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Introduction

Many airports were originally built by public bodies and their operations were treated as a public utility (Gillen, 2011). However, since the 1980s a large number of airports have been privatised and become increasingly complex businesses due to deregulation and changing competition. More recently there have been a series of private sales of airports such as the purchase of London Stansted Airport by the Manchester Airport group, or the sale of the Hochtief Airport investment portfolio to a Canadian investment fund (White, 2013; Project Finance Magazine, 2013). As airports around the world shift into private ownership and are bought and sold the appropriate assessment of their value is increasingly important (Parker, 2011; Vogel and Graham, 2010). In particular the stakeholders require detailed and robust information concerning the capital value of an airport. While such an investment can be seen as driven by aviation demands it is also a form of property investment since airports are, in fact, properties. The aim of this paper is to clarify the mechanisms for valuing airports, and in particular which property valuation approach is applicable. It has developed and extended research in a MSc dissertation by Friedrich Gottmans (Gottmans, 2013) that was supervised by one of the co-authors.

Standard valuation textbooks, such as Scarrett (2008) typically take the position that the valuation of airports, especially airfields, should be based on the cost method. The real estate literature generally classifies airports as non-standard specialised trading property (Wyatt 2013). However, there are only a very limited number of research papers that specifically address the issue. In the German language literature Pougias and Sternberg (2005) conclude that an airport should be valued as a company. In the English language literature there are a limited number of articles on airport valuation. Three studies treat airports as companies. Vasigh et al (2003) offer a predictive discounted cash flow (DCF) model of the valuation of three Korean airports from a company perspective. Two other studies propose the use of value drivers to derive business valuations of airports (Malighetti et al. 2011; Vogel and Graham, 2010). In contrast Parker (2011) argues that they should be treated as owner occupied assets based on depreciated replacement costs. This latter view is applied in a case study of Frankfurt airport undertaken by Krieg (2009).

Traditional practice is to apply a cost approach to airport valuation but there is a lack of (recent) consensus and part of the reason is that an airport is a complex entity providing a range of inter-related services, albeit centring on aviation. These activities can be divided into landside and airside (Parker, 2011). Runways and hangars are located airside, whereas multi-storey car parks, hotels and office buildings are usually located landside. Other typical airside properties are air traffic control towers, aprons for parked planes, and holding bays for aircraft alongside runways. Landside properties include hotels, car rentals, multi-storey car parks and office buildings (Lindsey, 2008a). However, the core of every modern airport is one or more terminal buildings comprising a wide range of facilities such as check in, baggage handling, border control, customs, airline lounges, administrative offices and retail premises both landside and airside (Parker, 2011). There has been a very limited attention in the valuation literature to these individual assets, for example aircraft hangars by Lindsey (2008b) or references to the valuation of turnover rents at airport shops (Blackledge 2009; McAllister, 1996). This paper seeks to decompose the concept of an airport and argue that the appropriate valuation approaches are based on it treated as a company.

This paper is structured as follows. First, it is necessary to analyse the relevant and contemporary business model of an airport itself before discussing the valuation of airports. In this section the importance of non-aviation business is evaluated. In the light of this analysis approaches to airport company valuation are next examined and issues highlighted. The next section examines the valuation of airport assets drawing on the institutional framework of International Accounting Standards. This section also examines the different real estate assets of an airport and the basis of their valuation. The conclusion provides an overview of the key findings, limitations and ideas for further research.

Airports as Businesses

Researchers have drawn attention to the challenging definition of an airport. From different perspectives it can be viewed as, “a group of assets comprising an operating airport business, a shopping centre at which airplanes park or a property company with ancillary aeronautical activities” (Parker, 2011, p678). The business of an airport company basically splits into core aviation activities to operate runways and terminal buildings and non-aviation business. In other words, an airport is a multi-product business that basically has two sides, the airside market and the non-airside market (embarking and disembarking passengers as direct customers and retailers) (Gillen, 2011).

Non-aviation business can be seen as predominantly real estate activities, such as property development within the estate, managing areas for retail and other services, including multi-storey car parks (Appold and Kasarda, 2011; Frank 2011; Pougias and Sternberg, 2005). Non-aviation income is primarily rental income from different sorts of tenants, whereas aviation income is based on airport charges for airlines using the facilities, e.g. runway, apron and terminal-gate (Gillen, 2011). In recent years, non-aviation business has become more and more important (Pougias and Sternberg, 2005), and these activities contribute between 40 and 48% of turnover in the main airports of Europe as shown in Table 1. However, the distinction is blurred as the letting of offices to airlines illustrates.

The importance of non-aviation activities is linked not only to ownership but also to the control/management of the airport. Commercially operated airports are increasingly willing to develop non-aeronautical businesses that lie outside the traditional boundary of airport activities (Morrison, 2009). In America airports are usually privately run and state owned but show significant interest in developing non-aviation activities. European airports, which are mainly partly privatised (see Table 1), have begun to develop more and more business with low or no relation to air transport, such as the Schiphol Airport City which also includes a shopping centre and a wide range of office properties for every type of office tenant, for example, consulting firms. Likewise, the privatisation of airports in Australia has led to a remarkable expansion of non-aviation activities (Morrison, 2009). Outside Europe, non-aviation income can constitute more than 80% of airport revenues (Akintoye and Beck, 2009).

Good infrastructure links such as motorways, train stations and the airfield itself offer real estate development opportunities. Non-aviation activities have advantages too because they are normally not subject to regulatory restrictions such as airport charges for airlines (Forsyth et al, 2011). Increasing non-aviation revenues can often be easier to achieve than airport charges. Also, the management of an airport typically externally outsources service activities such as ground handling. Therefore, an airport company receives much of its revenue as a landlord, only focusing on providing infrastructure and properties and managing subordinated service such as security firms (Pougias and Sternberg, 2005).

Valuation of Airport Companies

As airports are normally run as companies the valuation of an airport is logically as a company (Pougias and Sternberg, 2005). Fundamentally, there are three main methods for the valuation of companies. The first is the earnings multiplier type of model (profits method), which determines value as a multiple of an accounting profit such as the EBITDA (earnings before interests, taxation, depreciation and amortisation). An alternative method involves DCF models, where the future cash flow projections of the company and the opportunity cost of capital are taken into account (Gregory 2001). The final method is the asset-based type of model, which deals with the sale or replacement value of the physical or financial assets of a company.

Earnings Multiplier

A popular earnings-based type of company valuation model is the EBITDA multiple. The multiple is derived from the market value of comparable firms and this method is, therefore, called a “relative valuation” approach. This approach supposes that the expected cash generation potential of a company is comparable with the firms to which it is being benchmarked (Vasigh et al, 2003). Several press articles refer to EBITDA multiples as determining value in recent transactions in the ‘airport market’ (Infrastructure Investor, 2013; White, 2013).

However, this method has a number of drawbacks notably that it does not consider gearing and taxation effects, capital expenditures and different growth patterns of companies' profits (Gregory, 2001; Vogel and Graham, 2010). Thus, this approach has no reliable economic and scientific justification except when applied for unleveraged companies (Holthausen and Zmijewski, 2012b). Moreover, a certain number of transactions are required to create reasonable multiples. In the case of airport transactions, this number is probably still too small and the existing traded airports are very different in terms of size, local economy, and especially capital structure (Poungias and Sternberg, 2005). In addition the share of debt finance and the amount of capital expenditures (eg investments in properties) remains very heterogeneous for different airport companies, thus a credible EBITDA multiple cannot exist in the airport market.

Discounted Cash Flow Approaches

The DCF valuation or present value model requires the explicit forecast of future cash flows. In theory, the forecast needs to cover the entire life of a company. The DCF methodology is commonly used to estimate the present value of a firm, and Vasigh et al (2003) argue that it is the appropriate approach to value an airport. They apply it on aggregate basis to three Korean airports based on forecast passenger numbers prior to privatisation. To undertake this task forecast cash flows should include operating revenues and operating expenses, as well as incremental investments or divestitures. In a simple model, the projected cash flow equals the operating income of an airport. However, in the case of an airport valuation, capital expenditures for properties and/or sales of land affect the projected cash flow. DCF depends upon the quality of the cash flow or profit forecasts made for the entire business undertaken by a company and the complexity of an airport as a business represents significant challenges. Parts of the business are more risky and cash flows more uncertain than others questioning the appropriateness or ease of DCF.

Value Drivers Approach

An alternative macro-approach proposed by Vogel and Graham (2010) is a value profile based on the key value drivers, namely operating efficiency, asset utilisation/capital productivity and capital structure. They argue that value profiles, based initially on historical data, provide a clear picture of the underlying drivers involved and the direction as well as magnitude of any improvements required to improve financial performance. They argue that this approach reduces the problem of predicting earnings. Malighetti et al (2009) interpret value drivers more widely incorporating passenger growth, nearness of other airports, age, percentage of revenue from aviation and characteristics of the country, in a panel regression model. While these studies offer some guides to value the approach does not represent a practical tool.

Underlying Asset Valuation

An airport company can be viewed as a very specific kind of a property company. Properties represent the majority (counting for up to 90%) of assets held by an airport company as Table 2 shows. From this perspective an asset valuation of every single property that is part of an airport might be more appropriate than a DCF approach to the whole company. Nevertheless there are several practical problems that have to be faced and overcome. In particular, there are a range of real estate assets that comprise an airport that are traded rarely and the risk and costs of capital (discount rates) are difficult to determine. A real estate asset can also be valued using similar real estate assets, but there are problems in identifying 'similar assets', and making up for variation among them (Damodaran 2012). There is also the important issue of the inter-relationship between assets that represents a fundamental challenge to this approach. These valuation issues are addressed in the next section, set within international accounting standards for companies.

Accounting Standards and the Valuation of Airport Assets

If airports are treated like firms accounting standards have to be considered as they provide a framework of how to appraise the assets of a firm. The International Financial Reporting Standards (IFRS) on real estate assets have become obligatory for every listed company in the European Union (Weber and Baumunk, 2005). As more and more airports have become listed companies these standards play an important role in how to determine the value of the assets held by an airport. From this international accounting perspective, properties can be divided into three groups, namely property, plant and

equipment according to IAS 16, inventories according to IAS2 and investment properties according to IAS 40 (Böckem and Schurbohm, 2009).

For properties that are held for the production or supply of goods and services or for administrative purposes, so called owner-occupied property, according to IAS 16 the firm has the choice of recording properties at their depreciated construction costs or by the revaluation model in its financial statement (Parker, 2011). The revaluation model means the valuation of properties to their fair or market value on a regular basis (Keller and Weber, 2009). Properties, land, buildings or even parts of buildings held for rental or capital gain, according to IAS 40, are called investment properties (Melville 2009, Alexander et al. 2010). Such properties usually need to be valued with consideration to property valuation methods. Here, the common definition of the fair or the current market value of a property is “the amount for which an asset could be exchanged between knowledgeable, willing parties in an arm’s length transaction” (RICS, 2011, p 239). It is possible to value investment properties with the cost model (depreciated construction costs) but then it is obligatory for the firm to value owner-occupied properties, according to IAS 16, in the same way (Keller and Weber, 2009). There is considerable scope in the interpretation of these standards to the valuation of an airport.

A key issue in deciding the appropriate valuation basis is the “separability” of the assets. Parker (2011) quotes Horsley and Seed (1996) as defining this concept as,

“An asset is separable if the airport could sell, or exchange the asset, without affecting the value of the airport core or the separable asset.”

A further issue is the degree of asset specialism. Parker (2011) views an airport as an owner occupied property and sets out a series of careful tests within a theoretical framework based on IAS 16 for the valuation of terminals and land at an airport that draws out these separability and specialist criteria. He sees the main challenge for valuation as to whether a terminal should be considered as an asset or as a series of components. Following through the logic of his tests he concludes that the terminal is a specialist building that should be valued by replacement costs. He further argues that surrounding land could be valued in the same way to meet IAS standards, although the guidance is to a degree confusing and contradictory.

Krieg (2009) applies this approach by undertaking a valuation case study of Frankfurt airport on the basis that it is only one cash generating unit, i.e. the airport itself, including all its properties. He argues that a division of the airport for valuation reasons into several parts is neither manageable nor necessary. According to this author, there is no active property market for any kind of airport properties and only a few investment properties in terms of the airport exist. Furthermore, the mixed use of the terminal for retailing tenants does not necessarily lead to a valuation regarding IAS 40 and the fair (market) value model, since the share of leased areas is minimal compared to the entire area of the terminal. This view is shared by Parker (2011) above. Thus, the terminal building can be seen as solely owner-occupied. Even the valuation according to IAS 40 of multi-storey car parks that have been rented out is denied because of strong interdependences with the other operations of the airport, and so no separate fair market value can be determined (Krieg, 2009). On this basis his airport valuation follows IAS 16 as one owner occupied property.

These arguments are based on an airport as specialist asset and the inseparability of its constituent elements. The specialist nature is linked to the monopoly power of an airport that is vested in it by government designation. Yet is an airport in the same vein as an oil refinery or a power station? Arguably it has more in common with a shopping centre that has gained its right to operate through planning permission. Both receive most of their income from property rents and offer ancillary services. In theory elements of an airport could be sold off or let on very long leases, even though this has not yet happened. It is only recently there has been a market in airports and the development of sales of components is conceivable in the future.

Predicated on this argument an alternative view takes an airport as a collection of individual property assets and applies the IAS on a singular valuation basis and aggregates to establish the value of the property portfolio. A useful distinction in this regard is between operational assets and non-operational

properties, held for future development or capital gain (Parker, 2011). For instance, the runway is an owner-occupied, operational, specialised and non-separable airside property of an airport. Therefore, a valuation according to IAS 16 is absolutely necessary. On the other hand, a hotel building let to an operator is usually an investment, non-operational, non-specialised, and separable, landside property, and a valuation according to IAS 40 is appropriate. The classification of the terminal building remains the most problematic in terms of this classification. It is only partly owner-occupied because it includes different premises for external retail tenants, catering areas and airline offices. It is an operational building but in the wider sense it is non-specialist property encompassing retailing.

For specialised operational properties without any directly related income and without market comparables, such as fire stations, the costs method of valuation would be the most appropriate valuation approach. In respect of non-operational trading properties where rental income can be directly generated, for instance offices or retail units, then the income approach to valuation can be applied. The higher the share of turnover-related income the more appropriate the profits method might be the correct approach for certain types of premises especially shops let on turnover rents. Land and property with development potential are subject to residual valuations.

In some cases the comparison method of valuation could be appropriate. It is possible to compare single premises such as retail shops within an airport and between airports. Arguably only a few single properties require a pure comparison approach, because the submarket of airport properties is relatively small. Just one paper could be found that indirectly refers to a comparison of airport locations in order to determine the real estate values of different airport properties (Crider, 2011). Comparative evidence could be drawn from competing airports within the same market area (Crider, 2011). More generally comparisons should be based on equivalent catchment areas, the dimensions of the airport, and demographic factors relating to the region including the number and size of aircraft to be based there and forecasts of the total air traffic volume (Crider, 2011). Following this argument it is easy to see that the comparative approach could be applied to a range of property classes in one airport location with the same in another, for instance hotels and offices in Vienna and Zürich. A precise comparison of airport shops or premises within one airport or different airports is an appropriate application of the comparative approach as well.

Conclusions

Airports were historically established by governments as public service facilities and as such were valued on a cost basis. Textbooks continue to frame the valuation of airports in this way. However, the norm is now for airports in Europe to be privately owned with those still in the public domain almost certain to be ultimately privatised. With most airports increasingly commercial businesses the argument for using the cost approach has been diluted. While company valuations are now required to meet International Accounting Standards there is some debate about the application/interpretation of these standards to the valuation of airports.

At the heart of the choice of valuation method is the appropriate separability test. The arguments above for integration have focused on common physical location within a building and functionality. Much of the property value of an airport is generated by agglomeration economies in the same way as they are generated by proximity in a city centre or a shopping centre. Agglomeration economies are not dependent on ownership and so value that stems from this source will not fail the Horsley and Seed (1996) test set out above. This is illustrated by the occasional owner occupation of large anchor stores in shopping centres. On this basis a more appropriate separability test additionally embraces the potential for separate valuation and management.

This wider view of separability seems more appropriate to a modern commercial airport, thereby querying a simple cost approach to valuation. The paper argues that an airport can be viewed as a specialist property company and therefore, an airport's value is based on the valuation of its component assets according to common property valuation methods.

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Table 1: Overview of the Income and Ownership Structure in Top 10 European Airports

Airport in rank order	Passengers per annum (m)	Ownership	Aviation share of turnover per sector (%)	Retail and Services share of turnover per sector (%)	Real Estate share of turnover per sector (%)	'Other' share of turnover per sector (%)
London Heathrow	69.99	Fully private	58	21	12	10
Paris Charles de Gaulle	61.49	Partly private	53*	30*	8*	9*
Frankfurt	57.27	Partly private	60	22	-	18
Amsterdam	50.98	Partly private	59	28	13	-
Madrid	45.10	State owned	N/A			
Istanbul	45.00	Partly private, concession agreement	N/A			
Munich	38,19	State owned	52	48	-	-
Rome Fiumicino	36.74	Partly private, concession agreement	58**	42**	-	-
Barcelona	35.91	State owned	N/A			
London Gatwick	34.21	Fully private	53	34	10	4

*incl. Paris-Orly Airport **incl. Rome- Ciampino Airport

Source: Annual reports of the airport firms (ACI Europe 2013, Heathrow Airport Limited 2013, Aéroports de Paris 2013, Fraport AG 2013, Schiphol Group 2013, Aeropuertos Españoles y Navegación Aérea 2012, TAV Airports Holding 2013, Flughafen München 2012, Aeroporti di Roma 2013, Gatwick Airport Limited 2012).

Table 2: Overview of the Property Assets and Investment Properties in Top 10 European Airports

Airport in rank order	Share of property assets of the total assets (%)	Investment Properties according to IAS 40 included?
London Heathrow	75.2	Yes
Paris Charles de Gaulle	64.7	No
Frankfurt	59.1	Yes
Amsterdam	76.2	Yes
Madrid	74.6	Yes
Istanbul	N/A	N/A
Munich	86.3	No
Rome Fiumicino	60.0	No
Barcelona	74.6	Yes
London Gatwick	90.7	Yes

*incl. Paris-Orly Airport **incl. Rome- Ciampino Airport

Source: Annual Reports of the airport firms (ACI Europe 2013, Heathrow Airport Limited 2013, Aéroports de Paris 2013, Fraport AG 2013, Schiphol Group 2013, Aeropuertos Españoles y Navegación Aérea 2012, TAV Airports Holding 2013, Flughafen München 2012, Aeroporti di Roma 2013, Gatwick Airport Limited 2012)