Pan Am	1	286	5.9
United	6	253.5	11.5
Weighted Average		274	10.3
L-1011			
Air Canada	18	251 (-18)	8.3 (+0.4)
Delta	34	272.5	8.8
Eastern	25	300	5.9
Pan Am	9	238	7.7
TWA	33	261	8.4
Weighted Average		269	7.9

* Terms in brackets denote deviations from the weighted average.

Source: ICAO(1984a).

TABLE 20

Utilization of Aircraft - System Load Factors

CARRIER	1977	1978	1979	1980	1981	1982	1982	1984
Air Canada	63.2	62.5	65.8	67.5	65.5	62.5	64.9	67.5
CP Air	63.7	68.9	70.6	70.1	68.7	65.5	69.9	70.0
Nordair	37.5	42.2	55.3	56.2	50.3	-	-	-
PWA	53.5	54.6	52.7	53.5	54.3	52.0	53.7	50.3
EPA	54.2	55.9	56.7	54.8	56.3	47.7	50.4	55.8
Quebec Air	62.2	61.2	64.0	58.6	52.1	50.4	NA	57.8
U.S. Majors	55.9	61.2	63.2	58.3	57.3	58.8	60.3	59.0
U.S. Locals	53.9	58.6	58.7	54.8	55.5	56.5	56.3	58.8

Source: Statistics Canada(1984a); CAB(1983a); CAB(1983b); DOT(1986).

Corresponding figures for CP Air, PWA and Quebec Air are 25.28%, 18.36% and 3.10% respectively. It has to be indicated, however, that the two most efficient American carriers, Continental and Northwest have their direct operating costs below the trend values by 18.77% and by 17.04% respectively.

Total operating costs per RTK are presented in Table 22 and Figure 25. Except for EPA(with 5.29% above the trend), all Canadian carriers have costs lower than the trend values. Air Canada's costs are 10.68% below trend, while the figure for CP Air, Nordair, PWA and Quebec Air are 15.20%, 3.11%, 9.81% and 1.30% respectively. Similarly as in the case of direct operating costs, Northwest and Continental have total operating costs below the trend values by 16.26% and 28.04% respectively.

The analysis of carriers productivity and costs reveals that the Canadian carriers should be able to compete with their American rivals. The superior productivity and costs performance of the two American majors, Northwest and Continental indicates that the success of the Canadian carriers is not guaranteed and would require further reduction in costs and productivity improvements on their part. The ability of the Canadian carriers to increase productivity and reduce costs would have to be evaluated while assessing risks of the the 'open skies' agreements. The difficulty in making such an assessment lies in the fact that productivity and costs depend on work rules and wage rates, which are subject to labour contracts. Should the Canadian unions be more successful than their American counterparts in resisting cost reducing measures, the ability of the Canadian carriers to compete would be reduced. There is no easy way to assess the out-

TABLE 21

Direct Operating Costs per RTK

CARRIER	AVERAGE STAGE LENGTH	DIRECT OPERATING COSTS PER RTK (CENTS PER RTK)		PERCENT DEVIATION* (%)
		ACTUAL	TREND**	
CANADIAN CARRIERS				
Air Canada	1234	31.51	35.91	(-13.96)
CP Air	1568	23.66	29.28	(-25.28)
Nordair	757	54.74	48.71	10.99
Pacific Western	497	50.46	59.73	(-18.36)
EPA	445	69.39	62.62	9.75
Quebec Air	466	59.57	61.42	(-3.10)
AMERICAN CARRIERS				
American	1365	37.19	33.27	10.54
U.S. Air	608	57.51	54.45	5.31
Continental	1309	28.93	34.37	(-18.77)
Delta	916	47.90	43.72	8.73
Eastern	973	44.45	42.14	5.20
Frontier	777	44.74	48.03	(-7.34)
Northwest	1376	28.15	33.06	(-17.42)
Pan Am	1843	31.05	25.41	18.17
Republic	640	53.52	53.11	0.77
TWA	1554	34.85	29.87	14.26
United	1268	36.74	35.20	4.18
Western	1003	37.64	41.34	(-9.84)

**Trend values were obtained from the equation:
DOEX/RTK = 2.22323 - 0.26287*ln(ASL)
Se (0.18851) (0.27628)
t 11.793 -9.537
R SQUARE=8504

Where DOEX stands for direct operating expenditures and ASL stands for average stage length.
Direct operating expenditures include the following : Flight Crew Salaries and Other Expenditures + Aircraft Fuel and Oil + Flight Equipment Insurance + Rentals of Flight Equipment + Maintenance and Overhaul + Depreciation and Amortization + Other Flight Expenditures.

* Percent deviation=100*(Actual-Trend)/Actual

Source: ICAO(1984a); ICAO(1984b).

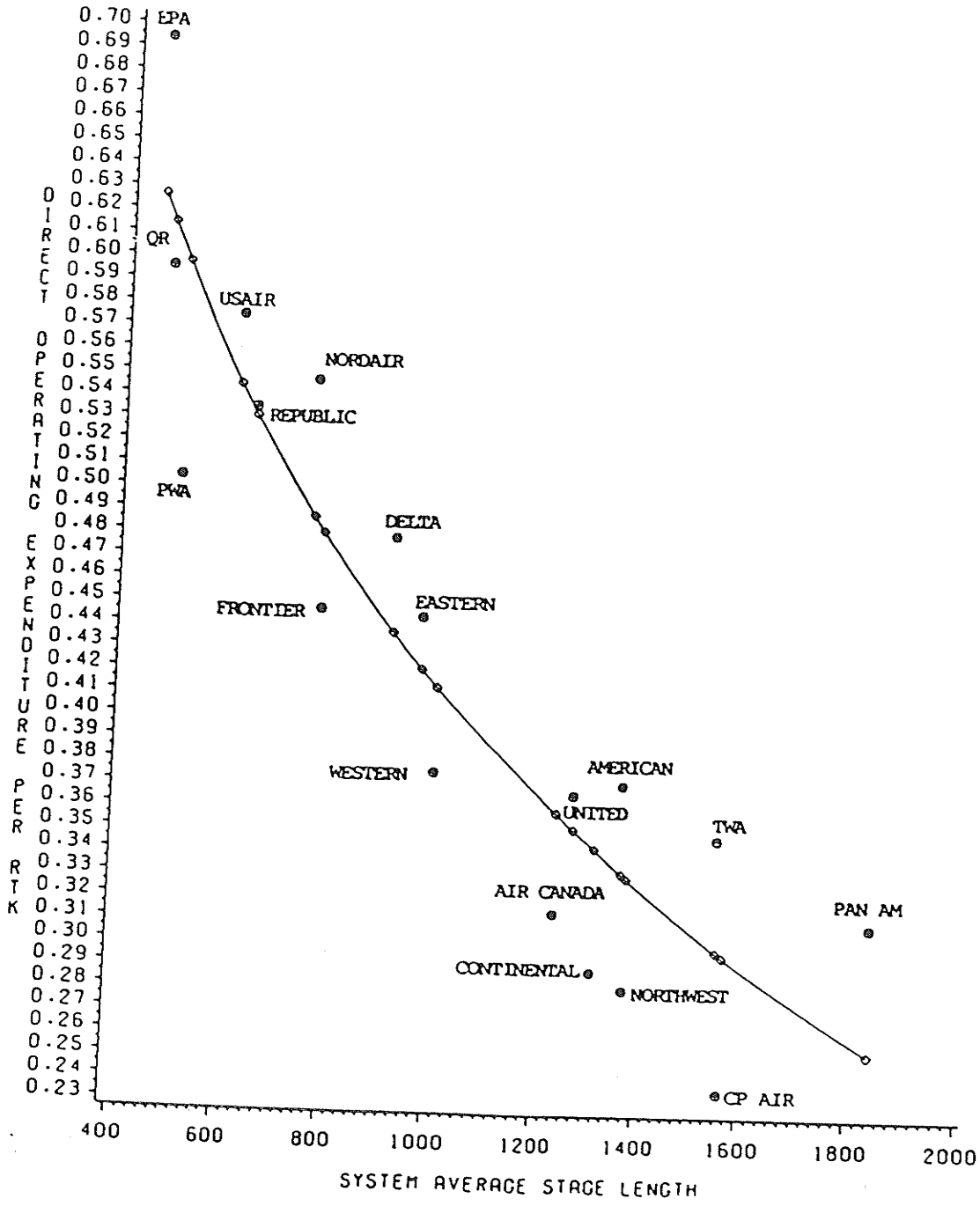

Figure 24: Direct Operating Costs per RTK, by. Carrier.
Source: Table 21.

TABLE 22

Total Operating Costs per RTK

CARRIER	AVERAGE STAGE LENGTH	TOTAL OPERATING COSTS PER RTK (CENTS PER RTK)		PERCENT DEVIATION* (%)
		ACTUAL	TREND**	
CANADIAN CARRIERS				
Air Canada	1234	64.02	70.86	(-10.68)
CP Air	1568	52.26	60.20	(-15.20)
Nordair	757	89.80	92.59	(-3.11)
Pacific Western	497	101.31	111.31	(-9.87)
EPA	445	122.72	116.23	5.29
Quebec Air	466	112.71	114.18	(-1.30)
AMERICAN CARRIERS				
American	1365	75.20	66.37	11.74
U.S. Air	608	110.28	102.35	7.19
Continental	1309	58.69	68.23	(-16.26)
Delta	916	93.81	84.11	10.33
Eastern	973	85.41	81.43	4.66
Frontier	777	89.09	91.43	(-2.63)
Northwest	1376	51.55	66.01	(-28.04)
Pan Am	1843	65.45	53.01	19.00
Republic	640	103.96	100.06	3.74
TWA	1554	70.93	60.60	14.56
United	1268	68.52	69.65	(-1.65)
Western	1003	73.01	80.08	(-9.67)

** Trend values were obtained from the equation:

TOEX/RTK = 3.8750 - 0.44484*ln(ASL)
Se (0.31472) (0.04584)
t 12.312 -9.704
R SQUARE=8548

Where TOEX stands for total operating expenditures and ASL stands for average stage length. Total operating expenditures include the following: Direct Operating Expenditures + User Chargers and Station Expenditures + Passenger Servicing + Ticketing, Sales and Promotional Expenditures + General Administration + Other Operating Expenditures.

Source: ICAO(1984a); ICAO(1984b).

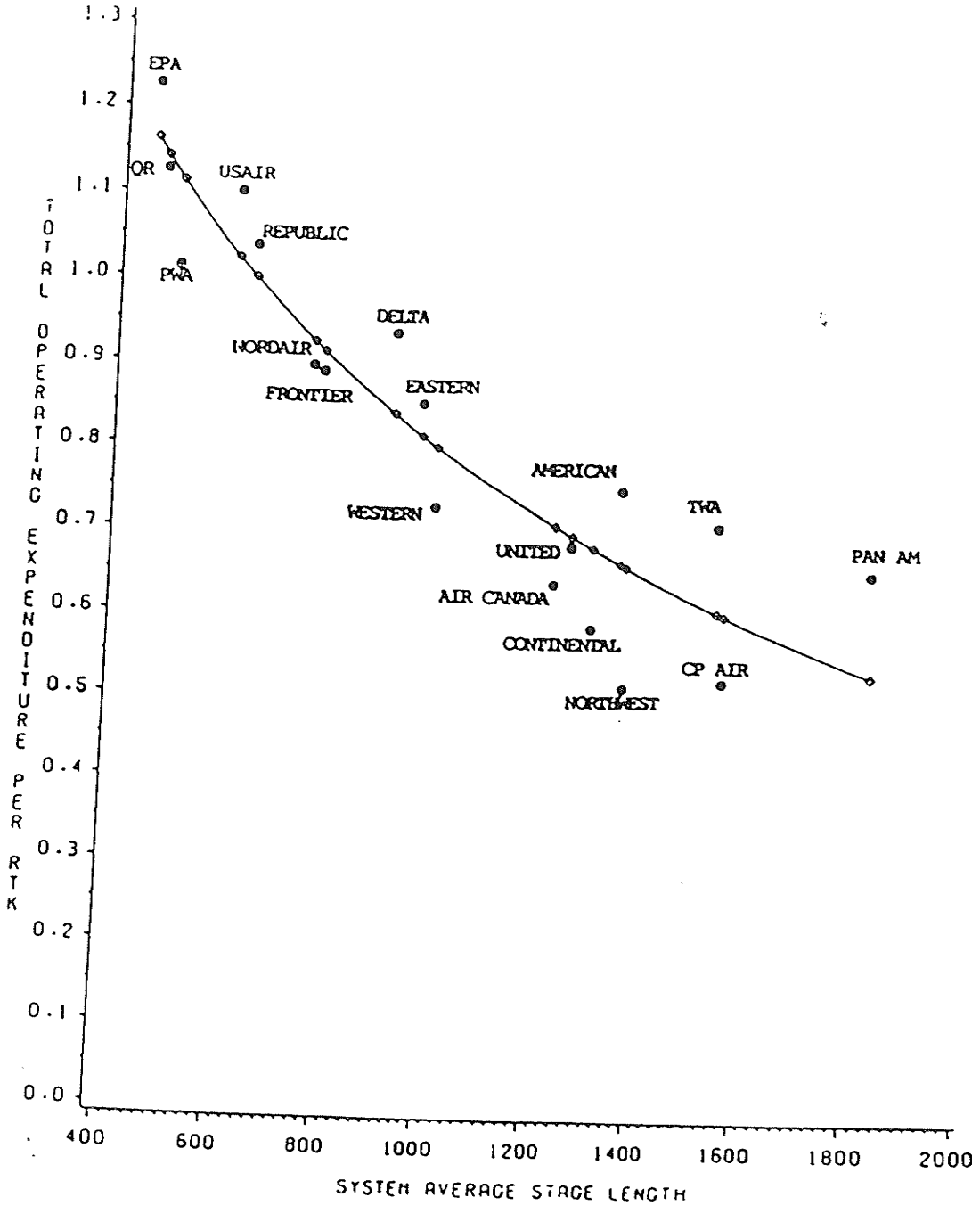

Figure 25: Total Operating Costs per RTK, by Carrier.
Source: Table 22.

come of future labour negotiations as they depend on bargaining skills of management and labour, the overall state of the economy, unemployment rates and other relevant factors. Thus, some uncertainty about the future competitiveness of the Canadian carriers has to acknowledged and risk involved considered in the evaluation of the desirability of the 'open-skies' agreement.

'Open skies' policy would create a free North American market for air transportation services. However, it would not change the fact that the airline industries of the two countries would continue to be subject to the developments in their domestic economies, which could affect their competitive positions. One of the possible complications for the 'open skies' policy may arise due to exchange rate flexibility. With easy entry and exit, exchange rate fluctuations may encourage capacity shifting to take advantage of changes in relative profitability of domestic and foreign routes. A change in the relative profitability and competitive position of a carrier may result in an entry that has nothing to do with improved productivity or increased cost efficiency, but there are forces that will reduce the impact of the exchange rate fluctuations. Suppose that the American carrier contemplates entry into the Canadian city-pair markets following the appreciation of the Canadian dollar. Although revenues earned in Canada would translate into higher earnings in U.S. currency, costs would also have to increase, since operating in Canada requires Canadian purchases. The question, then, is to what effect these increased costs have on the overall competitive position of an American entrant. The magnitude of this cost increase can be identified by examining the

data on airline costs(Table 1). The cost categories affected by exchange rates are those which are incurred for operating in a country which must be paid for in that country's currency. In the case of an American carrier entering a Canadian city-pair market, the percentage of operating costs affected by a change in the exchange te will be:

Passenger Servicing (9.76%) + fuel and oils (28.03%) + landing fees (7.52%) + insurance fees (1.09%) + other flight expenditures (1.08%) + reservation and sales (11.76%) + traffic servicing (7.48%) + Advertising and Publicity (1.82%) = 64.19%

This means that an improvement in the profitability due to exchange rate fluctuations will be offset by a factor of 0.64 due to an increase in costs. The net change in the competitive position will be

$$I = [E(t)/E(t-1)] * (1.00-0.64) = [E(t)/E(t-1)] * 0.36.$$

Where I stands for a relative change in competitiveness, E(t) denotes an exchange rate in period 't' and E(t-1) denotes an exchange rate in period 't-1'.

For example, a 10% change in the value of a country's currency will result in a 3.6% improvement in the competitive position for the foreing carrier entering the country's markets.(3.6% improvement for foreign carrier if country's currency has appreciated and vice versa for depreciation). It appears then the industry would be to a large degree protected from the effects of exchange rate fluctuations, although it should be noted that currency fluctuation is only one example of exogenous events affecting the carriers' relative competitive position. For example, changes in tax laws or labour regulations can

alter competitiveness of carriers even if their productive efficiency does not change. There are also important legal problems to be solved. If the American carriers enter the Canadian airline markets they will be earing income while operating in Canada, and they should be required to pay corporate income taxes and be subject to Canadian regulations. This could be achieved by requiring the American carriers to set up Canadian subsidiaries, although this arrangement would likely encounter problems due to high degree of costs jointness between different routes of an airline network. Rules for allocating costs and revenues and income reporting would have to be worked out before 'open skies' arrangement can be operational. An alternative would be to treat airline services as exports, but this solution may put the Canadian carriers in a position of disadvantage if tax rates and other regulations effecting airline competitiveness are more favorable in the U.S. These are only some of the complications that may arise and that need to be considered when analizing the desirability and risks and problems involved in pursuing the 'open skies' arrangement with the United States.

The feasibility of an agreement depends on how both sides perceive the benefits and costs involved. As far as the Canadian side is concerned, the national airline industry has been historically considered as an important part of the Canadian identity as a separate nation, which was the very reason for creating the industry.[54] As indicated in

[54] Explaining the rationale for the creation of Tras-Canada Airlines in 1937, C.D. Howe stated: "Many Canadian citizens when travelling from one point to another in Canada find they have to use the airlines in the United States, and they have been very insistent in demanding the establishment of direct Canadian service....I believe such a service would prove of immense value for national purpos-

the section, the 'open skies' agreement involves giving up some of the national sovereignty over the national space in exchange for the benefits of improved access to the American market and increased competition in the industry. The analysis cannot be easily expressed in monetary terms as it would require a dollar figure to be put on sovereignty and national identity. Assuming, however, that the Canadians are willing to take the risks involved and give up their sovereignty, it is not obvious that the Americans would be willing to enter such an agreement. Historically the U.S. government has been more protectionist with respect to Canada-U.S. aviation(Harris,1975), and the only period of the reversal from this rule was at the time of Carter's presidency. The shift towards 'open skies' approach in international aviation coincided with deregulation of the domestic airline industry. The principal objectives of public policies towards international aviation were to increase competition with a benefit to the consumer, and to improve the position of the American carriers in competition with the foreign airlines(Brenner et al.,1985). A series of bilateral agreements were signed as a means of implementing the new policy, which emphasised the increasing of the number of routes, relaxing of capacity restrictions and making pricing more flexible. The most notable examples include agreements with the Netherlands and Singapore(Doganis,1985). These agreements, however, failed to produce the expected results, the biggest losers being the American carriers.[55] This led to a reevaluation of the U.S. position towards inter-

es"(Corbett,1965).

[55] An example here may be the U.S.-Netherlands traffic where KLM, a Dutch flag carrier, increased its share of Amsterdam - U.S. traffic to over 90%("U.S. International Aviation Policy Makers Adopt More

national aviation with a greater emphasis on the national interest and fair exchange of economic benefits[56] (Brenner et al.,1985). Given this renewed emphasis on a fair exchange of benefits the question arises what benefits might the Americans derive from an the 'open skies' agreement with Canada. The possible benefits may involve the consumers and the industry. The consumers could benefit due to increased competition if the Canadian carriers are allowed entry into the new American markets. Given the small size of the Canadian carriers relative to the size of the American market this effect is likely to be small. The American industry is likely to be against such an agreement, since the status quo appears to be serving it well, an indication of which is an increase in its market share of the transborder traffic. The Canadian domestic market is small by the American standards and the industry may not find it sufficiently attractive to press the government into seeking the 'open skies' agreement with Canada. Thus, the 'open skies' policy, while potentially leading to a substantial increase in the degree of market contestability in the Canadian industry is unlikely, given the number of problems and risks involved, to offer an immediate solution to the industry problems.

Pragmatic Approach", ATW, 10,1984).

[56] The issues of the nature of competition and national interest in the context of internation aviation are discussed by Dennis(1986).

6.7 CONCLUSIONS AND IMPLICATIONS FOR REGULATORY REFORM

The analysis of this chapter has found the Canadian airline industry not being contestable. Given the small domestic market, high concentration levels and high proportion of international traffic in the industry's output, the Canadian airline markets deviate from the contestability ideal more than the American markets. Except for the northern routes, enhancing market contestability in the Canadian industry has been found as potentially welfare improving. However, the domestic policies to enhance market contestability have been found insufficient. The 'open skies' policy offers a greater increase in market contestability, but requires solving a variety of difficult legal and political problems. In addition to this, the American side has little to gain at present from such an agreement. Given the recent emphasis on the exchange of mutual benefits as a policy guide in the U.S., the short-term perspectives of reaching the 'open skies' agreement are not good. Whether such an agreement should be a long-run policy objective for Canada is only partly an economic question. Transportation industries in general, and the airline industry in particular, have been considered as an important part of the national identity, thus it is uncertain if the the 'open skies' agreement will be acceptable in Canada, even in the long run.

Regulatory reform is happening now, and therefore more immediate solutions to the industry problems have to be considered. The industry is not contestable and is unlikely to be made significantly more contestable by means of public policies. The industry, therefore,

even in the contestability framework, is a candidate for antitrust and regulatory scrutiny.

> Where markets are characterized neither by a large number of incumbents nor by ease of entry, public sector intervention may be required to prevent the exercise of monopoly power. In such cases, there is a strong presumption that the regulatory or antitrust agencies serve the public interest best if their intervention secures the sort of behavior on the part of incumbent firms that effective market pressures might otherwise enforce(Baumol,1985,p.13).

As indicated in Table 11, 21% of the first 100 Canadian city-pair markets are served by only one carrier. Because of the possibility of monopolistic pricing, these markets would be the prime candidates for public intervention. The analysis of Section 6.1 indicated that the alternative to regulation schemes, such as franchise bidding, are impractical in the airline industry. Regulation therefore appears to be the appropriate form of intervention. 'Freedom to Move' indicates a possibility of overruling price increases in monopolistic routes upon complaint. The scope and the method of intervention appear inadequate. The method is ad hoc and it is not obvious whose complaint will cause a possible price overruling. Is a complaint of one individual sufficient to warrant an investigation? If not one, how many citizens have to complain? Only price increases are singled out as candidates for investigation. Excessive pricing, however, may occur even without price increases. Consider, for example a case when fuel prices decreases or technological progress reduce airline costs. If firms recognize their mutual interest, they may not pass these savings to consumers and earn above normal profits. Such conduct and performance are clearly inconsistent with allocative efficiency.

The most typical structure of the Canadian city-pair markets is duopoly. It is theoretically possible that the rivalry between oligopolists will be sufficient to ensure the socially optimal performance by the industry. Such a result, however, is not guaranteed. The small number of firms opens a possibility of collusion, especially given the weakness of potential competition.[57] The possible collusion by the oligopolists could be addressed under the conspiracy clause of the new competition law. The new act reduces the requirements for the proof of the existence of the conspiracy but it does not eliminate it.

> It is necessary to prove that the parties thereto intended to and did enter into the conspiracy, combination, agreement or arrangement, but it is not necessary to prove that the parties intended that the conspiracy, combination, agreement have an effect set out in subsection(1)(Section 32(1.3), Bill C-91).

The necessity of proving the existence of conspiracy makes the legislation ineffective in dealing with 'conscious parallelism', which may result from the mere recognition of mutual interdependence and interest of the oligopolists. 'Freedom to Move' makes no provision for dealing with collusion, despite high levels of the industry concentration. Only monopoly routes are singled out for a possible investigation and intervention. Legislation dealing with the crucial national industry should not be based on the best scenario concerning the industry conduct and performance, and assume that firms will never collude. Given the limitations of the Canadian competition legislation

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[57] In addition to the possibility of collusion between the duopolists, there is a possibility of a mutually destructive warfare, if the firms have Bertrand type expetatitons (that is they assume that prices of their rivals are given). Such expectation are clearly irrational in the context of Canadian air transport and therefore the possibility of collusion is considered as the principal source of inefficiency.

in dealing with the collusive behavior, the alternative would be a closer scrutiny of industry pricing on all routes by the regulatory agency. If the firms do not collude, the regulatory agency might never intervene. Should a collusion occur, however, the regulatory agency should be given authority to alter price in the public interest. The possibility of such an intervention in itself may constrain firms from setting excessive prices.

As far as entry is concerned, the document suggests a continued regulation of entry in the north. Given the importance of service continuity on these routes, the continued entry regulation of entry appears justified. Service continuity should also be enhanced by the proposed requirement that the advance notice is given in the event of exit. As indicated in Section 6.3, a problem in the southern routes is insufficient actual and potential competition. In these routes 'Freedom to Move' proposes a complete freedom of entry to all 'fit and able' operators. The analysis of Section 6.5 suggests that reducing impediments to entry in these routes is potentially welfare improving. Thus, the proposals dealing with entry in the industry appear justified.

Chapter VII

SUMMARY AND CONCLUSIONS

As indicated in chapter 1, this study's objectives were:

1. To evaluate market contestability as a theory and its usefulness for public policy analysis.
2. To examine whether airline markets, in general, and the Canadian airline markets, in particular, are contestable.
3. To examine whether market contestability is an appropriate welfare standard for the Canadian airline industry.
4. To examine policies which can be used to enhance market contestability in the Canadian airline markets, and to identify their limitations.
5. Based on the analysis of problems 1 to 4, to evaluate the proposals in the document 'Freedom to Move' which deal with entry and pricing.

7.1 EVALUATION OF MARKET CONTESTABILITY

As far as the first objective is concerned, the analysis in chapters 2 and 3 found the principal uses of market contestability in policy analysis to be that of an industry model and a welfare standard. The essential characteristics of contestable markets include freedom of entry and exit and the possibility of 'hit-and-run' entry. When

these conditions are met, the mere threat of entry may discipline the existing firms and prevent monopolistic/oligopolistic pricing in highly concentrated industries. Firms' conduct and performance in contestable markets is independent from the internal organization of the market. Barriers to entry are defined in the contestability framework as a cost disadvantage of potential entrants versus incumbent firms. Typically, barriers to entry are related to sunk costs, since sunk costs are already foregone for the incumbents, while they are still a part of the opportunity cost for the entrants. 'Hit-and-run' entry may be possible under any of the following conditions: (a) price reactions of incumbents are constrained by regulation or antitrust legislation; (b) entrants believe that incumbents will not react; (c) entry is small; (d) the entry and exit lag is smaller than the incumbents' reaction lag; (e) there is a possibility of ex-ante contracts between customers and entrants.

The analysis in chapter 3 found that the first three conditions involved some important contradictions, while the feasibility of the last two in a given industry, has to be established empirically. When 'hit-and-run' entry is not possible, firms' behavior matters and there is a possibility of strategic entry deterrence. Incumbent firms may use their fist move advantage by creating barriers to entry and making commitments to make their entry deterring strategies credible. Low levels of sunk costs alone do not guarantee that an industry will behave in a way consistent with the contestability theory, which sets a limitation on its applicability as an industry model.

As a welfare standard and a policy guide, market contestability is inappropriate under the following conditions: innovation requires protection from opportunistic entry; 'lemon' type market failure is possible; first move advantage of the established firms opens a possibility of socially 'wasteful' commitments. Public policies aimed at reducing barriers to entry may also result in a welfare loss when the optimal market structure is unsustainable and when internalizing externalities requires restricting entry.

Two type of unsustainability can be distinguished - ex-ante and ex-post unsustainability. Ex-ante unsustainability does not allow the optimal market structure to emerge. It is possible, however, that if the industry is protected from opportunistic entry in the development stage, the optimal market structure will be ex-post sustainable. The presence of sunk and transaction costs has been found as a factor enhancing market sustainability.

As a policy guide, the usefulness of market contestability is also restricted by its partial equilibrium static perspective, which considers only the issues of allocative and cost efficiency. Public policies towards industries may go beyond the narrowly defined economic efficiency and include national and strategic interests, equity and other relevant social and political objectives.

7.2 MARKET CONTESTABILITY AS A MODEL OF AIR TRANSPORT

As far as the second objective is concerned, the analysis in chapters 4 and 5 reveals a general inconsistency between airline economics and the contestability model. As indicated by the theoretical analysis of chapter 4 and the empirical evidence presented in chapter 5, 'hit-and-run' entry is generally impossible in airline markets, which suggests a possibility of predatory behavior and strategic entry deterrence. The impossibility of 'hit-and-run' entry has also implications for policy in that public policies aimed at enhancing market contestability in the airline industry have to be supplemented by the appropriate competition policy, which would constrain predatory conduct.

The airline industry is also not free of barriers to entry, which may originate from asset related sunk costs, product differentiation, computer reservation systems and airline reliance on the travel agents, absolute cost advantage, availability of essential inputs and airport access and economies of airline size. The last source of barriers to entry is relevant in the context of small and gradual entry, before the new carrier reaches the minimum efficient scale of operation. The theoretical analysis in chapter 4, indicated that the economies of airline size may originate from economies of aircraft size, economies of scope between various airline services and network economies. In addition to costs savings in the provision of service, economies of airline size may also be related to cost savings to the consumer, which may result from lower transaction costs and time savings. The presence of economies of airline size, which may affect the levels

of concentration in the industry, is important in the contestability framework as it defines the source of potential competition in airline city-pair markets. In general, two types of entry are possible - entry of existing carriers into the new markets, and entry of the new start-up carriers. The theoretical analysis in chapter 4 suggested that barriers to entry would typically be higher for the new start-up carriers. The empirical evidence from the U.S. deregulation of airlines provided the additional support to this claim. The initial ease of entry for the new carriers resulted from the specific conditions of the industry after the Airline Deregulation Act of 1978, which included cost inefficiency of the existing carriers, inefficient route structures, inefficient price/quality mix and government policies supporting the new entry. Despite these favorable conditions, most of the new entrants failed, which is an indication of the weakeness of this type of entry as a source of potential competition. This, in turn, has important implications for countries with small domestic markets. In such countries, potential competition has to originate from start-up carriers rather than existing airlines. These carriers, however, will face significant risks and barriers to entry.

A number of empirical tests conducted for the American industry indicated a general inconsistency between the predictions of the theory and the actual performance of the industry, especially with respect to correlation between fares and concentration.

The analysis in chapter 6 reveals that the Canadian airline markets are not contestable, the deviations from the contestability ideal being greater than in the case of the U.S. airline industry. The most

important source of lower contestability is the high levels of concentration and the high share of international traffic in the industry's output.

Concentration in the airline industry can be defined in terms of the system data and in each city-pair market. In either case the industry can be described as a duopoly, the two dominant carriers being Air Canada and CAI. The third carrier Wardair is serving a limited number of long-distance routes. The major carriers have also extended their dominance of the industry to the commuter carriers, by buying the majority or minority shares of the small regionals. These commuter airlines typically share the major carrier's computer reservation codes, coordinate their flight scheduling and marketing strategies and participate in the frequent flyer programs of the majors. The control of the commuter carriers by the majors, eliminates competition between these two types of carriers and also may result in a barrier to entry for potential entrants. Entry into city-pair markets, currently dominated by the two major carriers would have to originate either from the new start-up carriers or from Wardair, which, given the American experience, is an indication of the weakness of potential competition in Canada. High proportions of international traffic and market imperfections related to the bilateral agreements have important implications for the Canadian airline industry as the designated 'flag' carriers can experience a significant product differentiation advantage over new entrants. The new entrants would have to offer discounts or incur other costs to overcome this disadvantage.

Thus, given that market contestability was found inconsistent with airline economics, and the fact of relatively low contestability of the Canadian airline markets, market contestability should not be used as a theoretical model when designing public policies towards the Canadian airline industry.

7.3 MARKET CONTESTABILITY AS A WELFARE STANDARD FOR CANADIAN AIR TRANSPORT

As far as the third objective is concerned, Chapter 3 identified the conditions under which sunk costs and other barriers to entry may be welfare improving. These conditions include market unsustainability, 'lemon' type market failure and innovations. Potential competition may also reduce welfare if firms make socially wasteful commitments to make their entry deterring strategies credible. Two types of unsustainability can be distinguished in the context of the airline industry - unsustainability of the natural monopoly in a given city-pair market and unsustainability of an optimal airline network. Chapter 2 indicated that unsustainability of the natural monopoly arises when the conditions for subadditivity are fulfilled but the average total cost curve is increasing at a point of intersection with the demand curve. However, when a firm can offer different prices to different customers market unsustainability need not arise. Airlines can typically charge different prices to different classes of consumers, which should ensure sustainability of natural monopoly, even when there are no barriers to entry and the incumbent is constrained not to change prices in the event of entry. Market sustainability will be further enhanced by the carriers' ability to react to entry. Network

sustainability can be related to the issues of cross-subsidy and the viability of low traffic density routes in the deregulated environment. The analysis in chapter 4 indicates that network unsustainability is possible when adding new routes while generating new traffic on the existing routes, requires that the whole system efficiency gain be transferred to the new routes to make them viable. Therefore, restricting entry may be necessary in the network development stage. Once the network is developed, the case for entry regulation becomes less obvious, as markets may be ex-post sustainable if barriers to entry are present. Given the carriers ability to set multiple prices and the impossibility of 'total' entry, both types of unsustainability should be very unlikly in the airline industry. Other types of innovative activities have also been found to be independent of the conditions of entry in the industry.

As far as 'lemon' type market failure is concerned, airline travellers are repeat customers. Airlines, therefore, have an incentive to built a reputation for high quality, which alone makes this type of market failure unlikely.

The issue of the impact of barriers to entry in the airline industry on the technological progress deals primarily with problem of interactions between the airline industry and the airplane manufactures. Given the small size of the Canadian airline market compared to the total demand for planes, changes in the structure of the Canadian airline industry leading to increased demand for capital equipment will likely have only negligible effect on aircraft manufacturers. Therefore, it can be assumed that technological progress in aircraft manu-

facturing is exogenous to the Canadian airline industry and will not be significantly affected by the industry's conditions of entry. Public policies aimed at enhancing market contestability may also be welfare reducing if firms make socially wasteful commitments in order to erect compensating barriers to entry. The analysis of chapter 4 suggests that there is a very limited scope for making 'wasteful' commitments in the airline industry.

One of the unique characteristics of the Canadian airline system is the difference between northern and southern routes. The northern routes serve small and isolated communities. Small population size, weather conditions and types of economic activity define the specificity of these routes. Air transport in the Canadian north provides an essential link between the northern communities and between these communities and the south. Low densities of traffic, low capital requirements and little scope for establishing integrated networks imply the absence of some of the conditions enhancing sustainability. Given that real life economic agents do make mistakes and differ in terms of their risk preference, a possibility of a mutually destructive entry cannot be excluded. While there is no reason to believe that the disruption of service will be permanent or even long-lived, when the continuity of service is essential, constraining entry might be justified. Thus, market contestability is inappropriate as a welfare standard for these routes.

As far as southern routes are concerned, a problem there is insufficient competition. Given that most of the Canadian airports operate with excess capacity and that the airline networks are already well

developed, there seems to be no compelling reason to restrict entry in the south.

Increasing market contestability in the southern routes could achieve two minimum objectives. First, Wardair could disrupt a possible collusion between the two major carriers by entering new markets where prices set by the majors offer positive economic profits(in the absence of collusion between all carriers). Secondly, enhanced contestability could put pressure on cost efficiency, should some, but not all, of the existing carriers become inefficient; more efficient carriers could take over the markets, and should all the carriers in the industry become inefficient, there would be a possibility of a new entry. By reducing barriers to entry and probability of strategic entry deterrence, the degree of allowable cost inefficiency in the industry would be reduced.

Thus, enhancing market contestability in the south should be welfare improving and contestability theory may be used as a welfare standard there. However, market contestability as a welfare standard is inappropriate in the north, where the social and political importance of service continuity may require constraining entry.

7.4 POLICIES TO FOR CANADIAN AIR TRANSPORT AND THEIR LIMITATIONS

As far as the fourth objective is concerned, domestic policies to enhance market contestability could include industry restructuring, disallowing airline marketing and scheduling agreements, reducing product differentiation and good will advantage of the existing carri-

ers, disciplining the computer reservation systems, eliminating the absolute capital cost advantage of the existing carriers, reducing the possibility of strategic entry deterrence and eliminating legal impediments to entry.

As far as the first case is concerned, restructuring the industry would have to involve dividing the existing major carriers into a number of smaller airlines. While this would not alter concentration in individual city-pair markets, a larger number of independent carriers would increase the strength of potential competition because entry could come from the existing, rather than from the new start-up carriers. This policy's limitations are that it would not allow the carriers to capture the available network economies and that the Canadian carriers would not be able to compete effectively with foreign carriers on international routes, as competition on these routes requires both cost efficiency and the ability to offer many destinations. Thus, it appears that industry restructuring is not a feasible policy option in Canada.

The second case involves agreements between the major carriers and the commuter airlines. It is not obvious, however, that disallowing airline agreements would improve welfare, the reason being that these agreements, while having an anticompetitive effect on the new entrants, improve coordination of schedules and reduce airline marketing costs.

The third case involves reducing product differentiation advantage of the existing carriers. It seems that little can be done to elimi-

nate good will advantage of the existing carriers. Furthermore, attempts to eliminate the good will advantage may be counter-productive, if they result in inferior service quality. As far as the characteristics mix of the product is concerned, only frequent flier programs appear to be candidates for intervention. These programs are popular with business travellers because they offer a premium to the flier rather than to the firm which incurs the cost of the travel. This characteristic of frequent flier programs could be eliminated by strict enforcement of the tax law, which considers program awards as taxable income when used for private consumption. A case for a complete elimination of these programs is less obvious. First, the Canadian carriers have to compete internationally and if they are denied the use of an efficient marketing tool, which continues to be used by their rivals, their competitive position will deteriorate. The second argument against elimination of these program has to do with the nature of competition in oligopoly. If the frequent flier programs are eliminated there is no guarantee that firms' rivalry will change to price competition, and firms may replace frequent flier programs with other marketing tools, which may be of less value to the consumers than current frequent flier awards.

As indicated in chapter 6, the designated international airlines can experience a product differentiation advantage versus the potential entrants. In order to eliminate this disadvantage, the new entrant would have to be given an equal opportunity to enter international routes, which is difficult to achieve given that that bilateral agreements, which regulate international aviation, typically do not

allow more than one designated carrier to serve a foreign country's route. Although allocation schemes such as auction bidding are possible, they are impractical in the airline industry, given the importance of name recognition and good will, and the fact that international routes are part of integrated networks.

The fourth case involves the computer reservation systems and airline marketing. As far as the computer reservation systems are concerned, two major options available are - separation of the computer reservation system from the industry or regulation of the privately owned systems. It appears that it is possible to eliminate or reduce barriers to entry related to the reservation systems. As far as the airline reliance on the travel agents is concerned, public policies are unlikely to succeed in eliminating this barrier to entry.

The fifth case involves the capital cost disadvantage of the new entrants, which arises because the new entrants are unknown to the lenders of capital and/or because a new venture may be intrinsicly riskier than operations of the existing carriers. The problem is that only the first reason for capital cost asymmetry is a legitimate candidate for public intervention, that is, if the government reduces the capital costs of the new entrants in such a way that they do not truly reflect the riskiness of entry, excessive entry will be possible. In practice it may be difficult to separate asymmetric and imperfect information related capital cost premium from the higher risk premium.

The sixth case involves predatory pricing and other predatory practices. In order to reduce the possibility for predatory conduct, a

set of operational rules to identify it should be designed. The Areeda-Turner condition could be used to identify a variety of predatory strategies. As indicated in chapter 6, the Areeda-Turner test can fail to identify predation if entry is small and/or gradual. Given these limitations, the Areeda-Turner condition may be considered as a sufficient but not necessary condition in identifying predatory practices and could be applied as a first step in evaluating a suspected predatory conduct. Should the test fail to identify predation, a more complete evaluation in the spirit of Bork's definition of the problem could follow. While improving the rules and procedures to deal with predatory performance is important, it is unlikely that any rule can completely eliminate predation.

In addition to designing appropriate rules and procedures, the responsibility for enforcing them has to be assigned. The lack of experience on the part of the anticombines authorities in dealing with the complexities of airline economics may make enforcement of antipredatory rules difficult. Since the responsibility for mergers has been retained by the regulatory authorities, it might be more efficient for regulatory agency to deal with the remaing competition policy issues, as well.

The last case involves legal impediment to entry. While the 'public convenience and necessity' requirement can be eliminated, safety consideration require the continued restricting entry to only 'fit and able' operator. The necessity to prove 'fitness' will impose some costs on the potential entrants.

The analysis in chapter 6 suggests that the domestic options to enhance market contestability in the industry are very limited. Even if the possible domestic policies, such as restricting frequent flier programs, regulating computer reservation systems and improving rules to deal with predatory practices, are successful, the industry will still be far from the contestability ideal. Given the high levels of concentration in the industry, the potential competition will have to originate primarily from the new start-up carriers. The American experience suggests that these carriers are unlikely to provide a meaningful threat to the existing efficient carriers. Given these limitations, an alternative approach could be to introduce foreign competition, which could be done by negotiating the 'open skies' agreement with the U.S.

'Open skies' agreement, in addition to enhancing market contestability, could also allow the Canadian carriers to compete more effectively for transborder traffic. The analysis in chapter 6 suggests that given the size and the financial strength of the U.S. carriers, and their presence at the major Canadian airports, the 'open skies' agreement could increase contestability more significantly than any combination of domestic policies. The analysis of carriers productivity and costs suggests that the Canadian carriers should be able to compete with their American rivals, but given the superior productivity and costs performance of the two American majors, Northwest and Continental, the success of the Canadian carriers is not guaranteed and would require further reduction in costs and productivity improvements on their part. While 'open skies' policy would create a free

North American market for air transportation services, it would not change the fact that the airline industries of the two countries would continue to be subject to the developments in their domestic economies, which could affect their competitive positions and would increase the risks involved in such an agreement. There are also important legal problems to be solved, including the issues of taxation the legal status of the U.S. carriers in Canada. In addition to this, the American side has little to gain at present from such an agreement. Given the recent emphasis on the exchange of mutual benefits as a policy guide in the U.S., the short-term perspectives of reaching the 'open skies' agreement are not good. Whether such an agreement should be a long-run policy objective for Canada is only partly an economic question. Transportation industries in general, and the airline industry in particular, have been considered as an important part of the national identity, thus it is uncertain if the the 'open skies' agreement will be acceptable in Canada, even in the long run. In general, given the number of problems involved, it does not appear that the 'open skies' agreement can offer a solution to the immediate problems of the industry.

The analysis of the above problem provides the additional proof that market contestability is inappropriate as an industry model when designing public policies towards the Canadian airlines. Not only the industry is not currently contestable, but it also cannot be made contestable by government policies.

7.5 EVALUATION OF "FREEDOM TO MOVE"

The last objective deals with the assessment of the proposals to deregulate the Canadian airlines. Analysis of the first four objectives of this study reveals that Canadian airline markets are not contestable and are unlikely to be made contestable by public policies. At the same time, the industry is highly concentrated which opens a possibility of abuse of market power.

The regulatory reform, as it was outlined in the document 'Freedom to Move', deals primarily with entry and pricing in the industry. As far as entry is concerned, the document proposes freedom of entry to all 'fit, willing and able' carriers in the south. In the north, entry is to be more closely regulated and the 'public convenience requirement' is to be continued. The more restrictive entry regulation of northern service is rationalized by the relative fragility of routes. Given the potential for destructive competition in the north and the importance of service continuity, continued regulation of entry in the north appears justified. The analysis in chapter 6 indicates the presence of insufficient actual and potential competition in the south. Thus, proposals to deregulate entry there appear justified.

As far as pricing as concerned, rate setting in the north will be still regulated, while price regulation is to be eliminated in the south. The only exception will be monopolistic routes where price increases can be overruled by the regulatory agency upon complaint. The method appears ad hoc and inadequate, and does not extend to routes served by more than one carrier. In such routes, insufficient actual

and potential competition suggest a possibility of monopolistic pricing in the industry, if the existing carriers recognize their mutual interdependence. There is a possibility that the carriers will compete vigorously and not collude. Such conduct, however, cannot be guaranteed. Given the weakness of the competition legislation in dealing with conscious parallel conduct, the lack of provisions against collusion in 'Freedom to Move' has to be considered as a serious policy error. In order to reduce a possibility of collusion and monopolistic pricing the regulatory agency should be given an authority to overrule prices (both levels and increases) in all routes, not only those served by one carrier.

7.6 CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

The analysis of this study has identified important limitations of market contestability theory as an industry model and a welfare standard. These limitations are especially relevant in the context of the Canadian airline industry. This industry is not currently contestable and it cannot be made contestable. Therefore, public policies towards Canadian air transport should not be designed using market contestability as a descriptive model of the industry. As a welfare standard, the theory has limited acceptability in terms of freedom of entry for southern routes but is inappropriate in the north. However, market power of the carriers and the possibility of collusion remain as problems. Proposals to relax rate setting regulation are found inappropriate and continued regulatory authority over pricing appears justifiable.

Chapter 1 outlined some of the limitations of this study. These limitations can be used to identify the area of further research in the areas related to the stated objectives of this thesis. First, the pure theory of contestable markets is still in its infant stage and many of important theoretical issues have not been resolved yet. Thus, there is a need for further theoretical research related to the contestability theory. Secondly, the theoretical and empirical analysis of this study, which was applied to the Canadian airline industry, should be supplemented by a test in which the industry performance is compared with the predictions of the contestability theory. It will be possible to conduct such a test in Canada after the process of deregulation and the industry adjustment to the new environment is completed.

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