

# Commercialisation and airport performance: The case of Ireland's DAA



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## ABSTRACT

Airport performance has been the subject of an increasing volume of empirical research in recent years. This paper bridges a gap in the existing literature through an in-depth case study analysis of the process of commercialisation in the Dublin Airport Authority (DAA), Ireland's state-owned airport company, and the corresponding impact on performance over the 1994–2014 period. We use a model of commercialisation to examine changes in the DAA's internal and external environments that show evidence of a more commercial focus. The DAA's economic performance is then analysed using total factor productivity (TFP) and labour productivity indicators, as well as basic financial indicators. Our analysis highlights the significant internal and external changes experienced by the DAA over the past two decades that have driven a continuous process of commercialisation. While TFP growth was positive or stable in half of the years that we examined, the overall level of TFP declined over our timeframe of analysis. Much of this decline was due to two considerable programmes of investment in long-lived infrastructure assets where a return in the short-term would not be expected.

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## 1. Introduction

Despite the increasing trend towards greater private sector participation in the ownership and management of European airports the fact remains that the State retains full or majority shareholdings in the vast majority of European airports.<sup>1</sup> State-owned airports have not, however, been immune to significant change and challenges. Over the last three decades, European airports have faced increased exposure to competitive pressures as a result of the liberalisation of the aviation sector. In many cases governments have shown reluctance to finance investment in airport infrastructure for reasons such as fiscal constraints. The business operations of European airports have therefore transformed considerably in recent years, with many airports moving from being publicly funded infrastructure providers to becoming diversified commercial self-financed businesses.

The changes faced by state-owned airports fall under the rubric of New Public Management (NPM) which has influenced governments around the world since the late 1970s. In broad terms NPM is

a reform agenda that involves reconfiguring the boundaries of government agencies (Bilodeau et al., 2006). NPM reforms are mainly directed at increasing the market-orientation of government agencies. They encompass a range of organisational changes including radical measures such as (i) privatisation, either in the form of full divestiture or the introduction of hybrid arrangements such as operational concessions and/or the contracting out of certain services to private companies, (ii) the exposure of government agencies to competition (liberalisation), and (iii) the adoption of an increased focus on profits and commercial performance (commercialisation).

Whereas NPM measures such as privatisation have been the subject of intense debate and frequent analysis, the question of commercialisation in the context of continued public ownership has received significantly less attention in the academic literature. This provides the primary motivation for this paper, which examines the case of Ireland's state-owned airports company, the Dublin Airport Authority (DAA), which has undergone significant NPM-style reforms over the last few decades. The main aim of our paper is to first chart the commercialisation process within the DAA over the period 1994–2014. We then assess the impact of the commercialisation process on the performance of the DAA over the same timeframe using both labour and total factor productivity measures as well as basic financial indicators. In order to disentangle the impact of a number of factors affecting performance - including commercialisation, changes in competition and the

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<sup>1</sup> Ownership information provided for 355 airports in the EU28 by ACI Europe (2016) shows that approximately 83 per cent of airports were in full or majority partial state ownership as of 2015.

regulatory environment, and internal organisational structures and governance - we utilise a model of commercialisation that is adapted from the model of organisational status change originally developed by Dunsire et al. (1988, 1991).

The paper is structured as follows: the next section provides a brief overview of the history of the DAA and its core operations. Section 3 reviews some of the empirical literature in relation to airport productivity/performance as well as the literature on airport commercialisation in general. Section 4 presents our model of commercialisation that we use to examine the determinants of the performance of the DAA. Section 5 describes the capital market status changes experienced by the DAA between 1994 and 2014 while sections 6 and 7 provide an overview of changes in the DAA's external and internal environment. Section 8 presents the results from our productivity analysis before section 9 summarises our findings and concludes.

## 2. Review of empirical literature

Empirical studies on the performance of airports in recent years have frequently focused on the impact of airport ownership on financial performance and/or technical efficiency. Such studies have been conducted at either the country level, for example, Fasone and Maggiore (2013) and Fasone et al. (2014) examine the impact of private ownership on the financial performance of Italian airports and find that airport companies with majority private ownership outperform others. Other studies have focused on the productive efficiency of airports using large within-country or cross-country panel data sets and employing sophisticated measurement tools such as Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA) or Total Factor Productivity (TFP) analysis. These studies generally control for whether airports are in majority public or private ownership in order to determine whether private sector ownership is superior. For example, Lin and Hong (2006), Oum et al. (2008) and Adler and Liebert (2014) utilise either DEA or SFA techniques to examine the efficiency of a large sample of international airports and produce mixed findings in relation to the impact of airport ownership.

DEA and SFA studies have also been extensively employed to examine the efficiency of airports at the country or cross-country level by controlling for a range of other non-ownership variables. For example Scotti et al. (2012) examine the impact of competition on the technical efficiency of Italian airports using SFA, whereas Oum et al. (2004) use TFP analysis to measure the efficiency implications of alternative forms of airport price regulation using a cross-country sample of major airports. A detailed review of the extant literature on airport performance employing DEA/SFA/TFP techniques is beyond the scope of this paper, however, for recent useful overviews of some of the main studies see Coto-Millán et al. (2014), Fragoudaki and Giokas (2016) and Liu (2016).

There have been very few studies that have focused solely on issues related to the DAA or compared its productivity to other airport operators. McClay and Reynolds-Feighan (2006) and Reynolds-Feighan (2010) are an exception and focus on the issue of terminal competition at Dublin Airport. In the context of this paper, both of these studies provide some very useful background to the historical development of the DAA and its regulation. The only comparative productivity studies that we are aware of that have included the DAA (Dublin Airport) in their analysis are Pels et al. (2001), Oum and Yu (2004) and Oum et al. (2006). Pels et al. (2001) include Dublin Airport in their DEA analysis of 34 European airports over the 1995–1997 period and found that it was fully efficient in terms of terminal output (passenger numbers) by 1997. Oum and Yu (2004) conduct a benchmarking exercise of 76 international airports for the 2000–2001 period and although they list

Dublin Airport in their sample it is not included in their results. Similarly, Oum et al. (2006) benchmark the performance of 116 airports over the 2001–2003 period but do not report individual results for Dublin Airport.

It is clear from the above that the performance of the DAA group as a whole has received very little attention in the extant literature. Furthermore, the relationship between commercialisation and airport performance has, to our knowledge, received no attention in the literature to date. This is largely due to difficulties with regard to how commercialisation as a process can actually be defined as well as how the process can be measured for any particular company. Our paper therefore contributes to the burgeoning empirical literature on airport performance by mapping the commercialisation process of Ireland's state-owned airport company over a twenty-year period and examining its impact on economic performance. The next section provides a brief background on the history of the DAA before we move on to describing our model, methodology and results.

## 3. Background of the DAA

The DAA (formerly Aer Rianta) is a commercial semi-state airport company that owns and operates Dublin Airport and Cork Airport (prior to 2013 it also owned and operated Shannon Airport). The DAA was established as a limited company in 1937 and originally acted as a holding company for the State's shares in Aer Lingus, the newly established national airline. In 1941 the DAA was given responsibility for managing Dublin Airport on an agency basis on behalf of the Minister for Industry and Commerce. The DAA relinquished its function as a holding company for Aer Lingus under the Air Companies Act 1966, and in 1969 it assumed the additional responsibility of managing both Shannon and Cork Airports.<sup>2</sup>

Compared to other Irish SOEs the DAA was unusual in that it did not own the assets that it operated, instead ownership rights of the three airports was vested in the relevant Minister. However, following a number of reviews,<sup>3</sup> it was decided that all long-term fixed assets (from 1986 onwards), in addition to all new assets (from 1988 onwards) would be financed from the company's own resources and borrowings (all assets acquired prior to this would continue to be owned by the Minister). This transfer of certain assets was a significant first step towards the company establishing a more arm's length relation with the government.

Further steps in this direction were taken following the enactment of the *Air Navigation and Transport (Amendment) Act, 1998* and the *State Airports Act, 2004*. The former transferred full ownership rights of all assets to the DAA while the latter granted more autonomy to each of the three airports and allowed for their eventual separation as fully independent entities. The implications of these two Acts in terms of the operations of the DAA are discussed in more detail in section 5.

Apart from the changes outlined here the DAA underwent a gradual commercialisation process over the entire period of analysis. This process is reflected in changes in the internal environment of the DAA along with changes in the external environment, in particular with the introduction of independent regulation in 2002. To disentangle these changes this paper develops a model of commercialisation which is adapted from the work of Dunsire et al. (1988, 1991) model of organisational status change and Parker (1995a, b) related work on the impact of privatisation on the

<sup>2</sup> Construction of Shannon Airport and Cork Airport was completed in 1947 and 1961 respectively.

<sup>3</sup> See Joint Oireachtas Committee on State-Sponsored Bodies (1979, 1992) for further detail.

internal environment of firms. The next section describes our model in more detail.

#### 4. Model of commercialisation

There is no strict definition of ‘commercialisation’ in the literature on airports and public enterprise in general and it is important to note that the aim and context of commercialisation can differ across airports. [Freathy \(2010\)](#) relates the term ‘commercialisation’ to the various commercial strategies and types of activities that have been undertaken by European airports in response to external sectoral changes and highlights how the pattern and level of commercial activity varies widely. Much of the extant literature related to commercialisation and performance effectively treats the term ‘commercialisation’ as meaning ‘corporatisation’ or as a form of partial privatisation. For example, [Oum et al. \(2006, p. 109\)](#) paper on the impact of ownership form on airport performance states that “commercialization and privatization have taken different formats/models in different countries” and then proceeds to focus entirely on countries that have partially or fully privatised their airports. Other studies such as [Bilodeau et al. \(2006\)](#) focus on the impact of corporatization on company performance and define corporatization as a process involving the transfer of the delivery of certain public services from a Government department to a separate agency in order to bring a more ‘businesslike’ approach to service delivery.

The above interpretations of commercialisation do not apply to this study since we focus on a commercial SOE that has already been through the corporatisation process and still remains under full public ownership. Instead our focus in this paper is on commercialisation defined as where following corporatisation, SOEs move towards a more arms-length relationship with government. The enterprise becomes more focused on commercial objectives such as reducing costs and increasing profits. Government expects the enterprise to meet all their operational expenses and to raise funds from the capital market. As the degree of commercialisation intensifies the requirement for government grants and guarantees to finance investments diminishes. In this paper we examine the changes in the internal and external environment of an SOE that can lead to increased commercialisation – to being more ‘businesslike’ – while still remaining under full public ownership, and the associated impact of this process on performance. To the best of our knowledge, there are no other studies of this aspect of commercialisation and its impact on performance in any sector.

In order to disentangle the various changes in the internal and external environments of a firm that can influence the commercialisation process we adapt [Dunsire et al. \(1988, 1991\)](#) model of organisational status change to develop a model of commercialisation. The original [Dunsire et al. \(1988, 1991\)](#) model was a three dimensional model of organisational change developed to examine public enterprise performance across three distinct dimensions (see [Fig. 1](#)). The first dimension (capital market) represents a change in capital market status ranging from a pure government department to a private enterprise where rights to profits are clearly defined. This change is not characterised by an immediate transformation from government department to a privatised company but rather by steps on a continuum representing various degrees between these two extremes. Non-commercial entities become increasingly focused on commercial objectives as they move along this continuum and it is expected that this will have a positive impact on performance. We use this dimension of the model to track major changes in the capital market status of the DAA that constitute an important element of the commercialisation process.

The second dimension of the original Dunsire et al. model is concerned with changes in competition ranging from monopoly to perfect competition. Since the DAA has effectively faced very limited competition from regional airports over our timeframe of analysis we have adapted this dimension to capture changes in the regulatory environment instead. Traditionally, most public enterprises were regulated by Ministers and their respective departments. The weaknesses of this regulatory approach include the fact that Ministers are often influenced by political considerations when making decisions on, for example, requested price increases, as well as the fact that the Minister’s department may not necessarily have the requisite expertise and knowledge to evaluate such requests (see [Gorecki, 2011](#)).

Following the introduction of a range of EU Directives beginning in the late 1980s, EU member states have established independent regulatory bodies within most key public utility sectors (e.g. transport and energy). This initiated a change in the regulatory mechanisms applied to public enterprises as traditional government regulation has been replaced by specialised independent regulatory bodies. Such bodies are less likely to be influenced by political considerations and generally adopt more sophisticated incentive based regulation mechanisms that focus not only on price but also on performance in the context of cost containment and quality of service. In the context of our model presented in [Fig. 1](#), it is therefore expected that a movement from government regulation to independent regulation is associated with an improvement in performance.

The third dimension of the Dunsire et al. model examines change in the internal organisational structure ranging from a pure hierarchy to a decentralised holding company. We adapt this dimension to include changes in the internal environment of the firm as identified by [Parker \(1995a, b\)](#) where he also focuses on changes in corporate goals, top management and the Board of Directors, organisational structure and the nature and location of the business. It is expected that a move from a pure hierarchy to a decentralised structure is associated with an improvement in performance.

The following sections examine the performance of the DAA from 1994 to 2014 using the model outlined above as a framework for disentangling the various elements of the commercialisation process and their potential impact on the performance of the DAA. We first describe the key capital market status changes that occurred before providing an overview of significant changes in the DAA’s external and internal environments over the same period that would be expected to have impacted on the commercialisation and performance of the firm.

#### 5. Capital market status change

This section provides a detailed description of the two key capital market status changes experienced by the DAA during the 1994–2014 period. We then examine whether these changes were associated with increased commercialisation by focusing on significant changes in the corporate objectives of the firm as well as evidence of more commercial activities at an operational level.

The first capital market status change occurred in 1998 when the *Air Navigation and Transport (Amendment) Act* dispensed with the out-dated agency relationship in which the DAA simply operated assets on behalf of the Minister and instead granted ownership rights to the DAA. Ultimately the government anticipated that the Act would formalise the DAA’s corporate and commercial mandate as it “would challenge the company to continue to be competitive and innovative in securing its place as the prime provider of air access gateways to and from Ireland”, thus providing “a basis for sharing the benefits of its competitiveness with its customers, the

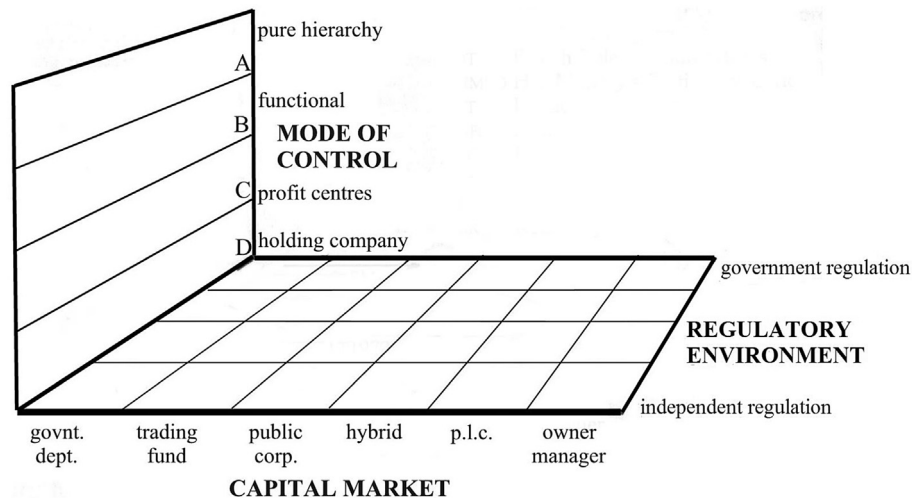


Fig. 1. Conceptual model of commercialisation. Source: Authors' adaptation of the organisational status change model presented in Dunsire et al. (1991: 22).

airlines and the travelling public, as well as rewarding the shareholder".<sup>4</sup>

The next major status change was in 2004 when the *State Airports Act* granted greater autonomy to each airport and allowed for the restructuring of the DAA whereby the three airports could be established as independent entities. The government's view was that Dublin, Cork and Shannon would perform better as fully independent, commercial and competitive airports. Separate Boards were established for both Cork and Shannon airports and each was given responsibility for day-to-day operations (under delegated authority). Both airports were required to submit business plans to the Minister before an official 'appointment day' for Cork Airport Authority (CAA) and Shannon Airport Authority (SAA) would be granted. Following a review of these business plans in 2008, and under the recommendation of all three Boards, the Minister announced the deferral of a decision on the separation of the airports until 2011 due to uncertainty in the context of the global economic recession. In the short term, new arrangements provided for:

... appropriate delegation of responsibility for the management and promotion of the airports, subject to the necessary accountability to the DAA board in respect of annual budgets, airport charges policy and capital expenditure. The arrangements also provide(d) for reciprocal membership of the boards of the Dublin Airport Authority, DAA, the Cork Airport Authority, CAA, and the Shannon Airport Authority, SAA, whereby the chairman of the CAA and SAA are members of the DAA board and the DAA has a senior executive nominee on the boards of the CAA and SAA.<sup>5</sup>

Shannon airport was officially separated from the DAA and established as a debt free entity on the 31st of December 2012. A timeframe for the completion of the separation of Cork airport has yet to be determined.

To assess whether the capital market status changes described

above were associated with increased commercialisation over the period 1994–2014 we examined annual reports for evidence of a more commercial focus in terms of changes in corporate objectives and policies related to diversification, international expansion and cost containment.

The evolution of the DAA's corporate objectives illustrated in Fig. 2 provides a clear indication of the increasing commercial focus of the company over time. The group's corporate objective at the beginning of our timeframe of analysis did not have a strong commercial focus and explicitly stated that the company's principal role was to serve the governments wider economic and social objectives. The DAA's increasing commercial focus became more evident following the transfer of assets in 1998 and the 2004 restructuring in particular, as evidenced by the CEO's statement that "all operational activity and every investment decision needs to be driven by rigorous commercial principles" and that this "renewed focus on competitive sustainability and appropriate commercial returns will underpin the strategic business plans" of all three airports (DAA, 2005: 7).

At an operational level, the increased commercialisation of the DAA is also evident from 1994 onwards with the firm engaging in significant international expansion and focusing on cost containment through the disposal of loss-making businesses and the implementation of a number of cost recovery plans. The expansion of Aer Rianta International's (ARI) operations provide the strongest evidence of the DAA's increased commercial focus over the 1994–2014 period. Although ARI was established as a subsidiary of the DAA in 1988 in order to manage the DAA's overseas consultancy and management businesses, it expanded its international operations significantly from the mid-1990s onwards. ARI's core area of business includes the management and operation of airport retail businesses overseas and it increased its portfolio of operations considerably from just over US\$250 million in total managed turnover in 1995 to over US\$1 billion by 2014.<sup>6</sup> Outside of airport retail operations ARI also acquired ownership stakes as part of joint partnerships in the UK's Birmingham International Airport (20 per cent acquired in 1997 and a further 4.125 per cent in 2000) and Germany's Düsseldorf (20 per cent in 1998) and Hamburg (7.2 per cent in 2000) airports with ARI taking over the management of the latter's operations as part of this deal.

<sup>4</sup> Dáil Éireann Debates (1999) Vol. 156, 5 June: *Air Navigation and Transport (Amendment) Bill, 1997: Second Stage*, cols. 373–4 (O'Rourke, M., Minister for Public Enterprise).

<sup>5</sup> Dáil Éireann Debates (2010) Vol. 717 (2), 5 October: *Adjournment Debate – State Airports*, cols. 378–9 (Connick, S., Minister of State at Department of Agriculture, Fisheries and Food).

<sup>6</sup> Source: DAA annual reports.



Fig. 2. DAA Corporate Objectives. Source: DAA annual reports.

An increasing emphasis on cost containment is also evident in the DAA's commercial agenda over the period of analysis and this is best exemplified by the group's disposal of assets. Prior to 2004 there was limited evidence of asset disposal with the most significant being in 1997/98 with the sale of the mail order service at Shannon airport and its shareholding in Aer Rianta Bewleys Ltd (catering company). From 2004 onwards the DAA took a more active role in evaluating the performance of its assets with the CEO explicitly stating that if business activities did not measure up to "rigorous commercial principles and returns on capital" the DAA would need to reassess its "involvement in these activities and either re-engineer them or exit from them" (DAA, 2005: 7).

The first business activity to be assessed was the Great Southern Hotel Group (GSHG) which the DAA had operated since 1990. The GSHG's profits had been in decline since 2001 and following a loss of €6 million in 2005 the DAA decided to dispose of its hotel assets in 2006. Soon after in 2007, the DAA also disposed of its assets in Hamburg and Birmingham airports. A significant portion of the proceeds from these sales was used to fund long-term capital investment. Another example of the DAA's focus on cost containment was increased use of outsourcing, with the most noteworthy services outsourced including ground handling (in 1988 and 1995<sup>7</sup>), catering (in 1998) and I.T. (in 2011). In addition, the DAA also implemented two cost recovery programmes, the first in 2002 when a voluntary early retirement scheme was implemented, and the second from 2009 to 2013 when a voluntary redundancy scheme was put in place.

The DAA therefore went through a continuous period of commercialisation (i.e. moved from west to east along the capital market axis in Fig. 1) as evidenced by the evolution in the corporate objectives of the company and the increasingly commercial focus of its operations in terms of its international expansion and focus on cost containment. It is important to recognise that this process of commercialisation is itself influenced by changes in the external and internal environments of the company and the next two sections provide an overview of the major developments in both environments.

## 6. The regulatory environment

In recent years European countries have adopted policies of deregulation and liberalisation, which have resulted in SOEs moving from market positions that are dominant to more competitive structures. The evolution of the international aviation industry in

terms of the deregulation of airlines and the expansion of low cost carriers has resulted in an increased competitive environment between major and secondary airports. However, the degree of competition witnessed by countries such as France, Germany and the UK is far greater than that experienced by Ireland. In part this is due to the fact that Ireland's land mass and population are much smaller and hence there is considerable overlap between catchment areas. This tends to give the major airports (Dublin, Cork and Shannon) an advantage over the four main secondary<sup>8</sup> airports currently operating in the Republic of Ireland (Donegal, Knock, Kerry and Waterford).

Each secondary airport is privately owned and differs considerably in terms of passenger numbers and infrastructural capacity. Despite the presence of these secondary airports, the three DAA airports have retained on average a 95 per cent market share of passenger numbers in recent years, with Dublin accounting for the vast majority of this total (see Table 1). It is evident that the degree of competition that the DAA (and in particular Dublin airport) encounters is relatively minor and is unlikely to have been a major determinant of performance over our period of analysis.

While the DAA has not been subjected to much competition over our timeframe of analysis, there have been significant changes in the regulatory regime applied to its pricing and activities. Historically, airport charges were calculated by the DAA on the basis of several characteristics including traffic growth, operating costs etc., and these suggested charges were then presented to the Minister for Transport for approval. This changed in February 2002 with the establishment of a politically independent sectoral regulator, the Commission for Aviation Regulation (CAR). A number of functions previously exercised by the Minister were transferred to the Commission, the most significant of which was the control of airport charges. The CAR originally regulated charges for all three of the State airports. However, since the enactment of the *State Airports Act 2004* the regulation of charges is confined to Dublin Airport where price-cap regulation is applied to a single-till.<sup>9</sup> The price cap, which is expressed as an annual maximum charge per passenger is reviewed every five years.

In determining the maximum passenger charge allowed for a particular year the CAR factors several different elements into its calculations. The regulatory building blocks for the price cap include the regulatory asset base, passenger forecasts, an estimate of efficient operating expenditures, a return on an efficient capital

<sup>7</sup> In 1995, the DAA appointed a second ground handling agent to encourage competition as Aer Lingus had been the sole provider of ground handling services since 1988.

<sup>8</sup> Secondary airports in this research are classified as any airport with annual passenger numbers of below one million.

<sup>9</sup> All airport activities are taken into consideration when determining the level of airport charges. This is in contrast to the dual-till approach where only aeronautical activities are considered.

**Table 1**  
Total passenger numbers (millions) by airport 2006 to 2014.

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Dublin	21.27	23.31	23.51	20.51	18.43	18.75	19.09	20.15	21.64
Cork	3.02	3.18	3.26	2.77	2.42	2.36	2.33	2.25	2.14
Shannon	3.69	3.52	2.96	2.58	1.53	1.36	1.29	1.31	1.53
Other	1.25	1.28	1.39	1.21	1.19	1.12	1.06	1.01	1.00
Total	29.23	31.30	31.12	27.06	23.57	23.59	23.77	24.72	26.31
DAA %	95.7%	95.9%	95.5%	95.5%	95.0%	95.3%	95.6%	95.9%	96.2%

Source: Authors' calculation based on air transport data sourced from the Central Statistics Office. Notes: (1) Airports included in the 'Other' category include Knock, Kerry, Waterford and Donegal (as well as Galway and Sligo airports up until 2011); (2) Official data is unavailable prior to 2006, however, based on an analysis of passenger numbers reported in DAA annual reports and national media archives for secondary airports, the overall market share of the DAA airports was even higher pre-2006.

stock and a depreciation charge on that capital, less an estimate of future commercial revenues. As with all other price cap regimes it is possible for the DAA to benefit if it can reduce its costs below the level of the cap as it can retain the value of these savings until the next regulatory determination when the price cap is reset.

In 2009 the CAR introduced minimum targets for quality of service with the DAA penalised by a reduction in the annual price cap of up to 4.5% if it fails to meet the targets set. The CAR also introduced a rolling scheme for operating expenditure (opex) in 2010, which included a number of categories unrelated to passenger numbers (security, retail and marketing were excluded for being sensitive to passenger numbers). This system serves to eliminate the possibility of the DAA deferring potential opex savings from the end of one regulatory period to the beginning of the next and so incentivises the DAA to achieve savings in every regulatory cycle.

It is also worth noting that the Minister for Transport in Ireland made three general policy directions to the CAR in 2005, 2007 and 2009. Each ministerial direction generally signalled to the CAR that the DAA's upcoming investment in a new terminal at Dublin Airport (Terminal 2) was mandated by the Government and of strategic importance to the country. In that context each policy direction stressed the importance that the Government attached to the financial sustainability of the DAA while undertaking this significant investment without any recourse to Exchequer funding or an equity injection by the State. In effect the three policy directions issued conveyed the importance of the development of Terminal 2 to the Government but it is likely that the CAR would have factored in such a major investment to ensure the financial sustainability of the DAA when making its price cap determinations regardless of whether the DAA was state-owned or not.

Overall, while it is clear that the degree of product market competition for the DAA's airports has not changed over the 1994–2014 period, the DAA's incentive to operate more efficiently has increased significantly as a result of the price cap mechanism applied to Dublin Airport since the establishment of the CAR in 2002. Within the context of our model of commercialisation we would therefore expect the changes in the DAA's external environment from 2002 onwards to have incentivised improved efficiency and performance *ceteris paribus* (moving the DAA from north to south along the regulatory environment axis in Fig. 1).

## 7. The internal environment

The third dimension of the model focuses on the relationship between performance and changes in the internal environment or organisational structure of the enterprise. The Dunsire et al. model hypothesised that the degree to which a company could achieve

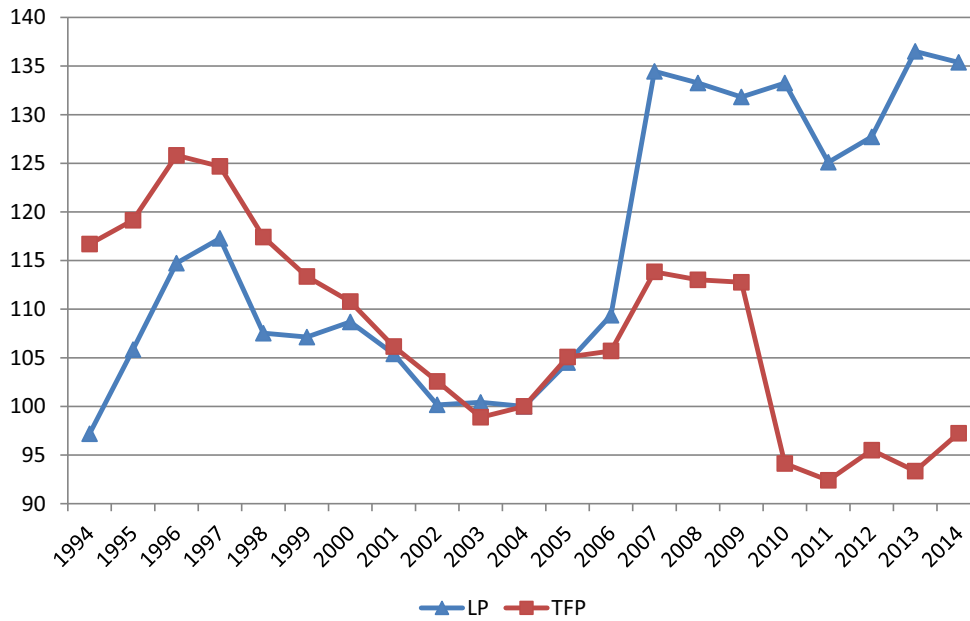
'goodness of fit' between its external environment and its internal environment impacts significantly on performance. It is expected that increased commercialisation will result in changes in the internal organisational structure with the adoption of a less hierarchical and more decentralised structure. Essentially, the company would be expected to move from a 'U-form' structure towards an 'M-form' structure (Williamson, 1967; 1970) where greater decision making power and responsibility is devolved to separate autonomous business divisions or subsidiaries. Building on Dunsire et al.'s work, Parker (1995a,b) also focuses on changes in the internal environment of the firm as reflected by changes to top management and the Board of Directors.

Parker (1995a,b) argues that, in general, public sector managers (who are often political appointees) may not have the required skills or experience to implement major internal changes in response to a significant change in organisational goals or the external environment. It is therefore often necessary to import "new management which does not carry the baggage of the past" in order to bring about significant internal restructuring and change. Parker (1995b) also highlights the corresponding importance of changes at the Board level, both in terms of its membership and its activities where it may be expected to become more concerned with strategy than with day-to-day operational matters as the company continues to commercialise.

The various internal changes identified by Dunsire et al. (1988, 1991) and Parker (1995a,b) described above are all evident in the case of the DAA. As outlined earlier, the 2004 *State Airports Act* was an explicit move towards a more decentralised structure as it allowed for the future full separation of the three DAA airports and established separate Boards at each airport with a greater degree of autonomy granted to each airport in terms of its operations and future development. In relation to top management, prior to 2004 the three CEOs that served during our period of analysis were all internal candidates that had held senior management positions for a number of years prior to being appointed. However, this tradition of appointing internal candidates changed following the 2004 restructuring with the following two CEOs appointed in 2005 and 2013 having previously held executive positions at ExxonMobil and Glanbia USA respectively.

The 2004 restructuring also saw major changes in the composition of the Board of Directors which had traditionally been dominated by members with experience mostly limited to the areas of aviation and accounting that were appointed by the Minister for Transport. New appointees to the Board from 2004 onwards included experts in the areas of financial regulation, law, communications, retail management, internal auditing and economics, as well as the former CEO of the British Airports Authority. The increased diversification of expertise at the Board level in more recent years is a clear indicator of development in the DAA's commercial agenda as the Board's main focus is the long-term strategy of the company and this necessitates access to an extensive knowledge and skill set outside of aviation.

Overall, the evidence presented in this section highlights significant change in the internal environment of the DAA during the period of analysis. Changes in the external environment (i.e. capital market status, competition and regulation) necessitated the need for a movement away from the traditional centralised command structure to a decentralised structure with increased autonomy (i.e. from north to south along the mode of control axis in Fig. 1). In addition, an increased level of commercialisation often necessitates the adoption of governance and management practices common in commercial business environments. The composition of both the DAA's management team and Board has changed significantly over time in line with changes in capital market status and the external environment. It is expected that the changes to the internal



Note: (1) All indicators are normalised to equal 100 in 2004; (2) Shannon airport data not included in 2013 and 2014 due to its demerger.

Fig. 3. LP and TFP 1994 to 2014.

environment identified above would be associated with improved productivity and financial performance.

## 8. Commercialisation and performance

In the context of the increased commercialisation evident from the changes in the DAA's capital market status and internal and external environments described above, this section examines the financial performance and productivity of the DAA from 1994 to 2014. While economic performance can be measured in a number of ways it is generally accepted that basic profitability-based financial indicators can be a poor barometer of performance for SOEs that may have other public or social objectives that conflict with the profit-oriented objectives of most private firms (Pestieau, 2009). We therefore include two measures of productive efficiency - labour productivity (LP) and total factor productivity (TFP) - in our analysis.

LP is a partial productivity measure that examines the ratio of real output to an index of labour, while TFP measures the change in total output in relation to changes in total inputs. TFP indicators have been used in multiple studies examining the performance of both SOEs (see for, example, Molyneux and Thompson, 1987) and privatised firms (see, for example, Martin and Parker, 1997) across a wide variety of sectors. Although there are issues with TFP measurement such as the difficulty in accurately estimating capital inputs or the fact that volume based measures of output cannot capture changes in output quality, it is nevertheless considered to be a standard and widely accepted approach in the literature. Fig. 3 illustrates our LP and TFP results for the DAA from 1994 to 2014.<sup>10</sup>

LP exhibited a downward trend from 1997 to 2004, however, post-2004 there was a marked improvement, with the significant jump in 2007 resulting from the reduction in employee numbers

following the sale of the GSHG. In contrast with LP, while there are as many years where TFP growth increased as when it decreased, the overall level of TFP declined over our timeframe of analysis. It is difficult to disentangle the exact determinants of the observed trend in TFP. While one would expect that the DAA's productive efficiency would have trended upwards over the past two decades given the clear signs of commercialisation identified in the previous sections and the move to incentive-based independent regulation at Dublin Airport, this is not evident from our productivity analysis. The main driver of the overall downward trend in TFP is two significant declines in the 1997–2003 and 2009–2010 periods. While both of these periods coincided with a drop in output (from 2001 to 2003 and 2009–2010), closer analysis of our results shows that much of the downward trend observed can be explained by the DAA's increased capital expenditure during these periods.

Lumpy capital expenditure patterns are not uncommon in infrastructure industries, where significant investments in new infrastructure are generally concentrated in short periods of time at irregular intervals. The benefits of investment in long-lived assets are unlikely to offset the cost of the new capacity during the construction period and in the early years of operation and, as a result, TFP can be adversely affected. This is the case with the DAA where two significant periods of capital investment – from 1998 to 2001 and in 2009–2010 in particular (with the opening of Dublin's Terminal 2) - largely explain the downward trend in TFP observed during these periods. The deterioration in TFP in the latter period was also heavily influenced by the negative impact of both the global financial crisis and Ireland's domestic economic crisis, with passenger numbers in the three DAA airports falling from 30 million in 2007 to 22.4 million in 2010. While the trend in our LP results differ significantly from our TFP results post-2007 this is unsurprising given LP is only a partial productivity measure that was heavily influenced by the sale of the GSHG in 2006.

Table 2 also provides an overview of the basic financial performance of the DAA between 1994 and 2014. The significant investment undertaken by the DAA over our timeframe of analysis is

<sup>10</sup> Further details on our LP and TFP methodology calculations can be found in the Appendix.

**Table 2**  
DAA financial performance 1994–2014.

Year	Turnover (€000)	PBITE (€000)	Capex (€000)	Employees (average)	ROS	ROCE	Turnover per employee
1994	246,570	43,337	32,300	2672	17.6%	21.5%	92.3
1995	269,831	50,930	30,478	2659	18.9%	22.2%	101.5
1996	293,699	55,924	28,701	2742	19.0%	21.3%	107.1
1997	313,368	60,347	72,313	2797	19.3%	18.0%	112.0
1998	338,216	76,436	95,731	3151	22.6%	17.1%	107.3
1999	371,949	65,325	144,782	3341	17.6%	12.0%	111.3
2000	424,993	83,070	81,290	3341	19.5%	12.7%	127.2
2001	438,320	67,203	114,590	3438	15.3%	8.5%	127.5
2002	420,874	75,912	94,963	3431	18.0%	8.3%	122.7
2003	436,868	48,641	59,758	3387	11.1%	5.5%	129.0
2004	465,688	69,907	84,018	3453	15.0%	7.6%	134.9
2005	524,982	94,070	100,322	3620	17.9%	9.7%	145.0
2006	590,586	116,353	134,406	3657	19.7%	9.8%	161.5
2007	623,364	150,079	248,871	3163	24.1%	10.1%	197.1
2008	630,940	117,929	349,232	3237	18.7%	5.5%	194.9
2009	546,716	65,399	522,810	3103	12.0%	2.8%	176.2
2010	558,153	91,401	227,898	2971	16.4%	4.3%	187.9
2011	557,492	93,749	90,028	3032	16.8%	4.0%	183.9
2012	574,611	112,804	44,228	3016	19.6%	4.9%	190.5
2013	500,589	100,006	55,866	2588	20.0%	4.4%	193.4
2014	563,792	86,784	65,354	2813	15.4%	3.8%	200.4

Source: DAA annual reports and authors' calculations. Note: results for Shannon Airport not included in 2013 and 2014 figures.

evident from the capital expenditure figures and is largely responsible for the downward trend in return on capital employed (ROCE) over the period. There is no discernible trend in return on sales (ROS) but this volatility is to be expected in the airline industry where profitability in any given year can be negatively impacted by various exogenous events. The trend in turnover per employee unsurprisingly mirrors our earlier results for labour productivity.

On balance, our productivity and financial performance results for the DAA provide a very mixed picture despite the significantly increased commercialisation orientation of the company documented in previous sections. While the DAA recorded a relatively steady increase in turnover from 1994 to 2014 and generated considerable, albeit erratic, operating profits, ROCE and TFP both declined as a result of a significant programme of investment. However, it is important to interpret these measures with a degree of caution and recognise that the long term benefits that can be expected from investing in future capacity will not immediately be evident and we return to this important point in the next section.

## 9. Discussion and conclusion

By presenting an in-depth case study analysis of the impact of commercialisation on the productivity and performance of the DAA this paper bridges a significant gap in the airport productivity literature, which, to date, has largely employed large cross-country or within-country panel data sets and concentrated on the productivity effects of numerous environmental (e.g. regional competition) and management (e.g. airport ownership) variables, as well as airport characteristics such as airport hub status. While such studies provide valuable insights into the relative efficiency of airports across countries and the determinants of such differences, there is a considerable dearth of in-depth case-study analysis that seeks to get inside the 'black box' in the airport productivity literature.

Our paper highlights the considerable changes that have occurred in the internal and external environments of the DAA over the 1994–2014 period and the continued commercialisation of the company in response to these developments. In relation to its internal environment, the DAA has evolved from being a company that merely operated airport assets on behalf of the Government to

owning those assets and operating them on an increasingly commercial basis as reflected by changes to its organisational structure, corporate objectives, top management and business operations. With regard to its external environment, although the DAA has not faced much competition it has experienced considerable change in its regulatory environment, with the establishment of CAR in 2002 and the introduction of an incentive-based price-cap mechanism for Dublin airport.

At face value, the productivity results reported in this paper do not show any evidence of a general upward trend in productivity (as measured by TFP) as a result of the continued commercialisation of the DAA over the 1994–2014 period. However, it is important to interpret TFP measures with a degree of caution and recognise that the long term benefits that can be expected from significant investment in physical capacity will not be immediately evident in any productivity analysis. A company that did not make the required timely investment in long-term capacity and instead opted to sweat existing assets for a number of years would have far more positive TFP results compared to a company that opted to invest, but in the long run would suffer due to lack of capacity or outdated infrastructure.

The DAA's performance must therefore be viewed in the context of its significant investment in the long-run capacity of Ireland's three main airports and the resulting benefit that accrues to Ireland's island economy that relies heavily on trade and tourism. Although its investment in Dublin's Terminal 2 was criticised when it opened in 2010 in the middle of a major recession when passenger numbers were decreasing dramatically, it now appears to be a justified investment with passenger numbers in Dublin reaching a record high of 25 million in 2015. These numbers are likely to increase as a result of IAG's recent takeover of Aer Lingus and its plans to further develop Dublin as a hub serving North America.

The DAA recently announced its decision to proceed with the construction of a second runway at the airport in response to the considerable growth experienced in Dublin and its projections for future traffic growth. As with the construction of Terminal 2, the investment in a new runway will likely reduce the DAA's productivity as measured by TFP in the short-term but will ensure that the airport has the required capacity to develop its business in the long-term. The decisions to make considerable investments in new capacity are indicative of the public missions adopted by SOEs in



general and the DAA in particular. Public missions around objectives such as infrastructure investment, sustainability and international expansion are important components of the overall objective functions of SOEs. They necessarily constrain the commercialisation process in the SOE sector and, as the case of the DAA demonstrates, they must be taken into consideration when interpreting standard indicators of economic performance.

## Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jairtraman.2016.12.002>

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