Public, private and mixed ownership and the performance of international airlines

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Abstract

Many airlines are neither completely public nor private enterprises but have hybrid or mixed public-private ownership. Theory and evidence regarding the performance of private, public and mixed ownership are addressed in the context of the international airline industry. The study empirically examines the influence of an airline's ownership structure on multiple dimensions of its performance. In general, the results indicate that public sector airlines under-perform relative private sector airlines. In addition, we find that airlines with mixed ownership tend to perform better than public sector airlines, but worse than private sector carriers. © 2002 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Over the past 15 years many publicly owned and operated national flag carriers have been fully or partially privatized. The motives for ownership restructuring through privatization are diverse, but normally include the objective of enhancing carrier financial performance and operating efficiency. For several reasons, efforts to evaluate the effects of privatization on airline performance have been inconclusive. In this regard, organizational performance is a multidimensional construct and is determined by a variety of inter-related factors. Consequently, the relationship between ownership structure and airline performance is also necessarily complex. Studies examining international airlines also face a number of methodological issues such as data availability and comparability (Oum and Yu, 1998; Schefczyk, 1993) that make international generalizations difficult. Additionally, in assessing post-privatization performance analysts confront the 'counterfactual problem' (Parker

and Martin, 1996; Al-Jazzad, 1999) of comparing actual performance against a hypothetical benchmark.

In addition to these problems in assessing the relationship between ownership and performance the diversity of approaches and motivations for airline privatization programs provide additional sets of issues to consider. In this regard, the privatization process itself matters (Molz and Gedajlovic, 1992). Where the main objective of privatization is to provide revenues for the state, then potential performance improvements may be realized by undertaking fundamental re-structuring prior to actual asset sales (Jenkinson, 1998). Consequently, the influence of ownership change on performance cannot be assessed in isolation from related policy issues. For example, government competition and regulatory policy has direct implications regarding post-privatization financial performance (Vickers and Yarrow, 1988). Among international airlines the relationship between ownership and performance is further clouded by the prevalence partial or 'multi-stage' asset sales that leave significant control in the hands of public owners. Partial airline privatization produces a mixed ownership regime embodying elements of state and private ownership. Whether mixed ownership is intended to be a permanent arrangement or transitional state is unclear in the absence of clear policy statements. In practice, mixed

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ownership has become increasingly prevalent among international airlines (Airline Business, 1998).

2. Theoretical perspectives on the ownership and performance relationship

Both agency and strategic management theory suggests that ownership influences firm performance because different owners pursue different goals and possess different incentives. The property rights school suggests that when a firm has no dominant residual claimant over its profits then it will be operated inefficiently (Alchian, 1965). Others contend that while state owned firms may be concerned with profitable operation, they must also pursue other objectives, which impairs their ability to achieve efficiencies and financial objectives (Martin and Parker, 1997). Moreover, because no distinct individual or group can clearly benefit from a public firm's profits, no one has the incentive to monitor or hold public managers accountable for their decisions. As a consequence of weak monitoring, public choice theorists such as Niskanen (1971) suggest that politicians and bureaucrats may substitute their own goals and preferences, such as employment and prestige, over efficiency and productivity considerations. Consequently, property rights theorists contend that private ownership is inherently superior to state ownership (De Alessi, 1983).

Recent empirical evidence comparing the performance of enterprises before and after privatization suggest that private ownership in competitive markets may represent the necessary conditions for improved performance (Al Jazzad, 1999; Parker and Martin, 1996; Pollitt, 1995). However, others have suggested that a single model of ownership and competition cannot be expected to be superior for all industries in all countries (Shirley, 1999; Yarrow, 1986).

In this regard, the attributes of mixed ownership models represent an interesting and little investigated development in the debate. Hybrid state-private ownership may provide an opportunity to benefit from the best qualities of public and private ownership. First, private ownership alone does not necessarily provide strong incentives for performance. Indeed, a dominant private shareholder of as enterprise may choose goals other than value maximization (Demsetz and Lehn, 1985). Yet others suggest that corporate control is more readily effected when ownership is concentrated because widely dispersed shareholdings produce free-rider problems with regard to monitoring (Shleifer and Vishny, 1997). Secondly, strong performance incentives for managers in private widely held firms stem from an efficient market for corporate control. The threat of takeover is regarded as a discipline on managers who are not maximizing the value of the firm (Hartley and Parker, 1991). However, in many developed and developing countries capital markets are weak and the discipline of the markets for corporate control is attenuated. Mixed ownership may facilitate the role of the state as a 'steward' in private firms that are either dominated by a strategic investor or where the threat of takeover is weak.

Third, government credibility as a seller of assets in programs of privatization matters in realizing their true value. Governments typically own many assets and the privatization of a single enterprise is often part of a wider program of asset sales. As such reputation effects may influence asset values, especially when government can influence the subsequent performance (and value) of an enterprise through regulation or political interference. Weak enterprise performance that is attributable to post-privatization government opportunism can lead to reduced interest in future asset sales. For example, the poor post-privatization performance by Spanish enterprises required the state to heavily discount subsequent asset sales, in some cases offering 'money-back' guarantees (Jenkinson, 1998). In this regard, multi-stage sales and continuing government ownership represents a credible commitment to private investors signaling that it has an interest in preserving a partially privatized enterprise's value.

Alternatively, hybrid ownership arrangements may blend the worst qualities of each. Boardman and Vining (1989) concluded that private corporations perform better than state-owned enterprises, but interestingly, mixed enterprises perform no better and often worse than state-owned enterprises. Boardman and Vining (1989) suggest that some patterns of joint ownership generate conflict between public and private shareholders, leading to managerial 'cognitive dissonance'. Support for this view is provided by Ehrlich et al (1994), who in their study of 25 international airlines over the period 1973–83, find that state ownership lowers long-run productivity growth and that partial airline privatization yields few productivity benefits in the short term.

3. Hypotheses

No clear guide exists to compare the performance and efficiency of private and public organizations (Negandhi and Ganguly, 1986) therefore it is necessary to establish a framework to generate hypotheses about airline performance and ownership effects. In this paper we utilize two dimensions: an efficiency-financial performance dimension and general-industry specific dimension, which creates a two by two matrix (see Fig. 1). Financial performance is arguably the most important dimension of a firm's performance since it reflects performance over a diverse array of activities. However,

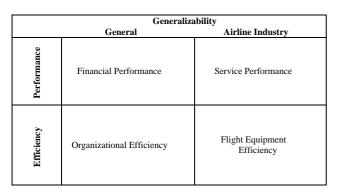| Generalizability		
	General	**Airline Industry**
Performance	Financial Performance	Service Performance
Efficiency	Organizational Efficiency	Flight Equipment Efficiency

Fig. 1. Dimensions of airline performance.

due to the divergent goal structures of private and public organizations, financial performance alone cannot be the sole criterion for assessing the performance and efficiency of public organizations (Negandhi and Ganguly, 1986).

In particular, the multiple goal structures of public firms may result in less emphasis upon financial performance. It does not necessarily follow however, that public firms may be less efficient than their private counterparts. Indeed, public airlines may be more efficiently managed yet still show inferior financial performance. This is because the multiple goal structure of public airlines may require the financial pie to be divided up among a wider group of stakeholders. For instance, in several developing countries the national flag carrier plays a strategic role in the local economy by focusing upon a large migrant labor sector. In these cases a highly efficient public airline may be expected to realize its superior efficiencies in the form of lower prices not as higher profits. In other cases, the state may require an efficient carrier to provide service on uneconomical routes. It follows that organizational efficiency should be examined separately from financial performance.

Apart from general indicators of firm performance, we need to also take into account strategic dimensions of performance that reflect the airline industry specific aspects of performance. These indicators may be of either a financial or operational nature but they ought to reflect relevant aspects of industry economics and competition (Schefczyk, 1993). In this paper we utilize two such indicators: service performance and equipment utilization.

Reflecting a theoretical, consensus we expect privately owned airlines to outperform publicly owned airlines with regard to financial performance. Private shareholders (principals) are concerned with financial returns on their investment. Relatedly, managers in private enterprises confront a market for corporate control, which focuses their attention on maintaining healthy financial performance. Public owners on the other hand are concerned with balancing more complex demands that may reduce profits such as affordability of fares,

service availability and employment levels. At the same time, managers in publicly owned airlines are shielded from the market for corporate control by untraded government held shares. Additionally, the monitoring of mangers in publicly owned airlines is complicated by multiple tiers and the often-differing interests of politicians and public bureaucrats (Martin and Parker, 1997). Neither bureaucrats nor politicians benefit from an airline's financial performance directly so each has little incentive to monitor this dimension of performance adequately. Other things being equal these factors are likely to promote superior private performance on three dimensions.

Hypothesis 1. Privately owned airlines will exhibit higher profit margins than state owned airlines.

Hypothesis 2. Privately owned airlines will exhibit higher rates of return than state owned airlines.

With regard to organizational efficiency there are numerous accounts of the relative inefficiency of the public administration of enterprise (Rainey et al., 1976). For many reasons, including those enumerated above relating to financial performance, managers in privately owned airlines have a greater incentive to seek out and implement organizational efficiencies that improve labor productivity. On the other hand, public managers have less incentive to economize on labor, indeed they may confront political pressure to maintain employment levels above those necessary to efficiently service prevailing traffic levels. In particular, public airlines may have more headquarter and other indirect personnel as a proportion of total employment.

Hypothesis 3. Privately owned airlines will exhibit higher employee productivity levels than state owned airlines.

Hypothesis 4. Privately owned airlines will exhibit a lower percentage of indirect personnel as a proportion of total employment than state owned airlines.

Other things being equal managers in privately owned airlines should be more sensitive to service quality than their public counterparts since perceived service quality is generally held to influence a firm's financial performance (Truit and Haynes, 1994). In the airline industry key service indicators relate to flight frequencies relative to traffic levels between specific destination-pairs. We do not utilize route specific data in this study therefore we have selected an indicator of service orientation, namely passenger service expenditures. Other things being equal, we expect privately owned firms to devote more financial and human resources to customer service than their public sector counterparts

Hypothesis 5. Privately owned airlines allocate more financial resources to passenger service expenses than state owned airlines.

Hypothesis 6. Privately owned airlines will exhibit a smaller passenger to in-flight personnel ratio than state owned airlines.

Due to the high fixed costs of operating an airline, it is important to efficiently utilize available capacity. Given their concern for financial performance, managers in privately owned airlines have a greater incentive to optimize their route structures and to use equipment efficiently. Because of their more complex goal structures, managers in publicly owned airlines are concerned with factors other than efficiency when selecting routes. For example, publicly owned flag carriers often fly a wide range of routes with very low frequencies. Such route choices may generate prestige or satisfy other public policy objectives but such an allocation of resources results less intense capacity utilization.

Hypothesis 7. Privately owned airlines will exhibit higher passenger load factors than state owned airlines.

Hypothesis 8. Privately owned airlines will exhibit higher levels of aircraft utilization than state owned airlines.

4. Sample and data sources

We tested our hypotheses using panel data from 1993–1997 on a sample of medium to large international scheduled passenger airlines. To be included in this sample an airline must fly (i) at least 15 million total aircraft kilometers per annum (ii) at least 10% of the airline's total aircraft kilometers must be on international routes and (iii) at least 10 million aircraft kilometers on international routes. These criteria exclude both large domestics such as USAir and smaller international carriers. Using ownership data from the Aviation Week & Space Technology's Aerospace Sourcebook (1996–1999) and International Civil Aviation Organization (ICAO) performance data (ICAO, 1994a, b, 1995a, b, 1996, 1997, 1998a, b, 1999a, b) we created a sample of 50 international airlines representing every continent. Although international accounting practices differ, ICAO requires airlines to report data in a standard format. Table 1 provides a list of the sampled airlines. The airlines in the sample vary widely in size, ranging from British Airways with an asset base of some US $18.5 Billion in 1997 to Avianca with a 1994 asset base of $332.3 million. Aircraft kilometers performed ranges from 1.499 billion kilometers for American Airlines in 1997 to 32.5 million for Virgin Atlantic in 1993.

5. Measures and methodology

We measure airline ownership by utilizing indicator variables that indicate whether an airline is either a mixed mode, or public sector airline. In this regard, we want to distinguish between public sector and mixed mode carriers since there is some evidence in the literature which suggests that companies that have mixed mode ownership structures under perform both private and pure public sector companies (Boardman and Vining, 1989). Unfortunately, there are no clear guidelines regarding the demarcation of private, mixed and public ownership airlines. We define our ownership categories assymmetricly to account for the fact that a relatively small governmental stake in an otherwise private sector airline may carry significant veto power while the same is not necessarily true in a state owned airline where a private party holds an equivalent stake (Jenkinson, 1998). Thus we consider airlines to be pure private sector airlines only in cases where private parties hold 99%, or more of the company's outstanding voting stock. In contrast, we categorize an airline as a pure public sector airline if a state, or states own 95% or more of the airline. Thus, we consider airlines with mixed mode ownership as those with private sector control of voting stock in between 6% and 98%.[1] By this standard, using the asymmetrical cutoff classification, the sample contains 109 cases (i.e. company years) of private ownership, 72 cases of government ownership and 69 cases an airline had mixed-ownership.

In the estimates reported below public sector and mixed mode indicator variables are regressed on eight independent variables corresponding to the eight hypotheses described above. As such, private sector airlines represent the baseline condition. The first dependent variable is return on sales (ROS), which measures net proceeds after operating expenses as a proportion of total operating revenue. The second measure of financial performance is Return on Assets (ROA). This ratio represents the amount net income that is generated by one dollar of net assets. The third dependent variable is employee productivity defined as the average amount of revenue generated by each company employee. The fourth dependent variable is Non-direct Personnel as Proportion of Total Personnel which is defined as the proportion of employees that are not classified as in-flight or maintenance personnel, to total personnel. As such, this operationalization measures non-direct personnel as all employees not providing aircraft maintenance or carrying out their tasks aboard aircraft.

We utilize two measures to capture service orientation. Passenger Service Expense represents the average, per passenger service expense. We also consider the ratio of Passengers to In-flight Personnel. Lastly, we consider two equipment utilization indicators: Passenger Load-Factor and Aircraft Utilization. The former is defined as passenger-kilometers carried expressed as a percentage

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[1] Nevertheless, the findings we report below are quite robust across choice of mixed, private and public sector ownership cut-offs. In particular, the estimates using symmetrical 1% cut-offs were virtually identical to the one's reported here.

Table 1
Airline sample and ownership

Airline	Country of Origin	1993	1994	1995	1996	1997
Aerolinas Argentinas	Argentina	Private	Private	Mixed	Mixed	Mixed
Quantas Airways	Australia	Private	Private	Private	Private	Private
Sabena	Belgium	Public	Public	Mixed	Mixed	Mixed
Transbrasil Airlines	Brazil	Private	Private	Private	Private	Private
Varig	Brazil	Private	Private	Private	Private	Mixed
Air Canada	Canada	Private	Private	Private	Private	Private
Canadian Airlines	Canada	Private	Private	Private	Private	Private
Air China	China	Public	Public	Public	Public	Public
Avianca	Colombia	Private	Private	Private	Private	Private
Egypt Air	Egypt	Public	Public	Public	Public	Public
Finnair	Finland	Mixed	Mixed	Mixed	Mixed	Mixed
Air France	France	Mixed	Mixed	Mixed	Mixed	Mixed
Lufthansa	Germany	Mixed	Mixed	Mixed	Mixed	Private
Olympic Airways	Greece	Public	Public	Public	Public	Public
Gulf Air	Gulf States	Public	Public	Public	Public	Public
Cathay Pacific	Hong Kong	Private	Private	Private	Private	Private
Air India	India	Public	Public	Public	Public	Public
Indian Airlines	India	Public	Public	Public	Public	Public
Garuda	Indonesia	Public	Public	Public	Public	Public
El Al	Israel	Public	Public	Public	Public	Public
Alitalia	Italy	Mixed	Mixed	Mixed	Mixed	Mixed
All Nippon Airways	Japan	Private	Private	Private	Private	Private
Japan Airlines	Japan	Private	Private	Private	Private	Private
Malaysia Airlines	Malaysia	Mixed	Private	Private	Private	Private
Aeromexico	Mexico	Private	Private	Private	Private	Private
Mexicana Airlines	Mexico	Mixed	Mixed	Mixed	Mixed	Private
Royal Air Maroc	Morocco	Public	Public	Public	Public	Public
KLM	Netherlands	Mixed	Mixed	Mixed	Mixed	Mixed
Air New Zealand	New Zealand	Private	Private	Private	Private	Private
Pakistan International	Pakistan	Mixed	Mixed	Mixed	Mixed	Mixed
Philippine Airlines	Philippines	Mixed	Mixed	Mixed	Mixed	Mixed
Tap Air Portugal	Portugal	Public	Public	Public	Public	Public
Korean Airlines	Republic of Korea	Private	Private	Private	Private	Private
Saudi	Saudi Arabia	Public	Public	Public	Public	Public
SAS	Scandinavia	Mixed	Mixed	Mixed	Mixed	Private
Singapore Airlines	Singapore	Mixed	Mixed	Mixed	Mixed	Mixed
South African Airways	South Africa	Public	Public	Public	Public	Public
Iberia	Spain	Public	Public	Public	Public	Public
Swissair	Switzerland	Mixed	Mixed	Mixed	Mixed	Private
Thai Airways	Thailand	Mixed	Mixed	Mixed	Mixed	Mixed
Turkish Airlines	Turkey	Mixed	Mixed	Mixed	Mixed	Mixed
Emirates	UAE	Public	Public	Public	Public	Public
British Airways	United Kingdom	Private	Private	Private	Private	Private
Virgin Atlantic	United Kingdom	Private	Private	Private	Private	Private
American Airlines	United States	Private	Private	Private	Private	Private
Continental Airlines	United States	Private	Private	Private	Private	Private
Delta Air Lines	United States	Private	Private	Private	Private	Private
Northwest Airlines	United States	Private	Private	Private	Private	Private
Trans World Airlines	United States	Private	Private	Private	Private	Private
United Airlines	United States	Private	Private	Private	Private	Private

of seat-kilometers available. Aircraft utilization is a variable that reports the average numbers of hours per day that an aircraft is in the air.

It is widely contended that the structure and intensity of competition is the main determinant of firm financial performance and efficiency (Porter, 1980), for instance a domestic market monopoly may produce good financial returns but poor efficiencies. Lack of domestic competition can influence the performance of international airlines in a variety of ways. For example, an airline with a domestic monopoly may enjoy preferential access to choice airport slots. In our statistical analysis, we control for domestic competition using an indicator variable signifying the presence of domestic competition. Airline performance may also be a function of firm size. In this regard, large airlines may enjoy economies

of scale and scope. Alternatively, larger organizations are more complex and bureaucratic, which may reduce efficiency. We control for airline size by utilizing the log (base 10) of an airline's total asset base.

Much of the literature on privatization and ownership has focused upon developing countries. Moreover, privatization programs have progressed furthest in developed economies. Therefore it is possible that ownership effects on performance are an indirect function of income levels of a country of origin. We control for these effects through the use of home country gross national product (GNP). Additionally, other geographic and institutional influences on performance may be mediated through region-wide factors. Therefore we also control for an airline's region of origin. The regional indicators used in this study are those used by ICAO, North America, South America and Caribbean, Europe, Africa, Middle East, Asia and Australia. For statistical reasons, only five of the six region indicator variables are entered into any regression model. The sixth variable (North America) represents the baseline condition.

6. Results

Our eight hypotheses are tested through a series of ordinary least square regression (OLS) models. In each of these models, the ownership measures and the control variables are regressed on a dependent variable. These results are reported in Table 2.

Hypothesis 1 predicts a positive relationship between private ownership and return on sales. Our results support this hypothesis, public sector airlines have a significantly lower return on sales than airlines with private or mixed-ownership ($t = -3.11$, $p < 0.01$). A different picture emerges when profitability is measured as ROA (Hypothesis 2). In this case, we find that *both* mixed ($t = -2.09$, $p < 0.05$) and public sector airlines ($t = -3.74$, $p < 0.01$) under-perform relative to private sector airlines. These results also show that airline ROA is strongly and positively related to home country GNP levels ($t = 3.69$, $p < 0.01$) and firm size ($t = -10.22$, $p < 0.01$).

With respect to general indicators of organizational efficiency we find that both state owned and mixed-mode airlines have lower workforce productivity than private sector airlines (Hypothesis 3). In this regard, state ownership ($t = -4.34$, $p < 0.01$) and mixed ownership ($t = 3.44$, $p < 0.01$) are both strongly and negatively related to employee productivity. Thus Hypothesis 3 is strongly supported. As with the profitability estimates, we find that GNP ($t = 10.09$, $p < 0.01$) is strongly and positively associated with employee productivity levels. At the same time, contrary to Hypothesis 4, no statistically significant relationship is found between an airline's ratio of non-direct to total personnel and its ownership structure.

Table 2
Regression estimates[a]

	ROS	ROA	Employee productivity	Non-direct/ total personnel	Passenger service expense	Inflight/total personnel	Passenger load factor	Aircraft utilization
Public sector airline	−0.33	−0.29	−0.32	−0.01	0.00	−0.17	−0.02	−0.51
	−3.11**	−3.74**	−4.34**	−0.10	0.02	−1.35	−0.17	−4.52**
Mixed-mode airline	−0.02	−0.17	−0.28	0.15	0.09	−0.27	0.07	−0.29
	−0.19	−2.09*	−3.44**	1.31	1.09	−1.98*	0.61	−2.31*
GNP	−0.22	0.28	0.72	−0.61	0.46	0.16	0.00	0.16
	−2.14*	3.69**	10.09**	−6.25**	6.00**	1.38	0.03	1.46
Domestic competition	0.16	0.06	−0.01	0.00	0.29	−0.44	0.27	0.20
	1.33	0.71	−0.16	0.01	3.39**	−3.06**	2.26*	1.50
Log assets	0.32	−0.70	−0.06	0.22	0.10	−0.06	0.26	−0.25
	3.36**	−10.22**	−0.92	2.43*	1.47	−0.54	2.67**	−2.47*
South America	−0.07	−0.01	0.24	−0.20	0.23	−0.22	0.00	0.13
	−0.84	−0.10	4.52**	−2.75**	3.78**	−2.54*	−0.02	1.59
Europe	0.15	0.04	0.43	−0.25	0.71	−0.30	0.47	0.45
	1.32	0.43	5.52**	−2.32*	8.32**	−2.31*	3.97**	3.80**
Africa	−0.13	−0.11	0.11	0.16	0.17	−0.16	−0.03	0.12
	−1.59	−1.95	2.09*	2.15*	2.81**	−1.72	−0.38	1.48
Middle East	0.10	−0.03	0.32	−0.11	0.42	−0.03	0.15	0.24
	1.17	−0.54	5.54**	−1.34	6.74**	−0.31	1.76	2.64**
Asia	0.14	−0.34	0.57	−0.49	0.62	−0.16	0.25	0.31
		−4.83**	8.54**	−5.41**	8.68**	−1.41	2.54*	3.05**
Adjusted R^2	0.21	0.59	0.59	0.36	0.57	0.06	0.20	0.20
F	5.76**	27.53**	27.53**	9.75**	25.36**	2.04*	5.50**	5.04**

[a] Standardized beta's and *t-statistics*
**$p < 0.01$, *$p < 0.05$

Hypothesis 5 and 6 pertain to the passenger service orientation and receive at best modest support. With respect to Hypothesis 5 there is no apparent significant relationship between direct passenger service expenditures and an airline's ownership structure. Interesting, both the existence of domestic competition ($t = 3.39$, $p < 0.1$) and GNP levels ($t = 6.00$, $p < 0.01$) are strongly and positively associated with passenger service expenditures. We find some support for Hypothesis 6 insofar as we observe the predicted negative relationship between the ratio of inflight to total personnel and state ownership ($t = -1.98$, $p < 0.05$). Though the sign is negative, there is no significant relationship between the inflight personnel ratio and mixed ownership.

Hypotheses seven and eight predict that private airlines will be found to use their flight equipment more efficiently than their public sector counterparts. Evidence on this issue is dependent on the choice of measure used. Contrary to Hypothesis 7, while competition ($t = 2.26$, $p < 0.05$) and scale ($t = 2.67$, $p < .01$) are positively related to passenger load factors, ownership structure is not. In contrast, as predicted by Hypothesis 8, there is a strong and evident association between aircraft utilization rates and ownership structure when utilization is evaluated as the average number of hours a company's planes are in the air. More specifically, we find that both public ($t = -4.52$, $p < 0.01$) and mixed ($t = -2.31$, $p < 05$) use their aircraft less intensely than private sector airlines.

7. Discussion & conclusions

The results of this study provide strong evidence that the ownership structure of international airlines affects some performance dimensions. After controlling for firm size, domestic competition, home region and home GNP levels, we find that public sector and mixed ownership airlines generally have lower profit levels than private sector airlines. Lower employee productivity levels are also manifest in public carriers and airlines with mixed ownership regimes. We have also found that state owned airlines have lower ratios of inflight personnel to total personnel than private sector airlines. In addition, though we find no relationship between ownership and passenger load factors, we do find that both public and mixed airlines utilize their aircraft less intensively than private airlines. On balance then, the results suggest that ownership does matter and that private airlines are more performance and efficiency oriented than either pure public sector airlines, or mixed-mode airlines. However, the evidence in this regard is not universal. For instance, we find no ownership effects when we look at passenger load factors, passenger service expenditures and the ratio of non-direct to total personnel.

The evidence in Table 2 tends to suggest that airlines with mixed ownership structures tend to perform in between their public private sector counterparts. This is evident from the size of the coefficient on the ownership variables. In the specific case of the ROA estimates while both the mixed mode (-0.17) and public sector (-0.29) coefficients indicate that these airlines under-perform private sector airlines, the relative size of the coefficients suggests that the effect is roughly 70% stronger in the case of pure public airlines. A similar pattern of results is apparent with respect to the employee productivity and aircraft utilization results. Further evidence suggesting that mixed mode airlines exhibit higher performance levels than public sector carriers is apparent in the estimates that show that in terms of ROS, public sector carriers under-perform private sector carriers, but mixed mode airlines do not. On balance then, the evidence presented here suggests that while mixed mode airlines perform poorly relative to private sector carriers, they do outperform pure public sector airlines along multiple indicators.

In conclusion, we note that while our results suggest that ownership structure is a material consideration with respect to the performance of international airlines, other factors such as scale and scope advantage, the wealth and existence of competition in a carrier's home market and geographic region of origin also have an important impact upon airline performance. In this regard, competition in a carrier's domestic market appears to effect passenger service expenditures and passenger load factors, which are two dependent variables our results indicate are unrelated to ownership structure variables. The large number of significant coefficients on region of origin variables in Table 2 indicates regional patterns in competition and regulation may also be important considerations. Also suggestive of the existence of location effects are our findings that GNP levels in a carrier's home country are related to a number of outcome variables such as ROS, ROA, employee productivity and passenger service expenditures.

Taken together our findings related to the effects of ownership as well as the pattern of results related to the control variables we entered in our models carry two clear implications. The first is that studies examining performance among international airlines need to control for a broad array of factors in order to confidently evaluate hypothesized relationships. Second, our findings showing the importance of domestic competition, GNP levels and region of origin effects suggest that governments have a variety of tools aside from direct ownership stakes with which they can influence the performance of international airlines. Thus the effects of full, or partial privatization on airline performance needs to be evaluated in the broader context of a nation's public policy with respect to its international airlines.

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